Capital Structure and Product Market Competition: An Empirical Analysis of the Supermarket Industry

by

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Abstract

This thesis examines empirically the impact of firm capital structure choices on product market competition. The leveraged buyout wave of the late 1980s provides an opportunity to study firms that dramatically altered their capital structures by increasing their debt levels. The supermarket industry provides the empirical setting for this study. I study the effect of LBOs on competition in local markets for supermarket products. Each chapter examines the effect of LBOs on product market competition in the supermarket industry using a different empirical approach.

Chapter 1 establishes an empirical link between a firm's leverage and its product market behavior using an event study methodology. When a supermarket chain announces that it will dramatically increase its debt through a leveraged buyout (LBO) or leveraged recapitalization, rival supermarket chains exhibit positive stock return responses. This positive return response is limited to those rivals which operate stores in some of the same geographic markets as the leveraging firm. Firms which do not operate in the same markets as the leveraging firm show no stock return response to the announcement. The results suggest that leverage may decrease a firm's aggressiveness in the markets for its products. This change in product market behavior benefits the firm's rivals.

Chapter 2 consists of a study of the entry and expansion behavior of large supermarket chains in 85 metropolitan areas. The major finding is that rival firms are more likely to enter and expand if a large share of the incumbent firms in the local market have undertaken leveraged buyouts (LBOs). I present evidence that this result is due neither to an intentional scaling back of LBO firms nor to weaknesses which existed in these firms prior to their LBOs. The study concludes that the LBO wave of the late 1980s may have led to weaker competition in this industry.

Finally, in Chapter 3, supermarket pricing behavior is investigated. I examine grocery prices in 35 cities following the leveraged buyout (LBO) of a supermarket chain competing in that city. The change in grocery prices in a city immediately following an LBO is significantly positively correlated with the share of total supermarkets in the city operated by the firm undertaking the LBO. I argue that this suggests that supermarket chains raise their prices when they undertake an LBO. Using a separate data set drawn from supermarket scanners, I find that LBO supermarket chains have higher prices than other supermarket chains in the same city. These two strands of evidence suggest that capital structure choices affect product market competition between firms.

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Introduction

The Modigliani-Miller theorem (1958) argues that, if capital markets are perfect and in the absence of taxes, a firm's choice of debt versus equity financing should not affect the firm's value. Since the publication of Modigliani-Miller, corporate finance economists have struggled to reconcile this theorem with the observation that firms behave as if capital structure decisions do matter. Theoretical and empirical literature has focused on bankruptcy costs, asymmetric information, and capital market imperfections as means by which firm capital structure choices could affect firm value. Recently, theoretical literature has examined how asymmetric information and capital market imperfections could forge a link between a firm's capital structure choices and its product market behavior.

In this thesis, I examine empirically the relationship between firm capital structure and product market competition. I present three different test of the hypothesis that highly leveraged supermarket chains compete different from supermarket chains with little debt in their capital structure. The leverage buyout (LBO) wave of the late 1980s provides an opportunity to study firms that dramatically increased their debt levels.

The dramatic increases in debt associated with the LBO wave sparked debate about the effect of high leverage on corporate performance. Proponents of high leverage, most notably Jensen (1989), argue that the discipline of debt repayment forces firms to eliminate "empire-building projects with low or negative returns, bloated staffs, indulgent perquisites, and organizational inefficiencies." Others argue that debt reduces a firm's

flexibility to take advantage of profitable investment opportunities and to respond to changes in market conditions. The empirical evidence on these two views is mixed.[1]

Much of the debate and empirical analysis focuses on the effect of leveraged buyouts on the performance of individual firms. By focusing on the firm in isolation, this literature ignores potentially important competitive interactions among firms in an industry. If debt makes firms low-cost competitors, highly leveraged firms should gain competitive advantage; if debt weakens firms, highly leveraged firms should lose market share to low-debt competitors.

In this thesis, I find stock market evidence that the announcement of the LBO of a supermarket chain is "good news" for rival chains. I find that supermarket chains are more likely to enter and expand in local markets in which the incumbent supermarket chains have undertaken LBOs. I find evidence that price changes in a city at the time a supermarket chain undertakes an LBO are positively correlated with the market share of the supermarket chain undertaking the LBO. Finally, I find that LBO supermarket chains tend to be the high-priced chains in their cities. These results support the hypothesis that LBOs tend to make firms less aggressive competitors in the market for their products.

The empirical results are consistent with recent theoretical literature examining the effect of debt on product market competition. For example, Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990) argue that information problems in the capital market make it difficult for firms with low cash reserves to raise financing. They show that these liquidity constraints encourage deep-pocket firms to compete aggressively and deplete the cash reserves of their less liquid rivals. These findings are also consistent with Phillips (1991). Phillips argues that firms may undertake high leverage in order to commit to

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[1]Kaplan (1989) and Lichtenberg and Siegel (1990) find evidence of operating improvements after LBOs. However, they also find reductions in capital expenditures and assets, which is consistent with both views. Further, Kaplan and Stein (1991) find operating improvements among LBO firms, but also a high incidence of financial distress, which presumably can lower firm value.

rivals not to undertake certain competitive investments. However, he does not consider the possibility that these commitments could attract entry. The empirical results are inconsistent with other models, including Brander and Lewis (1986), Maksimovic (1988), and Rotemberg and Scharfstein (1990), that predict that leverage makes firms more aggressive competitors by changing managerial and shareholder incentives.

To date, there has been very little empirical work to test these theoretical models of debt and product market competition. Spence (1985) and Guedes and Opler (1992) investigate cross-sectional correlations between industry leverage ratios and measures of industry concentration. Spence finds that low leverage ratios are correlated with high market concentration, while Guedes and Opler detect no cross-sectional relationship between leverage ratios and measures of concentration and contestability. A shortcoming of these papers is that omitted factors may contribute to both leverage ratios and competitive conditions. For example, more profitable firms tend to have less debt. If firms are more profitable in more concentrated industries, as oligopoly theory predicts, then one would expect to find low leverage in more concentrated industries, even though there may be no causal link between concentration and leverage.

This problem is mitigated somewhat in Phillips (1992), which is the only paper directly testing the effect of sudden large debt increases on subsequent product market behavior. Phillips examines how prices change in four industries in which the leading firm has undertaken an LBO. He finds that prices increased in the three industries in which the rival firms were also highly leveraged and fell in the one industry in which some rival firms were unleveraged. However, in a cross section with only four observations, it is difficult to conclude why the four industries differed in post-LBO pricing behavior.

My study of the supermarket industry has two principal advantages. First, focusing on a single industry avoids the problems of making cross-industry comparisons. Because supermarket chains compete in different combinations in local markets, I was able

to obtain a data suitable for cross-sectional analysis without resorting to cross-industry comparisons.

Chapter 1 establishes an empirical link between a firm's leverage and its product market behavior using an event study methodology. When a supermarket chain announces that it will dramatically increase its debt through a leveraged buyout (LBO) or leveraged recapitalization, rival supermarket chains exhibit positive stock return responses. This positive return response is limited to those rivals which operate stores in some of the same geographic markets as the leveraging firm. Firms which do not operate in the same markets as the leveraging firm show no stock return response to the announcement. The results suggest that leverage may decrease a firm's aggressiveness in the markets for its products. This change in product market behavior benefits the firm's rivals.

Chapter 2 consists of a study of the entry and expansion behavior of large supermarket chains in 85 metropolitan areas. The major finding is that rival firms are more likely to enter and expand if a large share of the incumbent firms in the local market have undertaken leveraged buyouts (LBOs). I present evidence that this result is due neither to an intentional scaling back of LBO firms nor to weaknesses which existed in these firms prior to their LBOs. The study concludes that the LBO wave of the late 1980s may have led to weaker competition in this industry.

Finally, in Chapter 3, supermarket pricing behavior is investigated. I examine grocery prices in 35 cities following the leveraged buyout (LBO) of a supermarket chain competing in that city. The change in grocery prices in a city immediately following an LBO is significantly positively correlated with the share of total supermarkets in the city operated by the firm undertaking the LBO. I argue that this suggests that supermarket chains raise their prices when they undertake an LBO. Using a separate data set drawn from supermarket scanners, I find that LBO supermarket chains have higher prices than other supermarket chains in the same city. These two strands of evidence suggest that capital structure choices affect product market competition between firms.

Chapter One: An Event Study of Supermarket LBOs

This chapter establishes an empirical link between the capital structure choices of a firm and its product market behavior by examining firms' stock return responses to the announcement that a competitor is undertaking a highly leveraged transaction such as a leveraged buyout (LBO) or leveraged recapitalization.[2] I focus on a single industry, supermarket chains. I find that supermarket chains that compete in some of the same local markets as the chain undertaking the LBO exhibit a positive and significant share return response to the announcements leading up to an LBO announcement. In contrast, supermarket chains not competing directly with the leveraging chain have no return response to the LBO announcement. Altogether, I estimate that a rival firm which competes only in those local markets also served by the firm undertaking the LBO increases in market value by approximately 4 percent at the time of the announcements leading up to the LBO. These results suggest that LBOs weaken firms' abilities to compete aggressively or weaken overall product market competition.

I adopt an event study methodology. I do not focus on the stock return response of the leveraging firm. The stock return response of the leveraging firm includes factors unrelated to the anticipated effect of debt on product market competition such as the market's estimation of the debt's effect on the firm's taxes and the estimation of the debt's effect on future bankruptcy costs. Furthermore, the stock return response to the announcement of a highly leveraged ownership transaction reflects the announced purchase price. The purchase price offered by a buyout group is not a market consensus price. The stock prices of rival firms are market consensus prices. Therefore, I focus on the stock return responses of the leveraging firm's rivals.

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[2] Kroger undertook a leveraged recapitalization in 1988. The rest of the firms in this study undertook LBOs. For convenience, for the rest of this paper, I will use the term to mean "LBO or leveraged recapitalization."

The approach of looking at the event responses of rival firms was pioneered by Eckbo (1983) and Stillman (1983) in the merger literature. It was recently applied in Lang and Stultz (1992). The Lang and Stultz paper examines the impact of bankruptcy announcements on the stock returns of rival firms and shares my focus on the effect of financial announcements on product market competition. In this prior literature, events are drawn from different industries. For each event, stock return responses are measured for rival firms in the same industry as the firm involved in the event.

By focusing on a single industry, I use information about local market competition to separate firms in the industry which are directly competing with the leveraging firm from firms which are not directly competing with the leveraging firm.[3] This helps to separate two alternative hypotheses about the source of stock return reactions to LBO announcements. If an LBO greatly improves the financial outlook of the firm undertaking the LBO and the LBO announcement merely increases speculation that other supermarket chains will undertake an LBO, then one would expect all firms in the industry to experience a positive stock return response to an LBO announcement. Finally, if supermarket LBOs weaken product market competition, then one would expect supermarket chains operating in the same local markets as the leveraging chain to exhibit a positive stock return response to the LBO announcement. However, supermarkets which do not compete directly with the leveraging chain should have no share return response to the LBO announcement. I find that firms which compete in some of the same local markets as a firm which is undertaking an LBO experience a positive stock return response to the LBO announcement. Firms which do not compete in any of the same local markets as the firm undertaking the LBO exhibit no significant stock return response. This finding supports the hypothesis that high leverage weakens product market competition or weakens LBO competitors.

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[3] This approach was pioneered by Whinston and Collins, 1992.

The organization of the chapter is as follows: Section 1 briefly describes the supermarket industry. Section 2 presents an event study analysis of the effect of debt announcements on the stock returns of rival supermarket chains. Section 3 concludes.

1. The Supermarket Industry

A supermarket is defined by the publication Progressive Grocer as a retail food store that has annual sales of more than $2 million and typically has greater than 9,000 square feet of selling space. Supermarkets account for 70% of retail food store sales but only 10% of retail food establishments. According to Progressive Grocer, there were approximately 30,754 supermarkets in the United States in 1988, 55% of which belonged to a chain of 11 or more stores.[4]

At the national level, the supermarket industry appears to be relatively unconcentrated. The top 4 supermarket chains accounted for only 16% of U.S. grocery store sales in 1982.[5] However, no supermarket chain in the U.S. is truly national. For example, the largest chain in the U.S., American Stores, operated in only 18 states in 1990. Thus, while the industry is relatively unconcentrated on a national level, local markets can be highly concentrated. The average metropolitan statistical area in the U.S. had a four-firm supermarket concentration ratio of 58% in 1982.

The late 1980s were a period of transition in the supermarket industry, as many large supermarket chains merged or went private in LBO transactions. LBOs occurred primarily between 1985 and 1988. In addition, one firm, Kroger, undertook a leveraged recapitalization a defense against a hostile raider. The largest highly leveraged transactions during the late 1980s were the $5.3 billion Safeway LBO, the $4.1 billion Kroger leveraged recapitalization, the $1.8 billion Supermarkets General LBO, and the

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[4] These data are from Progressive Grocer's Annual Report of the Supermarket Industry, 1988.

[5] Kaufman and Handy, 1989.

$1.23 billion Stop & Shop LBO. These four deals alone affected nearly 4000 U.S. supermarkets. During this period, it was also quite common for smaller regional chains and divisions of larger chains to undertake LBOs. Altogether, nineteen of the 50 biggest supermarket chains in the U.S. have undertaken LBOs. They accounted for approximately $72 billion of the $297 billion in supermarket sales in 1991.

2. An Event Study

2.1 Methodology

Events for study were selected using the Wall Street Journal Index and the Wall Street Journal for 1985-1990. A "debt event" was defined as an announcement that a firm was considering or undergoing a leveraged buyout or leveraged recapitalization. Also included were announcements that a firm was being pursued for takeover by an investor group (not another supermarket chain) if these announcements preceded an announcement that an LBO was being considered. These are included because such a takeover would in general greatly increase the leverage of the firm. Furthermore, once it becomes known that a firm is being pursued for takeover, the subsequent announcement that the firm is considering an LBO is not much of a surprise; every large supermarket takeover target during this period consider an LBO. Most of these takeover targets undertook an LBOs. Since mergers of two chains in the industry might be expected to affect the market value of other chains through the merger's effect on market concentration, debt events were excluded from the study which coincided temporally with the announcements of mergers in the industry.

The events under study are listed in Table 1. The events concern the leveraged buyouts of Vons, Safeway, Supermarkets General, Stop & Shop, and Cullum Cos. and also concern the leveraged recapitalization of Kroger. A priori, I expect the announcements to increase investors' expectations of the future debt level of the firm involved. The only possible exception is the final Kroger event, KRG3. The final Kroger

event is the announcement that Kroger would abandon its talks with the firm of Kohlberg, Kravis, and Roberts (KKR), an LBO specialist. Kroger announced it would remain public but undertake a leveraged recapitalization. While the leveraged recapitalization increased Kroger's debt level, it probably did not lead to as much of a debt increase as the market would have expected from a KKR deal. Thus, whether KRG3 was perceived as a debt-increasing or debt-decreasing event by the market depends on the market's assessment of the probability that Kroger would accept a KKR LBO and its assessment of how much debt the transaction would have involved.

The daily stock returns of fourteen supermarket rivals are used. The rivals are listed in Table 2. These rivals represent all of the supermarket chains which traded continuously from 1985 through 1989. It includes one firm (Arden Group) which participates in another business unrelated to retailing. It excludes firms which are primarily supermarket wholesalers but also own some supermarkets. [6]

The event study was conducted using daily data and a variant of the basic market model (for a discussion of the market model, see Fama, 1976). The equation to be estimated has the form:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \Sigma\delta_i h_i D_t + e_{it}$$

where:

R_{it} = firm i's return at date t.

R_{mt} = the return on the value-weighted NYSE/AMEX index at date t.

α_i, β_i, δ_i are parameters to be estimated.

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[6] This exclusion was made because it was impossible to separate from the data available which stores were owned by these wholesalers and which were independently owned and merely supplied by these wholesalers, since wholesalers typically license store names to the stores which they supply. Thus, for wholesalers, it was impossible to calculate the "market contact" variable which will become important below.

e_{it} is an error term.

h_i is an adjustment factor, to be discussed below.

D_t is a dummy variable which equals one during the four-day event window and 0 otherwise.

The factor h_i is included because changes in stock returns cannot be interpreted as percent changes in the future profits of a firm's supermarket retailing operations. The discrepancy between changes in equity values and changes in the total value of the firm's supermarket operations occurs for two reasons. First, one firm in the sample operates in an unrelated industry. Second, the firms in the sample have different amounts of leverage in their capital structure.

A chain's stock return response to an event will be small if the line of business affected by the event represents a small part of the firm's total activities. In this sample, one firm, Arden Group, participates in unrelated lines of business. The event dummy in the equation for Arden Group was multiplied by the share of its book value of assets attributable to supermarket operations in 1988. This adjustment allows the coefficient for Arden Group to be interpreted as the change in the value of the firm's supermarket operations in response to the event.

If an event affects the profits of two firms by the same amount, but the firms have different amounts of leverage in their capital structure, their stock return reactions will not be the same. This potentially important effect was identified by Rose (1985) and the adjustment factor described here was first described and employed in that work. The value of a firm, V, equals the value of the firm's equity, V_e, plus the value of the firms debt, V_d. The value of the firm must also equal the present discounted value of the firm's future profit stream, π^*. If an event changes π^*, but does not affect the default

probability of the debt, then V_e will change, but V_d will not. Thus, the percent change in the present value of future profits is given by:

$$\frac{d\Pi^*}{\Pi^*} = \frac{dV_e + dV_d}{V} = \frac{dV_e}{V} = \frac{dV}{V_e} \times \frac{V_e}{V}$$

The dummy variable for the event is multiplied by V/V_e to make the coefficient on the dummy variable represent $d\pi^*/\pi^*$. While this adjustment should be made using market values, market values of debt are difficult or impossible to obtain. Thus, the book values of debt and equity are used. The book value data is from 1988, but none of the firms in the sample had dramatic changes in the share of debt in total capitalization over the sample period. Note that this adjustment factor is greater than one and therefore, shrinks the estimated coefficients. Thus, the estimated event coefficients in previous work in which a leverage adjustment factor has not been used overstate the true percent change in overall profits due to the event.

Thus, the final equation to be estimated for each rival is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \Sigma\delta_{it} \cdot SAS_i \cdot 1/(SE_i) \cdot D_t + e_{it}$$

where $SAS_i \cdot 1/(1-SE_i) = h_i$, the adjustment factor,

and SE_i = the share of equity in the total capitalization of firm i

SAS_i = share of assets attributable to supermarket operations.

Seemingly unrelated regressions estimation (SUR) is used to measure the average response of a group of firms to an announcement about a rival's LBO. This methodology is employed because the error terms from the market model equation for a supermarket chain should be contemporaneously correlated with the error terms for other supermarket chains. Thus, efficiency is gained by employing SUR. Using SUR, the "average response"

is calculated by simultaneously estimating the response to an event for a group firms by constraining all of the firms in the group to have the same response to the event. Thus, for example, the first test below calculates an average response to each event for all firms. The SUR methodology allows estimation of only one response coefficient is estimated for each event. This methodology was used in Rose (1985) and is econometrically more efficient than calculating the event responses of each firm and then reporting the average event response.

2.2 Results

Table 3 shows the seemingly unrelated regressions estimation results. This table employs the procedure used in most of the previous literature; all of the firms in the sample are constrained to have the same stock return response to an event. This procedure ignores geographic market factors, but is shown to allow comparison to the previous event literature which ignores geographic competition. The first thirteen events were hypothesized to be debt increasing; thus, all were hypothesized to have the same sign. However, the last event could be interpreted as a debt-reducing announcement and may have the opposite sign from the other events. Of the events hypothesized to have the same sign, eight have positive coefficients and five have negative coefficients. However, of the 5 negative-signed events, none of the coefficients have a t-statistic greater in absolute value than -.48, while 6 of the positively signed announcement coefficients have t-statistics greater than one.

As noted in the table, the coefficients reported are 100 times the true event response coefficient. Thus, for example, the first Safeway announcement coincides with an increase in the market value of the firms in the sample of .45%. Only the coefficients for the first Safeway event and the first Supermarket General event are significant at the 5% level, and both have positive sign. Thus, the results for the fully constrained seemingly unrelated regressions are weak, but tend to favor the hypothesis that debt increases the

expected profits of rivals. As hypothesized, the final event, the announcement of the Kroger restructuring, has the opposite sign of the majority of the other events, though the coefficient is not significantly different from zero at standard confidence levels.

The estimation procedure used above is the one most commonly employed in the prior literature. The weakness of this procedure is that all of the supermarket chains in the sample are constrained to have the same coefficient for each event, even though some supermarket chains do not compete directly with the supermarket chains undertaking the LBOs. If positive abnormal returns are indeed due to an expectation that rivals will increase their product market profits, then only those firms which compete directly with the leveraging firm will have an abnormal positive return response to the debt event. Thus, the average response to each event calculated using the constrained SUR system above includes in the averages firms which are not expected to have any abnormal response. This biases the procedure toward a finding of no abnormal response. This criticism can be applied to most of the previous literature examining the effect of merger, takeover, or bankruptcy announcements on product market rivals, with the exception of Whinston and Collins (1992). To the extent that any of the industries examined by Eckbo (1983), Stillman (1983), Eckbo and Wier (1985), and Lang and Stultz (1992) compete primarily in local product markets, the results in these studies are biased toward a finding of no effect.

3 An Event Analysis Accounting for Local Market Competition

3.1 Methodology

One would expect that firms with zero market contact with the leveraging firm would have no stock market response to the announcement of a debt event if the stock return response measures product market effects. Similarly, firms which have positive market contact with the leveraging firm should have positive stock market responses to the announcement of the debt event.

For each event, annual volumes of the Supermarket News Annual Distribution Study of Grocery Stores Sales were used to determine which chains had market contact with the chain undertaking the LBO. This book lists the names of stores operating in each of the Standard Metropolitan Statistical Areas (SMSAs) in the United States. The Supermarket News guide lists store names, not parent firms. Information from the firms' annual 10K filings with the Securities and Exchange Commission and the 1988 Retail Tenants Directory were used to link store names to parent firms.

3.2 Results

Table 4 shows the results of a SUR estimation of return responses to events. For each event, all of the firms with positive market contact with the leveraging firm are constrained to have the same coefficient; all of the firms which have zero market contact with the leveraging firm are constrained to have the same coefficient. These restrictions can not be rejected at conventional confidence levels. The return responses for zero market contact firms are in column A; those for positive market contact firms are in column B. The table shows that, for 11 of the 13 debt-increasing events, the positive contact firms have a more positive response to the debt event than the zero market contact firms. For the positive contact firms, eleven of the 13 events have positive estimated coefficients while only 6 have positive estimated coefficients for the zero contact firms. As explained previously, the fourteenth event, KRG3 may be expected debt decreasing. The event response of the positive market contact firms for this event is more negative than the event response of the zero contact firms.

For positive market contact firms, the first announcements leading up to the Safeway and Supermarkets General LBO and the second announcement leading up to the Stop & Shop LBO have positive coefficients, significant at least at the 5% level. None of the coefficients in column A for zero-contact firms are significant. The joint hypothesis that all of the coefficients for positive contact firms in column B equal zero is rejected at

the 1% level. The joint hypothesis that all of the coefficients for zero contact firms equal zero can not be rejected at conventional levels of significance.

Part of the reason that many of the estimated effects of individual events may not be statistically significant is because information revelation is gradual; some announcements may not be much of a surprise given prior announcements. It may be of interest, then, to analyze the total effect of all of the announcements leading up to a firm's LBO. Table 5 sums the effects of all of the announcements leading up to the LBO announcement for each supermarket chain. The Kroger event sum does not include the announcement of the leverage recapitalization. It includes only those announcements for Kroger which are unambiguously expected debt increasing. For the positive market contact firms in column B, the sum of the effects of the Safeway, Supermarkets General, Stop & Shop, and Kroger announcements are all statistically significant at least at the10% confidence level. None of the summed event responses for the zero contact firms are significant at conventional confidence levels. These results suggest that leverage increases weaken product market competition.

The Cullum and Vons announcements are not statistically significant at conventional confidence levels. There were only 3 firms in the sample with positive market contact with Vons and only 2 firms in the sample with positive market contact with Cullum Cos. Some of the firms in market contact with Vons and Cullum exhibited large return responses to these events. The estimated return response for Albertsons was 1.27% for the Vons event and .92% for the Cullum event, changes in market capitalization of approximately $25 million and $18 million, respectively. The estimated return response to the Vons LBO for the supermarket operations of the Arden Group, which has all of its stores in the Los Angeles area, a market dominated by Vons, was 22%. However, the total return responses estimated by the SUR procedure were insignificant, due in part to the small number of stores included in the average and the noisiness of their market returns.

The argument can be made that, while statistically significant, the measured event responses do not appear large enough to be economically significant. The largest estimated return response is the 0.97% increase in firm values associated with the Safeway events, which represents a total change in the market value of the seven positive contact rivals of approximately $130 million. There are two responses to this argument. First, the adjustment to the event dummies made to correct for the amount of leverage in the firm's total capitalization shrinks the estimated coefficients (but does not affect their significance). This study is therefore not directly comparable with other event studies which failed to make this debt correction. The second response is in the same spirit as McAfee and Williams' 1988 criticism of the work of Eckbo(1983) and Stillman(1983). McAfee and Williams point out that the firms studied by Stillman and Eckbo were large multiproduct firms and that only a small fraction of these firms' profits are derived from products which compete directly with the firms undergoing a merger. Here, all of the firms except one have supermarket operations as their only business and the coefficient for the one exception is normalized to represent the profit increase of supermarket operations. However, because supermarkets compete in local markets, firms with positive market contact with the firm undergoing the debt event will still generally have less than 100% market contact. If two large chains only compete with each other in a few markets, then an LBO by one chain can have an enormous impact on those stores of a rival chain which compete directly with the LBO chain and yet still have a small overall impact on the total value of the rival.

Table 6 illustrates this point by imputing an event response of the stores actually competing with stores of the leveraging chain. This procedure requires several strong assumptions but is meant to give a very rough indication of the order of magnitude of the effect on the stores actually competing with the leveraging firms. Stores with no market contact with the leveraging chain should have no increase in value due to the debt event, as suggested in Table 5. The entire increase in the market value of a firm should then be

attributable to the increases in value of the stores which actually compete with stores of the leveraging chain. This implies that the percent change in the market value of a chain in response to a debt event is the product of two terms. The first is the change in the market value of the stores in competition with the leveraging firm. The second is the percent of the chain's pre-event market value attributable to stores in direct competition with the leveraging firm. If one assumes that each store in a chain contributed approximately equally to the chain's pre-event market value, then the second term can be approximated. The share of pre-event market value attributable to stores in competition with the leveraging chain can be approximated as the share of the chain's total stores that are in competition with the leveraging chain.

For each event group, the mean percent market contact for firms that had positive market contact with the firm undergoing the debt event was calculated using the Supermarket News data.[7] The 1988 edition of the Supermarket News guide, which contains data from 1985 or 1986 (depending on the SMSA), was used to estimate "market contact". The market contact between firm X, one of the chains undergoing a debt event, and firm Y, a rival firm, was calculated in the following way. All of the stores in SMSAs listed in the Supermarket News guide that were identified as belonging to firm Y were counted. Then, all of the stores that firm X had in an SMSA in which firm X had at least one store were counted. The "market contact" between firm X and firm Y is defined as a ratio. The numerator equals the number of stores that Y has in SMSAs in which firm X also has at least one store. The denominator equals the total number of stores that firm Y has in all SMSAs according to the Supermarket News guidebook. That is, market contact

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[7]Comparison of the Supermarket News data to other data sources available for specific SMSAs revealed that the Supermarket News data, though reliable in identifying which store chains operate in an SMSA, was extremely unreliable in its reporting of the numbers of stores in the SMSA. This is due in part to the fact that each SMSA's data are collected from a different source; the data are generally collected from the local newspaper. Thus, the results here should be viewed with caution. Attempts to use the market contact information as a normalization in the regression estimation produced extremely imprecise estimates of parameter values.

was defined as the share of the rival firm's stores in the sample which compete directly with the leveraging firm.

Using the Wall Street Journal and 10Ks, major sales of chains or parts of chains were identified. "Market contact" was adjusted to reflect these major sales. Thus, if for example, the Wall Street Journal reported that firm X sold all of its Pennsylvania stores to firm Z in December 1987, then all of the stores that firm X had listed in the Supermarket News guide in Pennsylvania SMSAs would be reassigned to firm Z for events occurring after December 1987, and market contact with the debt event firms would be recalculated for both firm Z and firm X.

I calculate an implied return response for the stores actually in market contact with the debt event stores. The methodology for this is:

$A = B/M$

where:

A = the implied event response for stores actually competing with the leveraging firm (shown in Table 6).

B = the total effect on the market value of positive contact firms (as measured in table 4)

M = mean market contact for firms with positive contact.

The implied return responses in Table 6 show that the effect of an LBO on rival firms can be not only statistically significant, but economically significant as well. The implied change in value of the firms directly competing with the leveraging firm increased by as much as 10.2%.

4. Summary and Conclusions

The results support the hypothesis that a firm's debt increase raises the profitability of the firm's rivals. Leverage increases may serve as a deliberate strategy undertaken to "soften" product market competition, as suggested in Phillips (1991). The results are also

consistent with the hypothesis that firms undertake leverage increases for tax and other reasons, although leverage gives low-debt rivals a product market factors. However, both interpretations of the results suggest that the positive stock return response is due to product market factors. This class of interpretations is supported by the finding that firms with positive market contact with the LBO firm have positive significant stock return responses to the event announcements, while the zero-contact stores do not have significant responses. The fact that product market overlap is a determinant of stock return responses to events suggests that leverage increases affect product market competition. The estimated increase in the value of the individual stores competing directly with the chain undergoing the debt event is shown to be large, ranging as high as ten percent.

This study does not offer any insight into the mechanisms by which debt affects product market competition. The chapters that follow will examine the impact of debt on product market competition more directly, by examining the impact of debt on firm's entry and expansion decisions in local markets and by examining the impact of debt levels on pricing in local markets.

Table 1: Events included in the event study. The observations column represents the observations for which the event dummy variable takes on the value one. The date is the date that the event was announced in the Wall Street Journal.

NAME	OBS	DATE	EVENT
VON1	202-205	10/23/85	Household International announces it will spin off its merchandising unit (which includes Vons) in an LBO.
SAF1	363-366	6/13/86	Dart Group announces that it holds a 5.9% stake in Safeway.
SAF2	374-377	6/30/86	Wall Street Journal reports rumors that Dart will attempt a Safeway takeover.
SAF3	390-393	7/23/86	Safeway is considering an LBO.
SAF4	394-397	7/29/86	Safeway agrees to a KKR LBO.
SMG1	549-553	3/10/87	Dart proposes to buy Supermarkets General for $1.62b.
		3/11/87	Supermarkets General is considering going private.
SMG2	579-583	4/22/87	Supermarkets General Board will meet to consider a recapitalization.
		4/23/87	Supermarkets General agrees to an LBO.
S&S1	765-768	1/15/88	Dart announces it seeks a major stake in Stop&Shop.
S&S2	776-779	2/1/88	Dart launches a tender offer for Stop&Shop.
S&S3	796-799	3/1/88	Stop&Shop and KKR agree to an LBO.
CUL1	879-882	6/28/88	Cullum Cos. reveals that it is discussing an LBO.
KRG1	932-936	9/13/88	Haft family reveals that it has a major stake in Kroger.
		9/14/88	Kroger reveals a leveraged restructuring plan.
KRG2	938-941	9/21/88	KKR makes a bid for Kroger.
KRG3	951-956	10/10/88	Kroger rejects KKR bid--will restructure.
		10/12/88	KKR will not pursue Kroger.

Table 2. Stocks included in the event study.

Albertsons
American Stores
Arden
Brunos
Delchamps
Food Lion
Foodarama
Giant Food Stores
Great Atlantic and Pacific Tea Co.
Hannaford Bros.
Marsh Supermarkets
Ruddick
Weis Markets
Winn-Dixie

Table 3. SUR Estimation Results: Average Response of All Firms. Each chain is allowed an individual intercept and covariance with the market (beta). Each chain is constrained to have the same coefficients for the event dummy variables. The joint test of the null hypothesis that all of the coefficients equal zero is chi-squared(14)=530.2, which rejects the null hypothesis at the 1% level.

Event	Coefficient	t-statistic
VON1	-0.036	-0.222
SAF1	0.445	2.788 ***
SAF2	0.117	0.733
SAF3	-0.077	-0.480
SAF4	0.170	1.067
SMG1	0.360	2.520 ***
SMG2	-0.042	-0.296
S&S1	-0.055	-0.341
S&S2	0.245	1.535
S&S3	-0.003	-0.020
CUL1	0.004	0.027
KRG1	0.168	1.175
KRG2	0.207	1.300
KRG3	-0.123	-0.941

* represents statistical significance a the 10% confidence level.
** represents statistical significance at the 5% confidence level.
*** represents statistical significance at the 1% level.

Table 4. Stock Return Responses of Zero Market Contact Firms Versus Positive Market Contact Firms. Panel A shows the coefficients on the event dummy variables for the firm involved in the debt event. Panel B shows the coefficients on the event dummies for the firms with postive measured market contact with the firm involved in the debt event. The test of the joint hypothesis that all of the coefficient entries in column A equal zero is chi-squared (15)=4.0, which is not significant at any conventional confidence level (1-p value=.995). The joint hypothesis that all of the entries in column B equal zero is chi-squared=31.24, which is significant at the 1% confidence level (1-p value= .005).

	Panel A		Panel B	
	Zero-Contact Firm		Positive Contact Firm	
	Coefficient x 100	t-statistic	Coefficient x 100	t-statistic
VON1	-0.128	-0.642	0.094	0.407
SAF1	0.143	0.592	0.641	3.231 ***
SAF2	-0.131	-0.541	0.277	1.394
SAF3	0.007	0.031	-0.132	-0.663
SAF4	0.153	0.633	0.185	0.930
SMG1	0.260	1.084	0.399	2.497 ***
SMG2	-0.101	-0.421	-0.018	-0.115
S&S1	-0.112	-0.549	0.019	0.083
S&S2	-0.012	-0.060	0.589	2.550 **
S&S3	-0.049	-0.239	0.059	0.255
CUL1	0.034	-0.203	0.488	0.870
KRG1	0.171	0.707	0.168	1.043
KRG2	0.016	0.059	0.280	1.560
KRG3	-0.119	-0.537	-0.126	-0.857

* represents statistical significance a the 10% confidence level.
** represents statistical significance at the 5% confidence level.
*** represents statistical significance at the 1% level.

Table 5. Event Responses of Firms for Summed Events. The table below sums up the effects of the events associated with each chain. Thus, for example the row labelled Safeway sums the coefficients for the four events leading up to the Safeway LBO. The Kroger row only sums those events which were unambiguously expected ex ante to be debt increasing (KR1 and KR2). Panel A shows the summed coefficients, chi-squared statistic, and significance levels for the zero contact firms. Panel B shows the summed coefficients, chi-squared statistic, and significance levels for positive contact firms.

	PANEL A ZERO CONTACT FIRMS		
Events	Coefficient x 100	Chi-Sq(1)	Significance Level
Vons	-0.128	0.412	0.521
Safeway	0.173	0.126	0.723
Supermarket General	0.159	0.219	0.64
Stop & Shop	-0.173	0.238	0.625
Cullum	0.034	0.041	0.839
Kroger	0.187	0.288	0.592

	PANEL B POSITIVE CONTACT FIRMS		
Events	Coefficient x 100	Chi-Sq(1)	Significance Level
Vons	0.094	0.165	0.684
Safeway	0.971	5.913	0.015 **
Supermarket General	0.381	2.823	0.092 *
Stop & Shop	0.667	2.755	0.097 *
Cullum	0.489	0.756	0.384
Kroger	0.447	3.435	0.063 *

* represents statistical significance a the 10% confidence level.
** represents statistical significance at the 5% confidence level.
*** represents statistical significance at the 1% level.

Table 6. The estimated change in the market value of stores competing directly with the leveraging firm. The mean percent market contact of positive contact rival firms with the firm undertaking the leverage increase. This is used to estimate the effect of the debt event on those stores of rival firms that operate in the same local markets as the debt event stores.

	Coefficient x 100	Mean Percent Mkt Contact for Firms with Positive Contact	Estimated Effect on Value of Stores Competing with Debt Event Firm
Vons	0.094	43.80%	0.20%
Safeway	0.971	43.20%	2.20%
Supermarkets General	0.381	35.20%	1.10%
Stop & Shop	0.667	6.70%	10%
Cullum Cos.	0.489	4.80%	10.20%
Kroger	0.447	47.40%	0.90%

Chapter 2: Local Market Entry, Exit, and Expansion Decisions of Large Supermarket Chains

In this chapter, I examine the effect of debt on product market competition by studying the local market entry and expansion decisions of large supermarket chains. Specifically, I study how these decisions change when firms dramatically increase their debt levels by undertaking leveraged buyouts. I find that firms are more likely to enter and expand in local markets in which LBO firms have a large market share. I estimate that non-LBO firms are 7% more likely to add stores in markets in which LBO firms have a 10% market share than in markets in which there are no LBO firms. I also find that LBO firms are less responsive to competitive opportunities such as high market concentration, a high market share, or the presence of highly leveraged competitors.

The organization of the chapter is as follows: Section 1 summarizes LBO activity in the supermarket industry. Section 2 describes the sample and data. Section 3 presents the basic results. Sections 4 interprets the findings of Section 3 by examining various explanatory hypotheses. Section 5 concludes.

1. LBO Activity in the Supermarket Industry.

A supermarket is defined by the publication Progressive Grocer as a retail food store that has annual sales of more than $2 million and typically has greater than 9,000 square feet of selling space. Supermarkets account for 70% of retail food store sales but only 10% of retail food establishments. According to Progressive Grocer, there were approximately 30,754 supermarkets in the United States in 1988, 55% of which belonged to a chain of 11 or more stores.[8]

At the national level, the supermarket industry appears to be relatively unconcentrated. The top 4 supermarket chains accounted for only 16% of U.S. grocery

[8] These data are from Progressive Grocer's Annual Report of the Supermarket Industry, 1988.

store sales in 1982.[9] However, no supermarket chain in the U.S. is truly national. For example, the largest chain in the U.S., American Stores, operated in only 18 states in 1990. Thus, while the industry is relatively unconcentrated on a national level, local markets can be highly concentrated. The average metropolitan statistical area in the U.S. had a four-firm supermarket concentration ratio of 58% in 1982.

The late 1980s were a period of transition in the supermarket industry, as many large supermarket chains merged or went private in LBO transactions. LBOs occurred primarily between 1985 and 1988.[10] The largest transactions were the $5.3 billion Safeway LBO, the $4.1 billion Kroger leveraged recap, the $1.8 billion Supermarkets General LBO, and the $1.23 billion Stop & Shop LBO. These four deals alone affected nearly 4000 U.S. supermarkets. During this period, it was also quite common for smaller regional chains and divisions of larger chains to undertake LBOs. Altogether, nineteen of the 50 biggest supermarket chains in the U.S. have undertaken LBOs. They accounted for approximately $72 billion of the $297 billion in supermarket sales in 1991.

The vast majority of the leveraged buyouts were not the result of unconstrained decisions by management and shareholders. Instead, most of them were undertaken in response to unwanted takeover attempts. In fact, four of the six biggest deals were undertaken to thwart the unwanted takeover attempts of a single investment group, the Dart group, an affiliate of the Dart drugstore chain.

LBO activity has not been concentrated in any single geographic region. In the sample used in this study, LBO firms accounted for 16% of the stores in midwestern markets, 17% of the stores in southern markets, 21% of the stores in northeastern markets

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9 Kaufman and Handy, 1989.

10 There is also one instance of a leveraged recapitalization in this industry, which was undertaken by Kroger. A leveraged recap is a transaction in which a firm borrows in order to pay a large dividend to shareholders of a least 50% of the former equity value of the firm. Because this recap resulted in debt levels for Kroger similar to typical LBO debt levels, it is included in this analysis as an LBO.

and 42% of the stores in western markets. Part of the unusually large LBO concentration in the West is due to the enormous importance of Safeway on the west coast. Safeway's 1985 market share in cities in the sample in the West totalled nearly 25%.

2. Data and sample.

The data consist of information on supermarket chains in 85 Standard Metropolitan Statistical Areas (SMSAs) in 1985 and 1991. The data are drawn from Progressive Grocer's Market Scope. This publication lists the supermarket chains and the number of stores operated by each chain in the most populated 100 SMSAs in the United States.[11] The book also lists the total number of supermarkets owned by independent firms in the SMSA. The 85 SMSAs studied consist of those SMSAs which were among the largest 100 in both 1985 and 1991 and for which the official Census definition of the SMSA borders remained unchanged between the two years. [12]

The Progressive Grocer data lists store names, not the names of parent companies. Store names were matched to parent company names using the Retail Tenants Directory, Thomas's Grocery Register, and supermarket firms' annual 10-K disclosures. From this list of parent firms, the 50 chains with the largest number of stores in the 1985 sample were identified. [13] It is the entry and expansion decisions of these firms in each of the 85

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[11] Some of the Progressive Grocer data was checked against microfilm copies of old telephone books to confirm the quality of the data source.

[12] Unfortunately, because the SMSAs were redefined for most of New England, the Bridgeport, Connecticut SMSA is the only New England SMSA appearing in the sample. This removes from consideration most of one LBO chain was very successful (Stop & Shop) and most of another which was very unsuccessful (Supermarkets General).

[13] One set of firms is left out of the sample of top firms. These firms are those involved in the only major antitrust challenge to a supermarket merger during the period. After the federal antitrust supervisory bodies decided not to challenge the purchase of Lucky Stores by American Stores, the California Attorney General's Office decided to pursue a challenge of the merger under the California antitrust statutes. The case was tied up in the courts for over a year, during which

markets that are studied. These firms account for 6068 of the 13,512 supermarkets in the SMSAs in the study.

All of the firms in the 85 SMSAs are classified by whether or not they have undertaken an LBO. I use this mechanism to divide firms into low debt and high debt firms because actual leverage ratios are unavailable for privately owned firms. The power of the test is weakened by the fact that many of the "low leverage" firms may have reasonably high levels of debt although they did not undertake an LBO.[14]

The information on LBOs was obtained in two ways. First, quarterly editions of Mergers and Acquisitions contain all ownership transactions (including LBOs) of greater than $1 million. Second, all references to transactions involving the supermarket parent companies in the sample were searched using indices to Supermarket News, Supermarket Business, and Progressive Grocer. From these sources, a definitive list of LBOs was assembled. For the purposes of this chapter, a leveraged or LBO firm is defined as a firm that underwent an LBO (or leveraged recapitalization) anytime between 1981 and 1990.

One difficult issue that must be addressed is how to treat the large number of asset sales that typically follow an LBO. When LBO firms want to exit a local market, they often sell the local division to another chain or spin it off to the division's managers soon after the LBO. In total, 633 of the 13,512 supermarkets in the study were assigned to a new owner due to a post-LBO asset sale. Of the 633 supermarkets sold following an LBO, 187 were sold to the division's management in a second LBO of the division.

These store sales are qualitatively different from simply closing the chains' stores in the market; and the purchase is different from completely new entry or massive expansion in that market. My approach is to treat the assets as if they were always owned

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time American Stores was not allowed to merge the operations of the two firms and was restricted from opening and closing new stores in California. The parties to this merger are left out of the specifications here, though results including them were checked, and are extremely similar.

14 I have confirmed that the debt ratios of non-LBO firms with publically traded debt or equity are in fact, much lower than the debt levels of LBO firms.

by the eventual purchaser. I take this conservative approach because otherwise, one would see increased entry into LBO markets simply because of these asset transfers, not because of any competitive effects.

For example, Safeway sold its southern California division to Vons shortly after the Safeway LBO in 1986. Here, I add the stores in my sample that were part of Safeway's southern California division to Vons's store total for 1985. Thus, for a Southern California city, the change in stores for Vons equals the net total of Safeway and Vons stores opened or closed in that city between 1985 and 1991. The change in the number of Safeway stores in any Southern California city equals zero. In constructing independent variables such as the LBO share of a market, the same convention is used.

Mergers among non-LBO firms were handled in a similar way. The stores of two firms which merged were treated as if they were always owned by the same firm. The one exception to this rule is that information about the acquisitions of very small independent chains was not generally available. Purchases of small independent chains by chains in the sample are thus counted as entry or expansion.

Information about asset sales was obtained by checking the Wall Street Journal Index and quarterly editions of Mergers and Acquisitions. I also searched references to asset sales in Supermarket News, Supermarket Business, and Progressive Grocer. Reallocation of the assets of the 50 largest firms in 1985 led to a final list of 48 separate firms for study.

Demographic data are obtained from Donnelly Marketing Information Services, a market research firm which provided the demographic data for the Progressive Grocer volume.

Finally, we expect that a firm is more likely to enter a new market if it operates in nearby markets. The distance between markets in the sample is calculated using data from a private marketing firm.[15]

3. Methodology and Results

The estimation undertaken here illustrates that, controlling for many factors, store growth is larger in markets dominated by LBO firms. This effect, however, can be ascertained by a simple inspection of the raw data. Across the 85 cities in the sample, the mean share of total stores of LBO firms was 22% in 1985. Total store growth was 2.5% in markets with less than the mean share of LBO firms. It was approximately 4.8% in markets with greater than the mean share of LBO firms. This finding is even more pronounced if we look only at the store growth of non-LBO firms. Non-LBO firms grew an average of less than one percent in markets with less than the mean LBO share. Total store growth was 12.5% in markets with greater than the mean LBO share. This basic observation, that firms grow faster if their rivals are highly leveraged, continues to be supported after accounting for other factors that might affect supermarket store growth.

3.1 Addition and Subtraction of Stores by Incumbent Firms

3.1.a Methodology

This subsection describes the underlying model of the addition and subtraction of stores by incumbent firms in local markets. The basic idea is that supermarket chains will

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[15] The distance was calculated by obtaining the zip code of the postmaster for the central city of the SMSA (or for the county seat for the following SMSAs: Lake County, Illinois; Nassau County, New York; Monmouth County, New Jersey; and Bergen County, New Jersey). A list of longitudes and latitudes for each zip code was obtained from the marketing firm. The straight line distances between cities was calculated, taking account of the fact that the longitude lines become farther apart as one moves south, but not taking into account the curvature of the earth.

add stores if the expected profits from doing so exceed some threshold; they will close stores if the profitability of those stores falls below some threshold. The problem, of course, is that the profitability of store additions and withdrawals is not observable. I use the ordered probit methodology to estimate the determinants of firm profits using information on the addition and subtraction of stores.

The methodology employed here is similar to that found in Bresnahan and Reiss (1987 and 1990). The Bresnahan and Reiss studies infer information about entry by examining the number of firms in specific lines of business in small local markets at a single point in time. In contrast, this study looks at entry and expansion which occurred over a period of time. Also, because Bresnahan and Reiss examine lines of business dominated by small, independent firms, they do not use firm characteristics to predict entry behavior. On these two dimensions, this chapter more closely resembles Dunne,Roberts, and Samuelson (1988), who explicitly consider entry and exit behavior of plants over time and the relationship of entry and exit to factors such as firm size, firm age, and industry characteristics. My study joins more recent work, including Berry (1992) and Cotterill and Haller (1992), which combine the focus on a single industry across local markets of the Bresnahan and Reiss papers and the explicit consideration of the effect of firm characteristics on entry and exit decisions of the Dunne, Roberts, and Samuelson paper.[16]

For example, consider a firm which is an incumbent in a local market. Let Πij^* denote the unobservable profits of firm i in market j. Let τ^+ equal the profit threshold for the addition of one store and let τ^- equal the profit threshold for the subtraction of one store. The conditions for the addition and subtraction of stores are as follows:

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16 The Cotterill and Haller paper, in fact, explores de novo entry into cities by supermarket chains. However, they do not consider the leverage characteristics of incumbent firms. They consider entry over a different time period using a different data set.

1) If $\Pi_{ij}^* < \tau^-$, the firm subtracts at least one store from the market;

2) If $\tau^- < \Pi_{ij}^* < \tau^+$, the firm neither adds nor subtracts stores from the market;

3) If $\Pi_{ij}^* > \tau^+$, the firm adds at least one store to the market.

The thresholds for the addition and subtraction of stores are estimated along with the determinants of profitability. In general, one could imagine estimating a model with separate thresholds for firms adding one,two,three,etc. stores. Here, I estimate only two thresholds, dividing observations into 3 groups based on whether firm i is adding stores in market j, subtracting stores in market j, or neither adding nor subtracting stores in market j. I take this approach for several reasons. First, if the parameters are estimated consistently using finer groupings of the data, then they are also estimated consistently by the grouping into the three categories that is employed here. Second, over one-third of the observations consist of firms adding exactly one store, subtracting exactly one store, or neither adding nor subtracting stores; the estimation of additional thresholds uses up degrees of freedom. Furthermore, the parameter estimates for this particular specification choice are particularly easy to interpret. Finally, the results obtained are similar to those obtained using more elaborate specifications, which are described in Section 3.3.

Therefore, the dependent variable, Y_{ij}, takes the value of negative one if firm i withdrew stores from market j between 1985 and 1991, zero if firm i neither withdrew stores from market j between 1985 and 1991 nor added stores, and one if firm i added stores in market j between 1985 and 1991.

One adjustment is made to the standard ordered probit specification. Due to their financial condition, LBO firms might require different threshold profit levels before adding or subtracting stores. For example, the addition or subtraction of a store might require a large fixed cost. LBO firms' cash constraints may make them less likely to choose to incur

a fixed cost in order to open a marginally profitable store or to close a marginally unprofitable one. Thus, one might expect the difference between the profit thresholds (τ^+-τ^-) to be greater for LBO stores. Therefore, separate profit thresholds are estimated for LBO and non-LBO firms.

There are three groups of explanatory variables included in the specifications: characteristics of market j, characteristics of the competition faced by firm i in market j, and characteristics of firm i.

The market characteristics are described below:

ΔHOUSEHOLDS$_j$: the change in the number of households in SMSA j between 1985 and 1991, expressed in units of 10,000 households.

ΔHH/MILE$_j$: the change in households per square mile in SMSA j. This is included because the change in households may have a different impact if it is distributed over a very large or very small land area. This variable is expressed in units of 10,000 households per square mile.

ΔINCOME$_j$: the change in median income in market j between 1985 and 1991. This variable is included although it is not expected that income will have a huge effect on the demand for "necessities" such as supermarket products. The change in median income is expressed in units of $10,000.

Δ INCOME2$_j$: the change in squared median income in market j between 1985 and 1991. This variable is included because any effect of income on the demand for supermarket products may not be linear. This variable is expressed in units of $\$10{,}000^2$.

Δ SHARE LESS \$10K$_j$: the change in the share of households in market j with annual incomes of less than $10,000. This variable is included because income may only be an important factor in supermarket demand for very poor households

DEV STORES/HH $_j$: city j's deviation in 1985 from the number of stores that would be predicted for city j, based on the number of households in city j. This variable is included because the use of the first five market characteristics implicitly assumes that each market was in an equilibrium state in 1985-- changes in the market structure

between 1985 and 1991 should be due to changes in the market characteristics between 1985 and 1991. DEV STORES/HHj adjusts for the possibility that an SMSA was in an over-stored or under-stored disequilibrium in 1985. The deviation is expressed in units of hundreds of stores. Thus, a city for which DEV STORES/HHj equals 0.1 has 10 more stores than expected, given the number of households in city j.

The following variables describe the rivalry faced by firm i in market j:

HHI5j: a measure of concentration in market j. This measure, related to the Herfindahl index, equals the sums of the squared market shares of the 5 firms with the largest market share in market j. A firm's market share is defined as its share of the total stores in a market. Calculation of the exact Herfindahl is prohibited because the number of stores owned by independent firms are reported as an aggregate in the data obtained from Progressive Grocer. The top 5 stores in a market have an average market share of 61%, and thus, the five store concentration measure provides a reasonable proxy for the degree of concentration in the market. The expected effect of the Herfindahl proxy is unclear. While a high Herfindahl might suggest that competition is less fierce and that there are profit opportunities, it might also suggest that the firms in the market have adopted mechanisms to blockade entry and expansion.

MARKET SHAREij: represents the market share of firm i's stores of in market j, where market share is again defined as the share of total stores. A chain with a large market share in a local market may be able to behave as a price leader in the local market. Adding new stores may be less expensive for a supermarket with a large market share in a local markets because the addition of a supermarket would probably lead to a very small increase in advertising and distribution costs. Thus, one might expect market share to be a positive determinant of profitability.

SHARE LBOij: the share of LBO firms among firm i's rivals in market j. Firm i's own stores are not counted when constructing this share. This variable is expected to have a positive and significant coefficient if LBO firms are less able to deter the expansion of their rivals than non-LBO firms.

Finally, one characteristic of firm i is included in the regressions[17]:

TOTAL STORES$_i$: the total number of stores that firm i has in the entire sample in 1985.

One frequent criticism of LBOs is that they reduce a firm's flexibility to seize competitive opportunities that arise. Therefore, LBO firms and non-LBO firms are allowed to have different coefficients for the variables describing rivalry in the market: HHI5$_{ij}$, MARKET SHARE$_{ij}$, and SHARE LBO$_{ij}$. If LBO firms are less capable of responding to market opportunities than non-LBO firms, then one would expect that the coefficients for HHI5$_{ij}$, MARKET SHARE$_{ij}$, and SHARE LBO$_{ij}$ would be smaller for LBO stores than for non-LBO stores. LBO and non-LBO firms are constrained to have the same coefficients for all other explanatory variables.

Let:

τ_L^+ and τ_L^- represent thresholds for the addition and subtraction of stores for LBO firms.

τ_N^+ and τ_N^- represent thresholds for the addition and subtraction of stores for non-LBO firms.

X_N represent the variables HHI5$_{ij}$, MARKET SHARE$_{ij}$, and SHARE LBO$_{ij}$ for non-LBO firms.

X_L represent the variables HHI5$_{ij}$, MARKET SHARE$_{ij}$, and SHARE LBO$_{ij}$ for LBO firms.

X represent the variables for which the coefficients are constrained to be the same for both the non-LBO and LBO firms (ΔHOUSEHOLDS$_j$, ΔINCOME$_j$, ΔINCOME2$_j$, DEV STORES/HH$_j$, TOTAL STORES$_i$).

L$_i$ is a dummy variable taking the value of one if firm i is an LBO firm and zero otherwise.

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[17] One might think that it would be appropriate to include a dummy variable for whether or not firm i has undertaken an LBO. In fact, by estimating separate expansion and withdrawal thresholds for LBO firms, I have done the equivalent.

Y_{ij} is the dependent variable, taking the value -1 if firm i withdraws stores from market j, 0 if firm i neither adds nor subtracts stores from market j, and 1 if firm i adds stores from market j.

$\Phi(\bullet)$ is the cumulative distribution function of the normal distribution.

The likelihood equation to be maximized is:

$$
\begin{aligned}
\text{(1) Likelihood} = & \prod_{\substack{Y_{ij}=-1 \\ L_i=0}} \Phi(\tau_N^- - X\beta - X_N\beta_N) \times \prod_{\substack{Y_{ij}=0 \\ L_i=0}} [\Phi(\tau_N^+ - X\beta - X_N\beta_N) - \Phi(\tau_N^- - X\beta - X_N\beta_N)] \\
& \times \prod_{\substack{Y_{ij}=1 \\ L_i=0}} [1 - \Phi(\tau_N^+ - X\beta - X_N\beta_N)] \times \prod_{\substack{Y_{ij}=-1 \\ L_i=1}} \Phi(\tau_L^- - X\beta - X_L\beta_L) \\
& \times \prod_{\substack{Y_{ij}=0 \\ L_i=1}} [\Phi(\tau_L^+ - X\beta - X_L\beta_L) - \Phi(\tau_L^- - X\beta - X_L\beta_L)] \times \prod_{\substack{Y_{ij}=1 \\ L_i=1}} [1 - \Phi(\tau_L^+ - X\beta - X_L\beta_L)]
\end{aligned}
$$

3.1.b Results

The results for the incumbent firm estimation are found in Table 1. Table 1 shows both the estimated coefficients that are common for both types of stores and the coefficients that are allowed to be separate for LBO and non-LBO stores. The "marginal effects" are included to aid interpretation of the estimated coefficients. The marginal effects reported are the change in the probability that the dependent variable falls into each category when an explanatory variable is changed slightly, holding the other explanatory variables constant. Thus, for example, the first entry for the third column of marginal coefficients for non-LBO stores shows the change in the probability that a non-LBO firm expands when the number of households increases.

The demographic variables have small effects. The coefficient of the change in households is positive, as expected, and the coefficient of the change in the share of very

poor households is negative, as expected. The positive coefficient of the deviation from expected stores per household is a bit puzzling, because it implies that expansion is more rapid in markets which are "overstored". The effect, however, is small and is statistically insignificant at conventional confidence levels.

The most important result is the finding that both LBO firms and non-LBO firms are more likely to expand if their rivals are LBO firm, although the effect is statistically significant only for non-LBO firms. This suggests that LBO firms compete less aggressively, because less aggressive competition would make the market attractive for growth by rivals. The estimated coefficient of non-LBO firms implies that, holding all variables at their means, if a firm with a 10% market share in city j undertakes an LBO, the probability that a given non-LBO firm in city j will expand rises from 43% to 50%.

The table also indicates that LBO and non-LBO firms appear to respond differently to market competition. Non-LBO stores have a larger coefficient of SHARE LBO_{ij} than LBO firms, implying that non-LBO firms gain more from their rivals' leverage than LBO stores. The coefficients of $HHI5_{ij}$ and $SHARE_{ij}$ are positive for non-LBO firms, indicating that they are more likely to expand if they are large players in a concentrated market. These coefficients are not surprising. Oligopoly theory suggests that profits are higher in more concentrated markets. Further, the positive coefficient for $SHARE_{ij}$ presumably reflects economies of scale in advertising and distribution in the supermarket industry. However, LBO stores are less likely to expand under those conditions, although the negative coefficients for LBO stores for $HHI5_{ij}$ and for $SHARE_{ij}$ are statistically insignificant. The joint hypothesis that non-LBO firms and LBO firms have the same coefficients for the three variables measuring market condition is rejected at the 2% level. These findings suggest that non-LBO firms are better able to exploit competitive opportunities such as having a large market share and operating in a concentrated market.

As expected, the thresholds for the addition and subtraction of stores for non-LBO firms are closer together than the thresholds for LBO firms. This implies that there is a wider range of profit levels over which an LBO firm would be neither expanding its store base in a city nor contracting it. However, the t-statistic for the linear hypothesis that the thresholds are wider apart for LBO firms than for non-LBO firms is only 1.14.

Altogether, the evidence implies that the presence of LBO firms increases the likelihood that non-LBO firms are expanding. That is, non-LBO firms have a higher expected profit from expansion activities when their rivals are leveraged. The incumbent specifications also provide some evidence that LBO firms obtain less benefit from market opportunities such as a large market share, a concentrated market, and the presence of highly leveraged rivals.

3.2 The Entry Decision of Potential Entrants.

3.2.a Methodology

In this subsection, I estimate potential entrants' decisions to enter new local markets. I define a potential entrant to market j in 1985 as a supermarket chain which is not a competitor in market j but which is an incumbent firm in another SMSA in the sample which is less than 800 miles from market j.[18]

I assume that firm i enters market j if $\Pi_{ij}^* > \tau^E$ where τ^E is the threshold profit level required for new entry. Thus, I estimate a simple probit.

The variables assumed to affect a firm's profit from entry are the variables ΔHOUSEHOLD$_j$, ΔINCOME$_j$, ΔINCOME2$_j$, ΔSHARE LESS \$10K$_j$, ΔHH/MILE$_j$, DEV STORES/HH$_j$, HHI5$_{ij}$, TOTAL STORES$_i$, and SHARE LBO$_{ij}$,[19] defined as above. In

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[18] The 800 mile cutoff is intended to capture the effect of a firm operating in the same region as the SMSA while avoiding the border problems of using dummy variables for regions of operation. The 800 mile cutoff keeps all actual instances of entry in the sample.

addition, it should be cheaper for firms to enter markets situated near their existing operations. In order to capture this effect, the distance between city j and the closest SMSA in the sample in which firm i has at least one store, $DISTANCE_{ij}$, is included.

Ideally, one would like to perform the specifications as before, allowing LBO firms to have a different entry threshold level and different coefficients for some of the variables. Unfortunately, because there are only 5 cases of new entry by LBO firms, this specification strategy is impossible. Instead, the estimation is performed only for non-LBO firms.

The dependent variable, Y_{ij} takes the value of zero if firm i does not enter market j and one if firm i enters market j. Let X denote all of the independent variables in the specification. The likelihood equation to be maximized is:

$$(2)\ \text{Likelihood} = \prod_{Y_{ij}=0} \Phi(\tau^E - X\beta) \times \prod_{Y_{ij}=1} [1 - \Phi(\tau^E - X\beta)]$$

3.2.b Results

The results of this estimation are shown in Table 2. Entry occurs in only 34 of the 1443 possible cases analyzed, making the unconditional probability of entry only about 2.3%. This explains why the coefficients correspond to such small marginal effects.

The coefficient of the LBO market share is positive, but significant at only the 28% confidence level. One reason for this insignificance will be explored in Section 4.

3.3 Specification Issues

Since the specifications contain several observations for each firm, some type of panel data methodology might be appropriate. To control for possible unmodelled firm

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[19] The only variable from the incumbent specification not included here is MARKET $SHARE_{ij}$. Obviously, this is not included because the market share of potential entrants in 1985 is zero.

heterogeneity, an ordered probit specification for incumbent firms was reestimated including a dummy variable for each of the firms in the sample (minus one). One problem which occurs when this many variables are added to a discrete dependent variable model is that observations become overdetermined. For example, the probability that a firm expands given the values of the independent variables could become trivially close to one. In order to avoid overdetermination, it was necessary to pare down the basic specification. I estimated a single set of entry and expansion thresholds for the two types of firms and forced LBO and non-LBO firms to have the same coefficients for MARKET $SHARE_{ij}$, $HHI5_{ij}$, and $SHARE\ LBO_{ij}$.

The basic result that the LBO share of a firm's rivals is a positive and significant determinant of firm expansion remains intact; the coefficient of SHARE LBOij was 1.29, and significant at the 10% level. None of the firm dummy variables were statistically significant at the 10% level.[20] The firm dummy specification could not be repeated for the potential entrant regressions because of the very small number of cases of actual entry in the sample.

In Section 3.1, for simplicity, I estimated the incumbent firm specification using only two profit thresholds. This divided the observations into three groups: those adding stores, those subtracting stores, and those neither adding nor subtracting stores. The essential results are robust to specifications with finer groupings. For example, the equations were respecified to allow five values of the dependent variable (corresponding to a change in stores of: $\leq$-2, =-1,=0,=+1,$\geq$+2). Fifty-five percent of the data takes on the values of -2,-1,0,1, or 2 exactly. In this specification, the coefficient of $SHARE\ LBO_{ij}$ for non-LBO firms was 1.46, within one standard error of the estimate in the simpler

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[20] The firm dummy methodology is very costly in terms of degrees of freedom, because some firms in the sample have as few as two cities in which they are incumbents. The firm dummy methodology thus estimates a new constant term for those firms based on only two observations. For this reason, this analysis does not focus on the firm dummy specification.

specification. As before, LBO stores had smaller coefficients for MARKET SHARE$_{ij}$, SHARE LBO$_{ij}$, and HHI5$_{ij}$ and this difference was significant at the 1% level. I also reestimated the specification allowing seven values of the dependent variable (for a change in stores of: $\leq$-3,=-2,=-1,=0,=+1,=+2,$\geq$+3), with similar results.

4. Interpretation

I have suggested that the results in Section 3 show that LBOs cause firms to compete less aggressively on the product market. By including the variables measuring market growth, I controlled for the possibility that firms which are in growing markets tend to undertake LBOs and growing markets are the markets that attract entry. Also, by including the measure of the cities deviation from the mean stores per household in the sample, I controlled for the possibility that LBOs tend to occur in "understored" markets and understored markets are those which attract entry. However, the finding of the previous section that firms are more likely to expand if rivals are highly leveraged is consistent with two alternative hypotheses:

I. Underperforming firms undertake LBOs

It could be that poorly performing firms are more likely to undertake LBOs. Even if the LBO improves the firm's performance somewhat, it may not be enough to make LBO firms as strong as the firms which did not undertake LBOs. Thus, the fact that a firm undertook an LBO selects for underperformance, but the LBO itself does not change the product market behavior of LBO firms. This hypothesis will be analyzed in section 4.1.

II. LBO firms are intentionally scaling back

Entry and expansion could be greater in LBO markets because LBO firms, either efficiently or inefficiently, decided to scale back in the markets in which they are incumbents. Rivals are expanding more in those markets because demand is not fully served by LBO firms. This possibility will be explored in section 4.2.

4.1 Hypothesis I: Underperformers Undertake LBOs

One important competing explanation to the hypothesis that LBOs make firms weaker product market competitors is that LBO firms were already weak competitors before their LBOs.[21] Several types of evidence suggest that this is not the case. Section 4.1.a discusses post-LBO asset sales. Section 4.1.b introduces accounting evidence. Section 4.1.c discusses event study evidence and Section 4.1.d examines the hypothesis in light of the relative performance of early and late LBO firms.

4.1.a Asset Sales

Even if LBO firms were underperformers on average prior to their LBOs, this would not necessarily affect the results of Section 3 if these firms sold off underperforming divisions to non-LBO firms in post-LBO asset sales. It has been argued that post-LBO asset sales in the supermarket industry are undertaken to excise the LBO firm's underperforming divisions and transfer them to firms which could better manage the assets. This point is made in Wruck (1992) in her case study of the Safeway LBO. In the Safeway LBO, "management initiated a system under which each division was evaluated and placed into one of two 'tiers'. Divisions with labor costs equal to the local competition were denoted 'tier 1' and would likely be retained. Divisions with wage rates higher than their local competitors were denoted 'tier 2' divisions. All tier 2 divisions were candidates for sale."

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[21] There are two ways that a firm could be an underperformer on average. The firm could have stores located in less profitable cities, or, the firm could manage its stores poorly. The first type of underperformance is of no concern here-- if LBO stores are in "bad cities", expansion and entry into those cities should not be prevalent. Thus, I focus on the possibility that LBO firms managed assets poorly.

As discussed in Section 2, I assign assets sold after LBOs to their eventual owners. The sale of the division is not counted as a loss of stores for the LBO firm nor as entry or expansion for the purchaser.

If the new owners of a division manage the assets better, the stores should not attract significant entry and expansion after the asset sale. It is, of course, possible that these poor divisions attracted some entry and expansion prior to being sold off. The estimated specifications measure the correlation between this extra entry and expansion and the share of LBO firms in the market, using the LBO status of the eventual purchaser of sold-off stores when calculating the LBO market share. Since many of the eventual purchasers were non-LBO stores, the asset assignment procedure helps to diminish the effect of these underperforming divisions on the results.

4.1.b. Accounting Evidence

If LBO firms were underperformers prior to their LBOs, this should be evident in a comparison of accounting data for the two types of firms. Table 3 contains accounting data for all of the supermarket chains that were publicly traded in 1985.[22] Eleven of these firms undertook an LBO after 1985 and 20 did not.

The table shows that LBO and non-LBO firms do not differ significantly. In particular, LBO firms do not generate significantly less operating income as a share of sales or net income as a share of sales. Furthermore, the market to book value of assets ratio, a proxy for the market's estimation of a firm's future prospects, is slightly higher for LBO firms. The capital expenditures to assets ratio and the retained earnings to net income ratio is somewhat higher for LBO firms, although the difference is not statistically significant.

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22 These data are from Compustat.

4.1.c Event Study Evidence

The event study evidence in Chapter 1 does not support the hypothesis that the LBO firms were underperformers that were perhaps improved somewhat by the leveraged buyout. The event study shows that supermarket chains experience a positive abnormal stock return response to the announcement that a rival chain will undertake an LBO. This response is limited to firms which operate in the same local markets as the LBO firm.

If it was common knowledge that LBO firms were underperformers and their performance was not worsened by undertaking an LBO, then the LBO announcements would not contain positive information for rival firms. There would be no share price response. If LBOs were expected to improve the firm's product market aggressiveness, rivals would experience a negative share price response to the LBO announcement. Thus, the event study finding of a positive share price response of firms to rival's LBOs is inconsistent with the hypothesis that LBOs were undertaken by firms that were underperformers and that product market competition did not change much following the LBOs.

4.1.d Evidence from Early vs. Late LBOs

If LBO firms were always underperformers, the performance of firms which undertook LBOs early should be similar to those that undertook LBOs later. The timing of the LBO should not matter because if the LBO merely selects for underperforming firms. Because I examine entry and expansion between 1985 and 1991, firms that undertook LBOs early in the period spent more of the observation period as highly leveraged firms. Therefore, evidence that those firms which spent more of the observation period highly leveraged attracted more entry and expansion would suggest that the LBO itself changes product market competition.

The specifications in Section 3 are repeated, except the LBO share of the market is divided into the shares of early LBO firms (SHARE EARLY LBO_{ij}) and late LBO firms

(SHARE LATE LBO_{ij}). Firms that undertook LBOs before 1987 are classified as "early" LBO firms. There are 1528 stores in the early group. Firms that undertook LBOs after 1986 are classified as "late" LBO firms. There are 1569 stores in the late group.

Table 4 shows the results for incumbent firms. For non-LBO firms, the coefficient of the early LBO share is 2.04 and the coefficient of the late LBO share is 1.77. Both are significant at the 5% level. This table alone might lend support to the hypothesis that there is little difference between early and late LBOs.

The results for potential entrants, however, are dramatically different. Table 5 shows that non-LBO potential entrants are much more likely to enter markets in which firms undertook LBOs before 1987. Given the small unconditional probability of entry of 2.3%, the marginal effect of incumbent firms undertaking LBOs in the early period is quite large. The marginal coefficient implies that, if an incumbent firm in the market with a 10% market share undertook an LBO in the early period, the probability that firm i would enter market j would rise from 2.3% to approximately 2.6%. There appears to be virtually no response of potential entrants to late LBOs.[23] This is not consistent with the view that firms undertook LBOs because they were weak firms.

The difference between the results for incumbent firms and potential entrants is not surprising. Incumbent firms have supply and distribution channels in place and are familiar with local real estate. Thus, they should be able to add sites quickly in response to changing market conditions. Indeed, I measure the change in stores between 1985 and 1991 is measured, yet the last LBO occurred in 1989, leaving plenty of time for responses to have occurred. In contrast, firms considering entering a new market area would need time to research real estate sites and set up distribution channels. Thus, if entry takes

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[23] The finding of this section, that late LBOs have no measurable effect on new entry, helps to explain the insignificance of the coefficient for the LBO share in Section 3. In that section, early and late LBOs are aggregated together.

longer to respond to new market conditions than expansion, it is not surprising that expansion has responded fully to late LBOs but that entry has not.

If LBO firms were simply always bad firms, then one would expect to find that entry responded as much to early LBOs as to late LBOs. Thus, the results of this section suggest that LBOs did change competition in local markets.[24]

4.2 Hypothesis II: LBO Firms are Scaling Back in Local Markets.

Another hypothesis generally consistent with the results in Section 3 is that LBO firms decided to scale back (efficiently or inefficiently). Under this view, non-LBO firms add stores to serve the demand left unserved by LBO firms, even if the LBO firms remain competitively strong. This explanation could lead to a positive coefficient of the LBO share of the market as found in Section 3. However, several items of evidence suggest that this hypothesis is an unlikely explanation for the results. Section 4.2.a suggests that one would not expect to see LBO firms intentionally scale back, particularly in some markets. Section 4.2.b presents evidence that LBO firms are indeed not scaling back relative to non-LBO firms. Finally, Section 4.2.c shows regression results that indicate that total store growth in a market is positively determined by the LBO share of the market.

4.2.a Would LBO Firms Really Scale Back?

The industry trade literature and other studies of the supermarket industry suggest that profitability in a local market is highly correlated with a firm's market share. High market share firms capture economies of scale in advertising and distribution and may

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[24] It has been suggested that an alternative explanation for these results is that early LBOs were undertaken by bad firms, while late LBOs were undertaken by relatively good firms. This explanation fails to account for the fact that early and late LBO firms invite virtually the same amount of expansion by non-LBO incumbents.

function as price leaders. If this is true, the optimal strategy for a supermarket chain's management is to maximize market share in those markets in which a firm remains an active competitor and to withdraw completely from other markets.[25] Evidence that LBO firms were scaling back relative to competitors on average in markets in which the firm had not withdrawn completely might be suggestive of inefficiency since maximizing market share in local markets appears to be an efficient strategy.

It is even more difficult to believe that LBO firms would intentionally scale back in those markets in which the LBO firm is a highly profitable producer. Profitable markets should tend to be those markets in which firms have a large market share. This is true for two reasons. First, anecdotal evidence suggests that profitability is correlated with market share, as discussed above. Second, markets in which a firm has achieved a high market share should tend to be those markets in which the firm was efficient relative to its rivals. Thus, one would not expect LBO firms to scale back intentionally in markets in which they hold a leading market position.

Table 6 repeats the incumbent firm specification of Section 3, but separates the market share of LBO rivals into two groups: the total market share of LBO firms among firm i's rivals in the top three positions in the market, SHARE TOP 3 LBO_{ij} and the total market share of LBO firms among firm i's rivals with smaller positions in the market, SHARE NON-TOP 3 LBO_{ij}. To separate the effects of the LBO firms' leverage and the effect of total market concentration, the total market share of the top three firms in the market is also included in these specifications (SHARE TOP 3_{ij})

Table 6 shows that the coefficient of the market share of LBO firms not in the top three positions in the market is larger than the coefficient of top-three LBO firms, but both are positive and statistically significant at the 5% level. The finding that the coefficient of SHARE NON-TOP 3 LBO_{ij} is larger than the coefficient of SHARE TOP 3 LBO_{ij} is not

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[25] As an example of this argument, see Peter A. Magowan (CEO of Safeway Stores), 1989.

surprising, since one might expect that LBO firms in marginal market positions are particularly ineffective in deterring rival firms from adding stores. However, the important result in Table 6 is that firms gain market share in LBO markets even if LBO firms held commanding positions in those markets. This suggests that LBO firms are losing market share even in those markets in which one would least expect them to intentionally scale back.

4.2.b LBO Incumbents are Not Scaling Back

LBO incumbents are not scaling back in their local markets relative to non-LBO incumbents, adjusting for market conditions. This is apparent in Table 1, which was discussed in Section 3.1. Table 1 shows that the thresholds for the addition and subtraction of stores equal -0.50 and -0.06 for LBO firms and equal 0.65 and 0.96 for non-LBO firms.

The low profit threshold for the subtraction of stores for LBO incumbents implies that LBO incumbents are no more likely to subtract stores from a market than their non-LBO counterparts, even after adjusting for LBO firms' differential response to market factors. The probability that an LBO incumbent withdraws stores from a local market when all variables are held at their means is 0.42. The probability that a non-LBO firm withdraws stores when all variables are held at their means is 0.45. Because LBO incumbents require profits to reach a lower threshold level before they withdrawing stores, they are not "scaling back" relative to non-LBO firms.[26] While the differences between LBO and non-LBO stores in the propensity to withdraw stores is not statistically

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[26] This analysis compares expansion of LBO and non-LBO incumbents adjusting for market conditions. A comparison of the average growth rate across markets of LBO and non-LBO incumbents without adjusting for market conditions indicates that the growth rate of LBO incumbents is slightly greater than the growth rate of non-LBO incumbents.

significant, these findings are certainly inconsistent with the hypothesis that LBO firms are "scaling back" relative to non-LBO firms.

4.2.c Full Market Regression Results

If the intensity of competition in a market did not change between 1985 and 1991, then the number of stores that the market could support should not change either, after adjusting for demographic changes. However, if the level of competition decreases, for example, a market can support more firms. In other words, if LBO firms intentionally scale back while non-LBO firms serve the segment of the market being forfeited by the LBO firms, then the firms are simply redividing a fixed "pie". The hypothesis that the degree of competition changes when firms undertake LBOs suggests that the size of the "pie" changes--LBO markets can accommodate more stores.

I estimate regressions for which the dependent variable is the total growth rate of all stores in a market. A finding that total store growth is positively associated with the LBO share of incumbents is inconsistent with the hypothesis that LBO stores are merely ceding market space to non-LBO stores. If markets in which LBO firms have a high market share can accommodate more stores than non-LBO markets, it must be that competition is less fierce in LBO markets.

The full-market regression specifications are presented with the caveat that they provides only a weak test of the hypothesis that firms tend to expand more when their rivals are leveraged. As we have seen above, LBO firms are less responsive to the LBOs of their rivals than non-LBO firms. The total market growth regressions presented below encompass two countervailing effects. A market with a large LBO share has more LBOs to respond to, but is also populated by firms that are less responsive to rivals' LBOs. This second effect tends to decrease the coefficient of the LBO share.

Table 7 shows the estimation of a regression of total store growth in each of the 85 markets on the LBO share of the market, the familiar demographic variables expressed in

percentage changes, the market's Herfindahl proxy, and the percent deviation of the market from predicted stores per household. Table 7 shows that the coefficient of the LBO share is positive but insignificant at standard confidence levels. This finding is not surprising given the result in Section 4.1 that, by 1991, new entry had not yet responded to late LBOs. Furthermore, this regression, which involves growth rates, should be more sensitive to the timing of the LBOs than the discrete variable regressions above. This is because the discrete variable methodology only uses the information that firms are expanding, contracting, or doing neither. However, how much a firm has expanded by 1991 may well depend on the timing of rival's LBOs. Table 7 shows the same regression as Table 6 except the LBO market share is replaced by the market share of early LBO firms. Here, the LBO share is a positive and significant determinant of total store growth at the 10% level.

The findings in this section contradict the hypothesis that LBO firms intentionally forfeited market share to non-LBO firms, but that competition in the local market did not ease. Evidence suggests that LBO firms are not scaling back relative to non-LBO firms. They are attracting rival expansion even in markets in which the LBO firm held a commanding market position prior to the LBO. Finally, LBO markets can support more stores than non-LBO markets, suggesting that competition is indeed weaker in LBO markets.

5. Summary and Conclusion

The principal result of this chapter is that high leverage encourages local entry and expansion by rivals. This suggests that leverage weakens product market competition and lends empirical support to the theoretical models of Fudenberg and Tirole (1986), Bolton and Scharfstein (1990), and Phillips (1991) It is also consistent with Phillips's (1992) finding that less leveraged firms in the gypsum industry cut price and gain market share when rivals are highly leveraged.

The results also provide some evidence that LBO firms take less advantage of competitive opportunities in their markets. In my sample, non-LBO firms were more likely to expand in concentrated markets where they had a large market share and rivals were highly leveraged. LBO firm expansion was less responsive to these factors, although the overall growth of LBO firms was similar to that of non-LBO firms.

The basic finding that markets in which LBOs are common attract entry and expansion is consistent with two alternative hypotheses: the first is that LBO firms were simply underperformers prior to their LBOs; the second is that LBO firms were intentionally scaling back, leaving residual demand to be absorbed by non-LBO rivals. Evidence against these alternative hypotheses was presented. Evidence was presented suggesting that LBOs weaken product market competition.

These results are certainly consistent with prevailing views about supermarket LBOs in the financial and trade press. It is often suggested that LBO stores are weaker competitors because they are unable to price aggressively and invest in remodeling and other improvements. For example, a Supermarket News writer notes that "Companies with strong balance sheets have the opportunity to price goods aggressively, experiment with merchandising formats, and make long-term investments..."

Similarly, Forbes reports that "the sharp blade of pricing can... be effective against leveraged rivals. The ink was not yet dry on Safeway's 1986 LBO when Giant Food Inc. of Landover, Maryland slashed prices on more than 400 items in its Washington outlets."

Finally, a firm proponent of LBOs in this industry, Safeway CEO Peter Magowan, (1989) argues that the "leveraging of the entire industry would make the chronic problem of price wars...less likely."

The results of this chapter suggest that product market competition changes when firms radically increase their leverage. However, it would be interesting to determine the dimensions on which competition in the product market changes. An examination of

price competition by leveraged and unleveraged supermarket changes is the subject of Chapter 3.

Table 1. Maximum likelihood estimation results for incumbent firms. Common estimates are coefficients that are constrained to be the same for non-LBO and LBO firms. Non-LBO firms and LBO firms have separate coefficients for strategic market condition variables. Marginal effects are calculated for both LBO and non-LBO firms, based on their separate thresholds for adding or subtracting stores. Standard errors are in parentheses. The dependent variable takes the following values: Yij = -1 if firm i withdraws stores from market j, Yij=0 if firm i neither adds nor withdraws stores in market j, and Yij=1 if firm i adds stores in market j.

			NON-LBO FIRM MARGINAL EFFECTS				LBO FIRM MARGINAL EFFECTS		
VARIABLES	COMMON ESTIMATE	NON-LBO FIRM ESTIMATE	dProb[y=-1] dx	dProb[y=0] dx	dProb[y=1] dx	LBO FIRM ESTIMATE	dProb[y=-1] dx	dProb[y=0] dx	dProb[y=1] dx
Δ HOUSEHOLDS j	0.0102 (0.0135)		-0.0039	0.0005	0.0034		-0.0028	-0.0009	0.0037
Δ INCOME j	-0.3473 (1.3115)		0.1329	-0.0168	-0.1161		0.0956	0.0309	-0.1265
Δ INCOME2 j	0.0259 (0.1214)		-0.0099	0.0013	0.0087		-0.0071	-0.0023	0.0094
Δ SHARE LESS $10K j	-0.0495 (0.0881)		0.0190	-0.0024	-0.0166		0.0136	0.0044	-0.0180
Δ HH/MILE j	-7.2748 (5.3936)		2.7838	-0.3523	-2.4315		2.0031	0.6473	-2.6504
DEV STORES/HH j	0.1738 (0.2901)		-0.0665	0.0084	0.0581		-0.0478	-0.0155	0.0633
TOTAL STORES i	-0.0613 ** (0.0293)		0.0234	-0.0030	-0.0205		0.0169	0.0055	-0.0223
MARKET SHARE ij		1.7385 * (1.0251)	-0.6653	0.0842	0.5811	-1.4715 (1.4488)	0.4052	0.1309	-0.5361
HHI5 j		2.9973 * (1.7071)	-1.1470	0.1452	1.0018	-0.5790 (3.4985)	0.1594	0.0515	-0.2110
SHARE LBO ij		2.0732 *** (0.6919)	-0.7933	0.1004	0.6929	0.6420 (1.0307)	-0.1768	-0.0571	0.2339
EXIT THRESHOLD		0.6527 (0.5148)				-0.4971 (0.5433)			
ENTRY THRESHOLD		0.9589 (0.5156)				-0.0620 (0.5435)			

* statistically different from zero at the 10% level
** statistically different from zero at the 5% level
*** statistically different from zero at the 1 % leve

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is in units of 10,000 households

DEV MEAN STORES/HH j is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Table 2. Maximimum likelihood estimation results for non-LBO potential entrants. Standard errors are in parentheses. The dependent takes on the following values: Yij=0 if firm i does not enter market j, Yij=1 if firm i enters market j.

VARIABLES	COEFFICIENT	Marginal effects dProb[y=1] dx
ENTRY THRESHOLD	1.0284 (0.4887)	
Δ HOUSEHOLDS j	0.0868 *** (0.0211)	0.0019
Δ INCOME j	1.2009 (1.2700)	0.0264
Δ INCOME2 j	-0.2148 (0.1351)	-0.0047
Δ SHARE LESS $10K j	0.1529 ** (0.0733)	0.0034
Δ HH/MILE j	-13.7557 (12.5219)	-0.3022
DEV STORES/HH j	-0.5899 (0.3649)	-0.0130
HHI5 j	0.5152 (1.6981)	0.0113
TOTAL STORES i	-0.1468 * (0.0802)	-0.0032
DISTANCE ij	-0.0022 *** (0.0005)	-4.86E-05
SHARE LBO ij	0.5258 (0.4897)	0.0116

* statistically significant at the 10% level
** statistically significant at the 5% level
*** statistically significant at the 1% level

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is in units of 10,000 households
DEV MEAN STORES/HH j is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Table 3. Comparison of 1985 accounting values for firms that would undertake an LBO between 1985-1990 and those that would not undertake an LBO during the period.

ACCOUNTING RATIOS	LBO FIRM MEAN	NON-LBO FIRM MEAN	T-STAT OF DIFFERENCE
operating income/sales	0.0363	0.0395	0.48
net income/sales	0.0040	0.0043	0.14
market value/book value of assets	0.8316	0.8194	0.10
capital expenditures/assets	0.1461	0.1300	0.80
retained earnings/net income	0.3703	0.3266	0.76
dividends/net income	0.2375	0.1896	0.39

Table 4. Maximum likelihood estimation results for incumbent firms, separating out the LBOs that occured before or during 1987 from those that occurred after 1987. Common coefficients are constrained to be the same for non-LBO firms, early LBO firms, and late LBO firms. Separate effects are calculated for non-LBO, early LBO, and LBO firms for market rivalry variables. Non-LBO, early LBO, and late LBO firms have marginal effects for each variable calculated based on the separate thresholds for the addition and subtraction of stores for the three types of firm. Standard errors are in parentheses. The dependent variable takes on these values: Yij=-1 if firm i withdrew stores from market j, Yij=0 if firm i neither added nor withdrew stores in market j, and Yij=1 if firm i added stores in market j.

			NON-LBO FIRM MARGINAL EFFECTS				EARLY LBO FIRM MARGINAL EFFECTS				LATE LBO FIRM MARGINAL EFFECTS		
VARIABLES	COMMON ESTIMATE	NON-LBO FIRM ESTIMATE	dProb[y=-1] dx	dProb[y=0] dx	dProb[y=1] dx	EARLY LBO FIRM ESTIMATE	dProb[y=-1] dx	dProb[y=0] dx	dProb[y=1] dx	LATE LBO FIRM ESTIMATE	dProb[y=-1] dx	dProb[y=0] dx	dProb[y=1] dx
Δ HOUSEHOLDS j	0.0179 (0.0145)		-0.0070	0.0007	0.0063		-0.0054	-0.0017	0.0071		-0.0057	-0.0011	0.0067
Δ INCOME j	-0.8653 (1.4845)		0.3390	-0.0342	-0.3048		0.2598	0.0807	-0.3405		0.2728	0.0517	-0.3245
Δ INCOME2 j	0.0695 (0.1365)		-0.0272	0.0028	0.0245		-0.0209	-0.0065	0.0274		-0.0219	-0.0042	0.0261
Δ SHARE LESS $10K j	-0.0925 (0.1024)		0.0362	-0.0366	-0.0326		0.0278	0.0862	-0.0364		0.0292	0.0552	-0.0347
Δ HH/MILE j	-7.4252 (5.4285)		2.9095	-0.2939	-2.6156		2.2297	0.6923	-2.9220		2.3412	0.4435	-2.7847
DEV STORES/HH j	0.0518 (0.3075)		-0.0203	0.0021	0.0182		-0.0156	-0.0048	0.0204		-0.0163	-0.0031	0.0194
TOTAL STORES i	-0.0668 ** (0.0301)		0.0262	-0.0026	-0.0235		0.0201	0.0062	-0.0263		0.0211	0.0040	-0.0251
MARKET SHARE ij		1.7015 * (1.0230)	-0.6667	0.0673	0.5994	0.9468 (2.3530)	-0.2843	-0.0883	0.3726	0.3908 (2.1788)	-0.1232	-0.0233	0.1466
HHI5 j		2.4966 (1.7454)	-0.9783	0.0988	0.8795	-10.2372 (6.2656)	3.0740	0.9545	-4.0285	1.9052 (4.4492)	-0.6007	-0.1138	0.7145
SHARE EARLY LBOij		2.0431 ** (0.8532)	-0.8006	0.0809	0.7197	1.1344 (1.8034)	-0.3407	-0.1058	0.4464	1.9692 (1.4522)	-0.6209	-0.1176	0.7385
SHARE LATE LBOij		1.7685 ** (0.8671)	-0.6930	0.0700	0.6230	2.8206 (2.1107)	-0.8470	-0.2630	1.1099	0.3706 (1.7444)	-0.1169	-0.0221	0.1390
EXIT THRESHOLD		0.4622 (0.5468)				-0.4812 (0.6216)				-0.4134 (0.7024)			
ENTRY THRESHOLD		0.7715 (0.5475)				0.1071 (0.6182)				-0.0791 (0.7075)			

* statistically different from zero at the 10% level
** statistically different from zero at the 5% level
*** statistically different from zero at the 1 % level

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is units of 10,000 households

DEV MEAN STORES/HH is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Table 5. Maximum likelihood estimation results for non-LBO potential entrants. Different effects are allowed for the market shares of firms which did LBOs prior to or during 1986 and firms which did LBOs after 1986. Standard errors are in parentheses. The dependent variable takes on these values: Yij=0 if firm i does not enter market j, Yij=1 if firm i enters market j.

VARIABLES	COEFFICIENT	Marginal Effects dProb[y=1] dx
ENTRY THRESHOLD	1.1004	0.0238
	(0.5009)	
Δ HOUSEHOLDS j	0.0815 ***	0.0018
	(0.0215)	
Δ INCOME j	1.5528	0.0336
	(1.3525)	
Δ INCOME2 j	-0.2558 *	-0.0055
	(0.1441)	
Δ SHARE LESS $10K j	0.1570 **	0.0034
	(0.0775)	
Δ HH/MILE j	-14.7407	-0.3190
	(13.8175)	
DEV STORES/HH j	-0.4492	-0.0097
	(0.3739)	
HHI5 j	0.3789	0.0082
	(1.7099)	
TOTAL STORES i	-0.1406 *	-0.0030
	(0.0797)	
DISTANCE ij	-0.0022 ***	-4.72E-05
	(0.0005)	
SHARE EARLY LBO ij	1.3122 *	0.0284
	(0.7113)	
SHARE LATE LBO ij	0.0298	6.44E-04
	(0.6168)	

* statistically different from zero at the 10% level
** statistically different from zero at the 5% level
*** statistically different from zero at the 1% level

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is in units of $10,000 households
DEV MEAN STORES/HH j is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Table 6. Maximum likelihood estimation results for incumbent firms, separating out the effects of LBO rivals with a large market position from LBO firms with small market positions. Common estimates are coefficients that are constrained to be the same for LBO and non-LBO firms. Non-LBO firms and LBO firms have separate coefficients for strategic market condition variables. Marginal effects are calculated for both LBO and non-LBO firms, based on their separate thresholds for adding and subtracting stores. Standard errors are in parentheses. The dependent variable takes on the following values. Yij=-1 if firm i withdraws stores from market j, Yij=0 if firm i neither adds nor withdraws stores in market j, and Yij=1 if firm i adds stores in market j.

VARIABLES	COMMON ESTIMATE	NON-LBO FIRM ESTIMATE	NON-LBO FIRM MARGINAL EFFECTS dProb[y=-1] dx	NON-LBO FIRM MARGINAL EFFECTS dProb[y=0] dx	NON-LBO FIRM MARGINAL EFFECTS dProb[y=1] dx	LBO FIRM ESTIMATE	LBO FIRM MARGINAL EFFECTS dProb[y=-1] dx	LBO FIRM MARGINAL EFFECTS dProb[y=0] dx	LBO FIRM MARGINAL EFFECTS dProb[y=1] dx
Δ HOUSEHOLDS j	0.0072 0.0135		-0.0028	0.0003	0.0025		-0.0021	-0.0006	0.0027
Δ INCOME j	-0.5184 1.3054		0.2016	-0.0222	-0.1794		0.1541	0.0420	-0.1961
Δ INCOME2 j	0.0371 0.1206		-0.0144	0.0016	0.0128		-0.0110	-0.0030	0.0140
Δ SHARE LESS $10K j	-0.0596 0.0904		0.0232	-0.0026	-0.0206		0.0177	0.0048	-0.0225
Δ HH/MILE j	-7.2007 5.4257		2.8008	-0.3085	-2.4923		2.1402	0.5840	-2.7241
DEV STORES/HH j	0.1751 0.2928		-0.0681	0.0075	0.0606		-0.0520	-0.0142	0.0662
TOTAL STORES i	-0.0649 ** 0.0294		0.0252	-0.0028	-0.0224		0.0193	0.0053	-0.0245
MARKET SHARE ij		-0.8255 2.0705	0.3211	-0.0354	-0.2857	-4.4234 * 2.6033	1.3147	0.3587	-1.6734
HHI5 j		-1.5962 4.7227	0.6209	-0.0684	-0.5525	-8.3512 7.8212	2.4821	0.6773	-3.1594
SHARE TOP 3 ij		2.1254 1.8302	-0.8267	0.0911	0.7356	3.1888 2.5808	-0.9478	-0.2586	1.2064
SHARE TOP 3 LBO ij		1.6703 *** 0.6655	-0.6497	0.0716	0.5781	0.3083 0.9203	-0.0916	-0.0250	0.1167
SHARE NON-TOP 3 LBO ij		3.0505 ** 1.4657	-1.1866	0.1307	1.0559	1.9839 1.5840	-0.5897	-0.1609	0.7505
EXIT THRESHOLD		0.9748 0.6082				-0.0175 0.6234			
ENTRY THRESHOLD		1.2827 0.6097				0.4239 0.6276			

* statistically different from zero at the 10% level
** statistically different from zero at the 5% level
*** statistically different from zero at the 1 % level

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is in units of 10,000 households

DEV MEAN STORES/HH j is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Table 7: Regression equation. Dependent variable is total store growth in each of 85 local markets.

CONSTANT	0.0261095 (0.1351)
% Δ HOUSEHOLDS	0.5985 *** (0.1549)
% Δ INCOME	-0.9694 (1.1372)
% Δ INCOME2	0.2898 (0.3463)
Δ % LESS $10K	-0.0073 (0.0084)
% Δ HH/MILE	67.7433 (53.3938)
% DEV STORES/HH	-0.1056 * (0.0604)
HHI5	-0.0794 (0.2775)
SHARE LBOs	0.0801 (0.0788)

Table 8: Regression equation. Dependent variable is total store growth in each of 85 local markets.

CONSTANT	0.0387 (0.1338)
% Δ HOUSEHOLDS	0.5673 *** (0.1541)
% Δ INCOME	-1.0558 (1.1247)
% Δ INCOME2	0.3164 (0.3427)
Δ % LESS $10K	-0.0080 (0.0082)
% Δ HH/MILE	71.4290 (51.3393)
% DEV STORES/HH	-0.0958 (0.0595)
HHI5	-0.0959 (0.2716)
SHARE EARLY LBOs	0.1580 * (0.0929)

Table 9. Maximum likehood estimation for non-LBO potential entrants. Different coefficients are allowed for the market share of LBO firms among firm i's top three rivals in the market and for the market share of LBO firms not among the top three rivals in the market. The dependent variable takes on the following values: Yij=0 if firm i does enter market j, Yij=1 if firm i enters market j.

VARIABLES	COEFFICIENT	Marginal effects dProb[y=1] dx
ENTRY THRESHOLD	1.2717 (0.7393)	0.0268
Δ HOUSEHOLDS j	0.0904 *** (0.0222)	0.0019
Δ INCOME j	1.0804 (1.3334)	0.0228
Δ INCOME2 j	-0.1980 (0.1424)	-0.0042
Δ SHARE LESS $10K j	0.1444 * (0.0754)	0.0030
Δ HH/MILE j	-13.4639 (12.7802)	-0.2838
DEV MEAN STORES/HH j	-0.6471 * (0.3783)	-0.0136
HERFINDAHL j	-2.8615 (5.7597)	-0.0603
TOTAL STORES i	-0.1460 * (0.0792)	-0.0031
DISTANCE ij	-0.0023 *** (0.0005)	-4.76E-05
SHARE TOP 3 ij	1.2615 (2.4438)	0.0266
SHARE TOP 3 LBO ij	0.5800 (0.5006)	0.0122
SHARE NON-TOP 3 LBO ij	-0.9804 (1.8425)	-0.0207

* statistically significant at the 10% level
** statistically significant at the 5% level
*** statistically significant at the 1% level

Δ HOUSEHOLD j is in units of 10,000 households
Δ INCOME j is in units of $10,000
Δ INCOME2 j is in units of $100,000,000
Δ HH/MILE is in units of 10,000 households
DEV MEAN STORES/HH j is in units of 100 stores
TOTAL STORES i is in units of 100 stores

Chapter 3: A Study of Supermarket Pricing

In this chapter, I examine empirically the relationship between firm capital structure and pricing behavior. The leverage buyout (LBO) wave of the late 1980s provides an opportunity to study firms that dramatically increased their debt levels. I examine changes in a supermarket's pricing behavior coincident with its undertaking an LBO or a leveraged recapitalization[27] by examining the change in grocery prices in a city when a supermarket chain with a large local market share undertakes an LBO. I find that the change in a city's overall grocery price level relative to the average grocery price level in the U.S. is significantly positively correlated with the LBO firm's share of the total supermarkets in the city. Using a separate data set, I also compare the 1992 prices of firms which undertook LBOs in the late 1980s to the 1992 prices of their less leveraged rivals, and find that LBO firms had higher prices in 1992 than non-LBO firms in the same city.

These results suggest that firm capital structure can effect product market competition. However, the empirical results are inconsistent with some recent theoretical models of capital market-product market interactions, including Brander and Lewis (1986), Maksimovic (1988), and Rotemberg and Scharfstein (1990); these predict that leverage makes firms more aggressive competitors by changing managerial and shareholder incentives.

The empirical results in this chapter are somewhat consistent with other theoretical literature examining the effect of debt on product market competition. For example, Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990) argue that information problems in the capital market make it difficult for firms with low cash reserves to raise

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[27] One supermarket chain, Kroger, undertook a leveraged recapitalization. A leverage recapitalization is a transaction in which a firm borrows in order to pay a large dividend to shareholders of a least 50% of the former equity value of the firm. Because this recap resulted in debt levels for Kroger similar to typical LBO debt levels, it is included in this analysis. For convenience, for the rest of this paper, I will use the term "LBO" to mean "LBO or leveraged recapitalization."

financing. They show that these liquidity constraints encourage deep-pocket firms to compete aggressively and deplete the cash reserves of their less liquid rivals. These papers suggest a reason why non-LBO firms have lower prices than LBO firms-- the non-LBO firms are trying to drive LBO firms from the market. However, these papers provide no explanation for the observation that LBO firms tend to raise their prices at the time of their LBO.

The finding that LBO firms tend to raise their prices is roughly consistent with Phillips (1991). Phillips argues that firms may undertake high leverage in order to commit to rivals not to undertake certain competitive investments. In the Phillips paper, all competitors in a market are better off when one firm undertakes a leverage increase. However, the Phillips paper describes a mechanism by which all firms would tend to raise their prices following an LBO. The Phillips paper offers no explanation for the observation that LBO firms tend to have higher prices than their non-LBO rivals in the same city.

This study confirms and extends the results in Chapters 1 and 2. In Chapter 1, I find that supermarket chains experience a positive a significant share price response to the announcement that a rival chain is undertaking an LBO. This positive share price response is limited to those firms which are in some of the same local markets as the firm undertaking the LBO. This result suggests that LBOs are good news for a firm's rivals. One reason that an LBO could be good news is because the LBO firm is expected to increase prices, as I find here. In Chapter 2, I find evidence that supermarket chains find entry and expansion more attractive in local markets dominated by firms which have undertaken LBOs. If LBO firms raise their prices at the time of the LBO and maintain higher price levels than their rivals as I find here, then entry into LBO markets should be attractive to less leveraged chains.

The organization of the rest of the chapter is as follows. Section 1 examines price changes in a city coincident with the leveraged buyout of a supermarket chain with a large

market share in that city. Section 2 examines the prices of supermarkets which undertook LBOs in the late 1980s relative less leveraged supermarkets in the same city. Section 3 concludes.

1. Prices Changes at the Time of an LBO

In this section, I examine how prices change in a city when an incumbent supermarket chain with a significant market position in the city undertakes an LBO. This is accomplished by uniting three data sets: the American Chamber of Commerce Researchers Association's quarterly price index; Progressive Grocer's Market Scope, which contains information on supermarket locations; and a master list of supermarket LBOs.

For information about supermarket locations, I use Progressive Grocer's Market Scope. Progressive Grocer lists all of the supermarkets operating in each of the 100 largest Metropolitan Statistical Areas in the United States and lists the number of stores in each chain. The Progressive Grocer data lists store names, not the names of parent companies. Store names were matched to parent company names using the Retail Tenants Directory, Thomas's Grocery Register, and supermarket firms' annual 10K disclosures.

The information on LBOs was obtained in two ways. First, I searched for references of supermarket LBOs in quarterly editions of Mergers and Acquisitions, which contains information on all ownership transactions (including LBOs) of greater than $1 million. Second, I also searched all references to transactions involving the supermarket parent companies in the sample using indices to Supermarket News, Supermarket Business, and Progressive Grocer. From these sources, a list of LBOs was assembled. Mergers and Acquisitions and firm 10Ks were used to determine the date on which each LBO was legally consummated. This study is limited to the period in which most of the supermarket LBOs took place: 1985 to 1990.

A supermarket chain which undertook an LBO was considered to have a significant market share in a city in the Progressive Grocer sample if the supermarket chain accounted for at least 5% of the total supermarkets in the city in 1985. All instances of the LBO of a firm with a significant market share in a city in the Progressive Grocer sample were identified.

The Progressive Grocer chain location data were then matched to price data. The price data for this section are drawn from the American Chamber of Commerce Researchers Association (ACCRA) Cost of Living Index. The Progressive Grocer data is at the MSA level and the ACCRA data is at the city level. Thus, I am assuming that the stores described in the MSA level data are distributed evenly enough across the MSA that the share of each store in a city is approximately the same as the share of that store in the MSA.

The ACCRA index quantifies price differences among cities to assist individuals making locational decisions. The index attempts to include goods representative of those purchased by a typical "middle manager". The overall ACCRA price index is composed of various components; I employ the grocery price index component which is reported separately. The grocery price index compares the cost of a specific basket of grocery products in a city to the cost of the same basket in other cities in the ACCRA survey. That is, the grocery price index equals the price of the basket of grocery products divided by the average price of the basket in all ACCRA cities. The items included in construction of the grocery price index are shown in the Data Appendix.

There were a total of 35 cities for which complete ACCRA data were available. The LBOs in these cities all took place between 1985 and 1989. The data can contain multiple cities for a single LBO. For example, 13 of the observations are for the Kroger LBO and 11 are for the Safeway LBO. The rest are for smaller LBOs.

Price index changes following an LBO in a city were calculated using the change in the grocery price index for the city between the "base quarter" and quarters following.

The "base quarter" is the quarter before an LBO was consummated if the LBO took place in the first half of the quarter. The "base quarter" is the same quarter in which the LBO took place if the LBO was consummated in the second half of the quarter. Price index changes between the base quarter and each of the 6 quarters following the base quarter were calculated. Of course, price index changes between the base quarter and future quarters are more likely to be affected by factors other than the LBO as the time window under observation becomes wider. The price index changes measure the change in the price of the ACCRA basket of grocery products in a city relative to the average price of the basket in the entire ACCRA sample. The tests which follow control for any city fixed effects because the price index observation for each city is compared only to other observations of the price index for the same city. Further, by using the price index, I control for general grocery price changes. The prices for each city are measured relative to the average prices in all ACCRA cities. Thus, these tests control for time effects, because each city's grocery price level is measured relative to the U.S. average grocery price level.

When a supermarket chain undertakes an LBO, there are two effects on the total price level of the city. The first is any effect on the total price level of the LBO firm's own price changes. The second is the effect that the LBO may have on the prices charged by rivals. These two effects will not necessarily move prices in the same direction. For example, it has been argued in the trade and financial press that LBO firms may increase prices following the LBO. One reason for this is related to the high search and switching costs in this industry. An experimental study of supermarkets by Devine and Marion (1979) recorded supermarket pricing behavior and customer shopping behavior following newspaper publication of prices for 26 supermarkets in the Ottawa-Hull, Canada. The study shows some evidence that consumers switch supermarkets in response to the information that they were shopping in a high-priced supermarket. However, their results also suggest that consumers do not have complete information about the relative costliness

of their supermarket. If learning about supermarket prices is costly and takes time, then a supermarket chain can increase revenues in the short run by raising prices. If supermarket chains are cash-constrained, they may spend their reputations for low prices in order to ameliorate their immediate cash constraints.

It is not clear how one should expect rival supermarket chains to respond to the price changes of the LBO supermarket chains. Since prices are strategic complements, one would expect that, if a supermarket chain can commit to charging higher prices, rival supemarket chains will charge higher prices also. However, a rival supermarket chain will not increase prices if it hopes to induce exit, because an increase in prices by the rival raises the profits of the LBO firm. Presumably, the speed with which consumers learn about the price differences between firms is a function of both time and the magnitude of the price differences between the two firms. Deep pocket supermarket chains may lower their prices dramatically in order to force consumers to learn quickly about the price differences between the two chains and to induce exit of the LBO chain. For example, Forbes reports that "the sharp blade of pricing can... be effective against leveraged rivals. The ink was not yet dry on Safeway's 1986 LBO when Giant Food Inc. of Landover, Maryland slashed prices on more than 400 items in its Washington outlets." While Giant was not successful in inducing Safeway's exit from the D.C. market, it was widely reported in the supermarket and financial press that the D.C. division was strongly considered by Safeway management as a candidate for a post-LBO asset sale.

Thus, the expected overall effect of an LBO on a city's price level is unclear. Table 1 shows the post-LBO price changes for the 35 cities under study. Table 1 does not show unambigously that grocery prices in a city either rise or fall when a supermarket chain with a significant market share undertakes an LBO. Significance levels for two types of tests are shown in Table 1. The first test is a matched pairs two-sample t-test which tests

whether the mean price change across the 35 cities in the sample is zero.[28] The second set of significance levels reported in the table correspond to a test of whether the median price change across the 35 cities is zero. If the median price change were zero, then one would expect that half of the cities would experience a positive price change, while half would experience a negative price change. I test whether the number of cities in which prices rose or fell is significantly different from the number expected if "prices fell" and "prices rose" were drawn from a binomial distribution with the probability of either change equalling one-half.

Table 1 shows that, in the first quarter following the LBO, the average price change across the 35 cities is positive. The median price change is statistically different from zero at the ten percent confidence level. In contrast, the average price change across the 35 cities is negative for the second through sixth quarters. In the fourth quarter following the LBO, both the mean and median price changes are statistically different from zero at the 5% confidence level.

The mean city grocery price change is calculated across cities in which an LBO would be expected to have very different effects. For example, San Diego, California is included for the period surrounding the Vons LBO in 1985. Vons accounts for 49% of

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28 The two-sample matched pairs t-test is more efficient than the standard t-test because it uses the information that the price index observations for each pair of periods are matched pairs of observations for the same city. The test statistic for the hypothesis that the difference between X and Y equals zero is:

$$\frac{\sum_{i=1}^{n} \frac{X_i - Y_i}{n} \sqrt{n}}{\sqrt{\frac{\sum_{i=1}^{n} (X_i - Y_i)^2}{n}}}$$

The t statistic for the two-sample t-test is numerically identical the t-statistic for the constant term in the regression of $(X_i - Y_i)$ on a constant.

the total supermarkets in San Diego. On the other hand, Manchester, New Hampshire is included following the Supermarkets General LBO in 1987. Supermarkets General accounts for only 5% of the total supermarkets in Manchester.

When a firm has a large market share in a city, then the firm's prices should form a large component of the average supermarket prices used to construct the ACCRA price index for that city. Also, when a firm has a large market share in a city, that firm may be more likely to act as a "price leader" in that city. That is, other firms may be more likely to mimic a large firm's price changes. Finally, when a supermarket has a large market share in a city, it is likely to be highly profitable in that city due to economies of scale in that industry.[29] Thus, rival supermarket chains would be less likely to try to lower their prices to induce the exit of a supermarket chain with a large market share. For these three reasons, if debt affects pricing behavior, we would expect to find some correlation between the change in the ACCRA price index for each city over the LBO window and the market share of the supermarket chain undertaking the LBO. If the change in the ACCRA price index was negatively correlated with the share of the LBO firm, this would tend to suggest that the LBO firm was lowering its prices following the LBO. If the change in the ACCRA price index was positively correlated with the share of the LBO firm, this evidence would favor the hypothesis that the LBO firm was raising its prices following the LBO. A positive correlation would also support the hypothesis that LBO supermarket chains do not change their prices following an LBO, but that rival supermarket chains lower their prices following the LBO of a supermarket with a small market share in order to try to induce exit.[30]

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29 See Chevalier (1993) for a discussion of the positive correlation between market share and profitability in the supermarket industry.

30 This hypothesis is however, not consistent with the finding above that prices rise significantly in the quarter immediately following the LBO.

Table 2 shows the correlation between the percent change in the ACCRA price index and the share of the firm undertaking the LBO. The share of the firm undertaking the LBO is calculated by using the firm's share of total stores in the city from the Progressive Grocer data. The simple correlations are reported along with the significance level for the test of the hypothesis that the correlation equals zero.[31]

For all six of the time windows examined, the correlation between the change in the index and the share of the LBO store is positive. It is difficult to imagine other hypotheses that would explain this result other than the hypothesis that LBO firms raise their prices in the periods following an LBO. The positive correlation between the price change and the LBO share is statistically different from zero at the five percent confidence level for the first window following the LBO. The finding that the largest and most significant correlation coefficient is for the first is encouraging, since the narrowest window is the one in which factors other than the LBO are the least likely to contaminate the results. The positive correlation is also statistically different from zero at the 10 percent level for the fourth window following the LBO.

The main result of this section is that, in the window of time immediately before an LBO and the time following an LBO, the change in the relative price level of a city is positively correlated with the share of total stores in the city accounted for by the firm undertaking the LBO. This finding suggests that LBO firms raise their prices around the time of their LBO. That this change in the prices of the LBO store was not detected in the change in the overall price level of the city is not surprising since in general, the LBO store

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31 The test statistic for the hypothesis that $\rho(X,Y)$, the correlation between X and Y, equals zero is:

$$\frac{\sqrt{n-2}\,\rho}{\sqrt{1-\rho^2}}$$

This statistic is distributed t with n-1 degrees of freedom. The statistic is numerically identical to the t-statistic for the coefficient on X in a regression of Y on X and a constant.

represents a small share of the total supermarkets from which average prices are constructed.

2. Price Differences within the City

Section I showed that price increases in a city over the period in which an LBO takes place are correlated with the market share of the LBO firm. This result suggests that LBO firms may raise their prices when they undertake an LBO. However, the results of Section I do not allow us to separate two possible hypotheses. The first hypothesis is that LBO firms had lower prices than non-LBO firms before the LBO, and raised their prices at the time of the LBO to meet the market price. The second hypothesis is that LBO firms raise their prices at the time of the LBO and end up with higher prices than their rivals. Table 3 helps to distinguish between these two hypotheses. Table 3 examines the question of whether, in 1992, LBO firms had higher prices than their non-LBO rivals in the same city.

Table 3 uses supermarket electronic scanner data to compare the price levels of LBO and non-LBO supermarket chains. These data were obtained from Information Resources Inc.(IRI), a firm which collect scanner data from supermarkets for sale to manufacturers of supermarket products. The data aggregate the scanner information for all of the stores in a chain within one city. However, the data is a unique resource in that it reports firm-specific information.[32]

The scanner database organizes supermarket products into 551 different product "types". A product type is a narrowly defined supermarket product such as egg substitutes, furniture polish, shelf stable clam juice, etc. I eliminate from study product types which <u>any</u> supermarket in the IRI database did not sell in 1992. Thus, I will

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[32] Unfortunately, the IRI data are not available for the time period during which the supermarket LBOs took place. Thus, scanner data could not be used to examine an individual firm's prices before and after an LBO took place.

compare prices for product types carried by all supermarket chains in the sample. Three hundred fifty six product types were carried by all supermarkets in the database.

I constructed a price index for each supermarket. The price index consists of the sum of the supermarket's average price for each product type, weighted by the dollar share of the product type in total U.S. supermarket sales of the 356 product types. Weighting the product prices in this manner is sensible because consumers would consider a weighted average of product prices when comparing supermarket prices. If consumers are going to buy all of their supermarket needs in one store, then they would compare the price level of their desired basket of purchases at different supermarkets. Weighing a product's price's contribution to the price index by the product's share of total U.S. supermarket sales weights the product by its importance in the average U.S. consumer's market basket.

Each supermarket's price index is compared to the price index of other supermarkets in the same city. This is done to avoid attempting to control for the myriad cost differences across cities which could lead to different prices across cities. Supermarkets producing efficiently in the same city should have very similar costs. In order to examine LBO and non-LBO prices in the same city, I study only the 17 cities in the IRI database which have data for both LBO and non-LBO supermarkets in 1992.

For each city, I compute a non-LBO average price level and an LBO average price level. Altogether, 24 LBO and 25 non-LBO firm price levels are used to compute these averages. Table 3 shows tests of the hypotheses that the mean and median difference between the non-LBO average price level for a city and the LBO average price level is zero. The test statistics in Table 3 understate the true significance level of the price differences because they ignore that the LBO price level and the non-LBO price level are means for each city. The test statistics treat these means as simple observations.

The results clearly suggest that LBO firms are the high priced firms in their cities. On average, the LBO supermarket price level in a city is 3.1% higher than the non-LBO supermarket price level. The hypothesis that the true mean difference between LBO and

non-LBO price levels is zero is rejected at the 1% level using a two sample t-test of matched pairs of observations.

I also test whether the median difference between LBO and non-LBO price levels is zero. In thirteen out of 17 cities, the mean price level of the LBO firms in the city is higher than the mean price level of the non-LBO firms in the city. The test that the median price difference is zero is simply the test of the probability that 13 out of 17 cities in the sample would show higher LBO prices if LBO prices equal non-LBO prices for the median city. If the median city had no price difference between LBO firms and non-LBO firms, then one would expect to observe higher LBO prices half of the time. In 17 flips of a fair coin, the probability of obtaining heads 13 times is 0.025. Table 3 reports the two-tailed significance level, or the probability of having one type of firm appear to have higher prices than the other type of firm 13 out of 17 times. The two tailed significance level of the test of equality of the medians is 0.049.

One striking fact drawn from comparison of LBO and non-LBO overall price levels is not reported in Table 3. For each city, I ranked all of the supermarkets in the city by their price levels. In 10 of the 17 cities, all of the LBO supermarkets in the city had higher prices than any of the non-LBO supermarkets in that city. The reverse was only true for one of the 17 cities.

Table 3 also reports the average price differences between LBO and non-LBO stores for broad categories of supermarket products. These broad categories were: refrigerated foods, frozen foods, shelf-stable foods, health and beauty aids, and household cleaners. The LBO firms had higher prices on average for all of these categories of supermarket products. Price differences between non-LBO and LBO stores were greatest for the health and beauty aid category, and the shelf stable food category. Mean and median price differences between the two classes of stores were significant at the 5% level for health and beauty aids, shelf stable food, and frozen food.

These results strongly support the hypothesis that LBO firms are higher priced firms than their rivals. The price difference between LBO firms and their rivals does not appear to be due to LBO firms for some reason increasing prices on one line of products. Rather, the evidence suggest that LBO firms have higher prices throughout the supermarket.

3. Summary and Conclusion

The results of this chapter suggest that LBO supermarkets raise their prices following an LBO and that LBO firms have higher prices than the other supermarkets in their cities. These results are consistent with the results for supermarket LBOs in Chapter 1 and Chapter 2, but are not fully explained by any of the existing theoretical models of supermarket pricing.

These results do not answer the question of whether or not the large debt increases of the late 1980s were value-enhancing or value-destroying for supermarket chains. It may be, for example, that non-LBO supermarket chains charge inefficiently low-priced and are inefficiently patient in their attempts to induce the exit of rivals. Or, it may be true that, while leverage has other benefits, it is costly to the firm in product market competition. However, the results of this chapter, especially when taken together with the results of Chapter 1 and Chapter 2, clearly suggest that there exists a real link between a firm's capital structure and its product market behavior.

TABLE 1: The change in prices between the base quarter and quarters following the LBO. The base quarter is the quarter before the LBO if the LBO took place in the first half of the quarter. The base quarter is the quarter in which the LBO took place if the LBO took place in the second half of the quarter. The first significance test is a two-sample t-test with matched pairs, testing if the prices following the LBO differ from prices in the base quarter. The test of medians tests if the median price difference between a quarter following the LBO differ from prices in the base quarter. The table tests if the number of cities in which prices fell or rose following the base quarter is significantly different from the number expected if "prices fell" and "prices rose" were drawn from a binomial distribution with the probability of either change equalling one-half. The total number of cities in the sample is 35.

	PRICE DIFFERENCE	SIGNIFICANCE LEVEL (prob mean price diff = 0)	NUMBER OF CITIES WITH POSITIVE PRICE CHANGE	SIGNIFICANCE LEVEL (prob median price diff = 0)
time 0 to time 1	1.031%	0.130	23	0.090
time 0 to time 2	-0.768%	0.700	14	0.311
time 0 to time 3	-0.769%	0.102	14	0.311
time 0 to time 4	-1.230%	0.002	10	0.027
time 0 to time 5	-0.505%	0.339	15	0.500
time 0 to time 6	-0.451%	0.341	17	1.000

TABLE 2: This table reports the correlation between price changes between the base quarter and quarters following the LBO in a city and the store share of the firm undertaking the LBO in that city. The significance level reports the probability that the true correlation equals zero. The total number of cities in the sample equals 35.

	CORRELATION BETWEEN PRICE CHANGE AND SHARE OF THE LBO FIRM	SIGNIFICANCE LEVEL (probability correlation = 0)
time 0 to time 1	0.357	0.035
time 0 to time 2	0.265	0.123
time 0 to time 3	0.271	0.115
time 0 to time 4	0.292	0.089
time 0 to time 5	0.190	0.275
time 0 to time 6	0.207	0.233

TABLE 3: For each city, an average price index for the LBO stores and an average price index for the non-LBO stores is calculated. This table reports tests of whether the mean and median price differences between the LBO stores and non-LBO are zero. The test of the mean price difference is a two-sample matched pairs t-test. The test of the median price difference is a test of whether the number of cities in which the average LBO store price was higher than the average non-LBO store price is more than would be expected if "higher prices" and "lower prices" were drawn at random from the binomial distribution. The total number of cities in the sample is 17.

CATEGORY	MEAN OF THE PRICE DIFFERENCES BETWEEN THE LBO AND THE NON-LBO STORES IN EACH CITY	SIGNIFICANCE LEVEL (prob mean price diff=0)	NUMBER OF CITIES IN WHICH LBOS HAD HIGHER PRICES	SIGNIFICANCE LEVEL (prob median price dif=0)
OVERALL	3.096%	0.003	13	0.049
REFRIGERATED FOODS	1.582%	0.237	12	0.143
FROZEN FOOD	2.223%	0.140	13	0.049
SHELF-STABLE FOOD	3.525%	0.004	13	0.049
HEALTH&BEAUTY AIDS	4.620%	0.001	13	0.049
CLEANERS	2.510%	0.190	10	0.629

DATA APPENDIX:

GROCERY ITEMS IN ACCRA INDEX

T-Bone Steak	Price per pound, USDA choice
Ground Beef or Hamburger	Price per pound, lowest price
Bacon	Price per pound, rashers, Oscar Mayer, Hormel Black Label, Armour or Field's
Frying Chicken	Whole fryer, price per pound
Chunk Light Tuna	6.5 oz. can, Starkist or Chicken of the Sea, packed in oil.
Whole Milk	One-half gallon carton
Eggs	One dozen grade-A large
Margarine	One pound, Blue Bonnet or Parkay
Parmesan Cheese, Grated	8 oz. canister, Kraft
Potatoes	10 pound sack, white or red, lowest price
Bananas	Price per pound
Head Lettuce	Head (approx. 1.25 pound size)
Bread, White	24 oz. loaf, lowest price
Cigarettes	Carton, Winston, king-size (85mm)
Coffee, Vacuum-packed	One pound, Maxwell House, Hills Brothers, or Folgers
Sugar	5 pounds, cane or beet, lowest price
Corn Flakes	18 oz. Kelloggs or Post Toasties
Sweet Peas	17 oz. can Del Monte or Green Giant
Tomatoes	14.5 oz. can, Hunt's or Del Monte
Peach Halves	29 oz. can, Hunt's, Del Monte, or Libby's
Facial Tissue	175-count box, Kleenex brand
Washing Powder	42 or 49 oz. , Tide, Bold, or Cheer
Shortening	3 pound can, all-vegetable Crisco
Frozen Orange Juice	12 oz. can, Minute Maid brand
Frozen Corn	10 oz. whole kernel, lowest price
Baby Food	4.5 oz. jar, strained vegetables, lowest price
Soft Drink	2 liter Coca-Cola, excluding any deposit

BIBLIOGRAPHY

American Chamber of Commerce Researchers Association, Inter-City Cost of Living Index, and Cost of Living Index, various issues.

Amemiya, T., Advanced Econometrics, Harvard University Press, Cambridge, MA, 1985, p. 348-354.

Berry, S.T., "Estimation of a Model of Entry in the Airline Industry", Econometrica 1992, vol. 60, p. 889-917.

Bolton, P. and D. Scharfstein, "A Theory of Predation Based on Agency Problems in Financial Contracting", American Economic Review 1990, vol. 80, p. 93-106.

Brander, J.A. and T.R. Lewis, "Oligopoly and Financial Structure," American Economic Review 1986, vol. 76, p. 956-970.

Bresnahan, T. and P. Reiss, "Do Entry Conditions Vary Across Markets?", Brookings Papers on Economic Activity 1987, no. 3, p. 835-879.

Bresnahan, T. and P. Reiss, "Entry in Monopoly Markets", Review of Economic Studies 1990,vol. 57, p. 531-553.

Cotterill, R. and L. Haller, "Barrier and Queue Effects: A Study of Leading U.S. Supermarket Chain Entry Patterns," The Journal of Industrial Economics 1992, vol. 40, p. 427-440.

Devine, D.G. and B.W. Marion, American Journal of Agricultural Economics 1979, vol. 61, p. 228-237.

Dunne T., M. Roberts, and L. Samuelson, "Patterns of Firm Entry and Exit in U.S. Manufacturing Industries," Rand Journal of Economics 1988, vol. 19, p. 495-515.

Eckbo, B.E., "Horizontal Mergers, Collusion, and Stockholder Wealth", Journal of Financial Economics 1983, vol. 11, p. 241-273.

Eckbo, B.E. and P. Wier, "Antimerger Policy under the Hart-Scott-Rodino Act: A Reexamination of the Market Power Hypothesis," Journal of Law and Economics 1985, vol. 28, p. 119-149.

Fama, E., Foundations of Finance, 1976, Basic Books.

Fudenberg, D. and J. Tirole, " A 'Signal-Jamming' Theory of Predation," Rand Journal of Economics 1986, vol. 17, p. 366-376.

Greene, W., Econometric Analysis, Macmillan Publishing Company, New York, 1990, p. 686-689.

Guedes, J. and T. Opler, "The Strategic Value of Leverage: An Exploratory Study," unpublished manuscript, Cox School of Business, Southern Methodist University, 1992.

Jensen, M.C., "The Eclipse of the Public Corporation," Harvard Business Review 1989, no. 5, p. 61-74.

Kaplan, S.N., "The Effect of Management Buyouts on Operations and Value," Journal of Financial Economics 1989, vol. 24, p.217-254.

Kaplan, S.N. and J. Stein, "The Evolution of Buyout Pricing and Financial Structure in the 1980s," Quarterly Journal of Economics, forthcoming.

Kaufman, P.R. and C.R. Handy, "Supermarket Prices and Price Differences: City, Firm, and Store-Level Determinants", Economic Research Service, U.S. Department of Agriculture, TB-1776, Dec. 1989.

Lang, L. and R. Stultz, "Contagion and Competitive Intra-Industry Effects of Bankruptcy Announcements: An Empirical Analysis," Journal of Financial Economics, forthcoming.

Lichtenberg, F.R. and D. Siegel, "The Effect of LBOs on Productivity and Related Aspects of Firm Behavior," Journal of Financial Economics 1990, vol. 27, p. 165-194.

Magowan, P., "The Case for LBOs: The Safeway Experience," California Management Review 1989, vol. 32, p. 9-18.

Maksimovic, V., "Capital Structure in Repeated Oligopolies," Rand Journal of Economics 1988, vol. 19, p. 389-407.

McAfee, R.D. and M.A. Williams, "Can Event Studies Detect Anticompetitive Mergers?" Economics Letters 1988, vol. 28, p. 199-203.

Modigliani, F. and M. Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investment," American Economic Review 1958, p. 261-297.

Phillips, G.M., "Financial Slack, Refinancing Decisions, and Firm Interaction", working paper, Purdue University, 1991.

Phillips, G.M., "Increased Debt and Product Market Competition: An Empirical Analysis," working paper, Krannert School of Management, Purdue University, 1992.

Progressive Grocer's Annual Report of the Supermarket Industry, April 1989 edition of Progressive Grocer.

Progressive Grocer's Market Scope, MacLean Hunter Media, White Plains, NY, 1986 and 1992 editions.

Retail Tenants Directory, National Mall Monitor, Clearwater, Florida, 1988 edition.

Rose, N., "The Incidence of Regulatory Rents in the Motor Carrier Industry," Rand Journal of Economics 1985, vol. 16, p. 299-318.

Rotemberg, J. and D. Scharfstein, "Shareholder-Value Maximization and Product Market Competition", The Review of Financial Studies 1990, vol. 3, p. 367-391.

Spence, A.M., "Capital Structure and the Corporation's Product Market Environment," In Corporate Capital Structures in the United States, ed. B. Friedman, University of Chicago Press, Chicago, IL., p. 353-382.

Stillman, R., "Antitrust Horizontal Merger Policy, " Journal of Financial Economics 1983, vol. 11, p. 225-240.

Supermarket News Distribution Study of Grocery Store Sales, 1987 - 1990 editions, Fairchild Publications.

Whinston, M.D. and S.C. Collins, "Entry and Competitive Structure in Deregulated Airline Markets: an Event Study Analysis of People Express," Rand Journal of Economics 1992, vol. 23, p. 445-462.

Wruck, K., "Leveraged Buyouts and Restructuring: The Case of Safeway, Inc.," Harvard Business School Case N9-192-095, 1992.