This is to certify that the

dissertation entitled

The Impact of Firm and Market Specific Characteristics on Product Market Competition: An Empirical Analysis of the Discount Department Store Industry

presented by

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has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Finance

Naveen Khanna
Major professor

Date August 17, 1998

DATE DUE	DATE DUE	DATE DUE
JUN 0 8 1999 APR 1 0 2005 0 1 2 6 0 5		

THE IMPACT OF FIRM AND MARKET SPECIFIC CHARACTERISTICS ON PRODUCT MARKET COMPETITION: AN EMPIRICAL ANALYSIS OF THE DISCOUNT DEPARTMENT STORE INDUSTRY

By

Sheri Teresa Tice

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Finance

1998

ABSTRACT

THE IMPACT OF FIRM AND MARKET SPECIFIC CHARACTERISTICS ON PRODUCT MARKET COMPETITION: AN EMPIRICAL ANALYSIS OF THE DISCOUNT DEPARTMENT STORE INDUSTRY

By

Sheri Teresa Tice

Recent empirical research has documented that leverage impacts firm aggressiveness in the product market. I extend this research by studying how managerial ownership as well as other firm and market specific characteristics affect firm aggressiveness in the product market.

The discount department store industry is an excellent industry to use due to a lot of heterogeneity in firm specific characteristics, essentially homogeneous merchandise, and a large number of firms in the industry. Because Wal-Mart entered many local markets, expanded through connected regions, and retained their cost advantage over the period, their entry into local markets can be seen as exogenous. Thus, the discount department store industry provides a natural experiment to study which firm and market specific characteristics determine how incumbent firms respond to a new threat, the entry of Wal-Mart, at the local market level.

In a study of the expansion responses of incumbent firms in the discount department store industry to new entry by Wal-Mart into local markets, I find that private firms are less likely to expand then public firms. I also find that public firms with high managerial ownership are less likely to expand then public firms with low managerial ownership. Other results are that a higher level of debt decreases the likelihood of expansion, a higher level of focus increases the likelihood of expansion, and the more dependent a firm is on the market under attack, the greater the likelihood of expansion.

I also find that Wal-Mart has a harder time gaining market share in local markets with a high fraction of stores owned by firms with high levels of managerial ownership. Wal-Mart also has a harder time gaining market share in local markets with stores owned by firms with low debt, high focus, or high profitability. Wal-Mart also has a harder time gaining market share in low Herfindahl markets. There is evidence that stores in higher Herfindahl markets are more profitable which supports co-operation within these markets and/or high switching costs in lower Herfindahl markets.

I dedicate this dissertation and all the time and effort put forth to my parents, my husband, Barry, and my children, Brock and Crystal. My parent's encouragement helped to continue when I felt discouraged. My husband and children supported me in this endeavor, even when it required sacrifice on their part. They also helped me to keep the important things in perspective.

ACKNOWLEDGMENTS

I would like to express extreme gratitude to my dissertation chairman, Dr. Naveen Khanna. His optimism, guidance, energy, patience as well as the time he invested helping me are very appreciated. I also want to thank him for the knowledge I gained from him in the seminar I took from him as well as during the dissertation process. I cannot imagine having a better mentor.

I also want to thank the other members of my dissertation committee, Dr. Assem Safieddine, Dr. Peter Schmidt, and Dr. Richard Simonds, for their insightful and helpful comments throughout the dissertation process.

In addition, I want to thank the other faculty members in the finance department particularly those who instructed the doctoral seminars, or invested their time in the doctoral program in other ways. I also want to thank Dr. Richard Simonds for accepting me into the doctoral program while he was chairman.

I also want to thank my fellow doctoral students for their help during my stay in the program.

TABLE OF CONTENTS

LIST OF TABLES.....ix

LIST OF FIGURES.....x

CHAPTER 1 Introduction.....1

CHAPTER 2 History of the Discount Department Store Industry.....4

2.1 Definition of the Industry.....4

2.2 Firm Locations and Movements.....6

2.3 Summary.....8

CHAPTER 3 The Effect of High Managerial Ownership, Focus and Capital Structure On Firm Aggressiveness in the ProductMarket.....9

3.1 Introduction.....9

3.2 Research Design.....13

3.3 Data.....17

3.4 Empirical Results.....21

3.4.1 Explanatory Variables.....21

3.4.2 Significance of Managerial Ownership:Private Versus Public Firms.....24

3.4.3 Determinants of Private Firm Expansion.....34

3.4.4 The Significance of Managerial Ownership: Public Firms Only.....36

3.5 Robustness Checks.....42

3.5.1 Operating Profit Margin Instead of Discount Sales per Square Foot....42

3.5.2 Parent Firm Size....42

3.5.3 Unmodeled Market Heterogeneity....44

3.5.4 The Importance of Managerial Ownership Controlling for Firm Size and Economic Growth....49

3.6 Summary....50

CHAPTER 4 Incumbent and Market Specific Determinants of an Entrant's Penetration Into New Local Markets....51

4.1 Introduction....51

4.2 Research Design....53

4.3 Data....57

4.4 Empirical Results....61

4.4.1 New Entrant Penetration: The Importance of Incumbent Ownership....61

4.4.2 An Indirect Test for Managerial Entrenchment....70

4.4.3 New Entrant Penetration: Markets With Only Public Incumbent Firms....73

4.4.4 Incumbent Penetration: Markets With Both Public and Private Firms....87

4.4.5 Modified Herfindahls and Profitability....92

4.5 Summary....95

CHAPTER 5 Summary....97

APPENDIX A Tables....99

APPENDIX B Figures....136

LIST OF REFERENCES....149

LIST OF TABLES

Table 1 Chains Attacked by Wal-Mart.....99

Table 2 Summary Statistics: Public and Private Incumbent Firms.....100

Table 3 Simple Correlation Matrix: All Observations Public and Private.....101

Table 4 Univariate Probit: Public and Private Incumbent Firms.....102

Table 5 Univariate Probit: Public and Private Incumbent Firms Time Dummies Included.....103

Table 6 Summary Statistics: Private Incumbent Firms.....104

Table 7 Univariate Probit: Private Incumbent Firms.....105

Table 8 Summary Statistics: Public Incumbent Firms.....106

Table 9 Simple Correlation Matrix: Public Firm Observations.....107

Table 10 Univariate Probit: Public Incumbent Firms.....108

Table 11 Univariate Probit: Public Incumbent Firms Time Dummies Included.....109

Table 12 Univariate Probit: Public Incumbent Firms Using Operating Profit Margin.....110

Table 13 Univariate Probit: Public Incumbent Firms Parent Size Added.....111

Table 14 Univariate Probit: Public and Private Incumbents Regional Dummies.....112

Table 15 Univariate Probit: Public Incumbents Regional Dummies.....113

Table 16 Univariate Probit: Public and Private Incumbents State Population Changes....114

Table 17 Univariate Probit: Public Incumbents State Population Changes....115

Table 18 Univariate Probit: Public Incumbents State Population Changes Herfindahl Instead of Market Share....116

Table 19 Univariate Probit: The Importance of Ownership Controlling for Firm Size, and Economic Growth....117

Table 20 OLS Regressions Explaining Wal-Mart's Market Share as a Function of Ownership in a Local Market....118

Table 21 Summary Statistics: All Markets....119

Table 22 Summary Statistics: Markets With All Public Incumbents....120

Table 23 OLS Regressions Explaining Wal-Mart's Market Share as a Function of Ownership in a Local Market: Market and Firm Size Controls....121

Table 24 Constrained Least Squares Spline Regressions Testing for Differences in Slope Coefficients for Different Ownership Groups: Market and Firm Size Controls Added....122

Table 25 OLS Spline Regression: Explaining Wal-Mart's Market Share as a Function of Different Ownership Groups: Market and Firm Size Controls Added....123

Table 26 Simple Correlation Matrix for Independent Variables Using Public Incumbent Markets....124

Table 27 Summary Statistics: Markets With All Public Incumbents....125

Table 28 OLS Regressions Explaining Wal-Mart's Market Share at Year +2: Markets With Only Public Firms: Dependent Variable is Pen_j 126

Table 29 Summary Statistics: Markets With All Incumbents....127

Table 30 OLS Regressions Explaining Wal-Mart's Market Share at Year +4: Markets With Only Public Firms....128

Table 31 OLS Regressions Explaining Wal-Mart's Market Share in Year +2 as a Fraction of Stores In Market in Year -1: Markets With Only Public Firms....129

Table 32 Simple Correlation Matrix for Independent Variables Using All Local Markets....130

Table 33 Summary Statistics: All Local Markets....131

Table 34 OLS Regressions Explaining Wal-Mart's Market Share: All Markets No Debt Ratio, No Focus Variable....132

Table 35 OLS Regression Explaining Wal-Mart's Market Share: All Markets. No Debt Ratio....133

Table 36 Summary Statistics....134

Table 37 OLS Regressions Explaining State Profitability And Herfindahls....135

LIST OF FIGURES

Figure 1 Standard Discount Department Store Sales per Person (U.S.) 136

Figure 2 Fraction of 1975 Industry Sales By Top Five Chains 137

Figure 3 Fraction of 1995 Industry Sales By Top Five Chains 137

Figure 4 Top Ten Firms Based on Sales 138

Figure 5 Wal-Mart 1975 Store Locations 139

Figure 6 Wal-Mart 1985 Store Locations 140

Figure 7 Wal-Mart 1990 Store Locations 141

Figure 8 Wal-Mart 1996 Store Locations 142

Figure 9 Wal-Mart and Sky City 1981 Store Locations 143

Figure 10 Wal-Mart and Sky City 1990 Store Locations 144

Figure 11 Wal-Mart and TG&Y Store Locations 1977 145

Figure 12 Wal-Mart and TG&Y Store Locations 1986 146

Figure 13 Wal-Mart and Duckwall 1975 Store Locations 147

Figure 14 Wal-Mart and Duckwall 1996 Store ocations 148

CHAPTER 1

Introduction

Recently, financial economists have started to examine the relationships between firm characteristics and product market competition. In the capital structure area, one group of theoretical models predicts that increases in financial leverage "softens" product market competition while another group of theoretical models predicts that increases in financial leverage "toughens" product market competition. In the incentive contract area, a group of theoretical papers hypothesize that incentive contracts can influence the level of managerial aggressiveness in the product market and entry decisions.

On the empirical side, a couple of recent papers have documented a link between changes in a firm's capital structure and subsequent product market competition. Nonetheless, there are many unanswered questions regarding the impact of firm specific characteristics such as managerial ownership, capital structure and diversification on product market competition. There are also unanswered questions regarding the impact of market specific characteristics on product market competition. For example, it is

easier or harder for a new entrant to gain market share in a high Herfindahl market versus a low Herfindahl market? High Herfindahl markets may provide profit opportunities, however, the firms in these markets may have developed effective barriers to entry and expansion. This dissertation is an empirical attempt to broaden our understanding in these areas.

I use the discount department store industry as a laboratory to examine the impact of firm and market specific characteristics on product market competition. This industry provides a natural experiment for several reasons. First, there are a large number of firms with heterogeneous characteristics. Second, these firms compete locally. Third, there is essentially a homogeneous product. Fourth, Wal-Mart expanded dramatically throughout the United States presenting a severe competitive threat to the many regional chains in the industry. This allows me to examine how firms respond to a virtually identical threat holding industry constant.

In Chapter 2 the industry that is used to conduct this analysis, the discount department store industry, is defined and described. Maps showing store locations are used to demonstrate the regional nature of many of the firms as well as Wal-Mart's dramatic expansion. The maps are also used to show differences in firm responses to Wal-Mart entering their local markets.

Chapter 3 examines the firm and market specific determinants

of incumbent firms' decisions to expand or not when Wal-Mart enters their local markets. The fundamental question addressed in this chapter is: Do different firm and market specific characteristics lead to different investment decisions in the product market when incumbents face the same threat?

Chapter 4 examines the firm and market specific determinants of Wal-Mart's market share gains after entering local markets. The fundamental question addressed in this chapter is: Which firm and market specific characteristics does Wal-Mart find leads to easier market penetration? An indirect test of agency theory and the entrenchment hypothesis is also done to examine the relationship between managerial ownership and Wal-Mart's ability to gain market share after entering a market. An examination of the link between market concentration and profitability is also done.

CHAPTER 2

History of the Discount Department Store Industry

2.1 Definition of the Industry

The discount department store industry was first defined by a trade journal called Discount Merchandiser in 1961. They defined a discount department store as "a departmentalized retail establishment utilizing many self-service techniques to sell hard goods, health-and-beauty aids, apparel and other soft goods and other general merchandise. It operates at uniquely low margins. It has a minimum annual volume of $1,000,000 ($500,000 in the 1970's) and is at least 10,000 square feet in size." The discount department store industry grew rapidly. They took sales away from department stores as they were a cheaper alternative for many items. They also took sales away from variety stores as they provided a larger product assortment. More recently, they are adding food selections and are attempting to take sales away from grocery stores. Figure 1 demonstrates this by showing standard discount department store sales per person in the United States.

A list was compiled of all of the discount store chains that Discount Merchandiser had on the "Leading Discounters" list in at

least one year during the time period of 1975 - 1996. To be on the "Leading Discounters" list they had to have sales of at least $100 million ($50 million in the 1970's). This procedure eliminated the very small "mom and pop" type chains which have very little public information available.[1] A trade journal called The Directory of Discount Department Stores was then used to determine store locations for all of these chains for each year in which they operated in the industry during the period of 1975 – 1996.[2] Thus, a discount department store chain had to be on the "Leading Discounters" list in Discount Merchandiser and located in The Directory of Discount Department Stores to be included in the sample.

At the beginning of 1975, there were 105 firms with at least one discount department store chain. By the beginning of 1996, there were 34 firms with at least one discount department store chain. Not only were there fewer players in 1996, but the stores and sales were concentrated in the largest firms. Figures 2 & 3 show the fraction of discount department store sales achieved by the top five firms in the industry ranked by sales in 1975 and 1995 respectively. It is evident that the larger firms are capturing a

[1] Variety stores are not in the The Directory of Discount Department Stores or the sample. Only standard discount department stores were used. No membership/warehouse clubs or hyper-markets were included in the sample.

[2] If two or more chains were owned by the same firm at the same time, they were combined into one chain. The net result was 113 chains.

much larger fraction of industry sales in the United States in 1995 than in 1975.

In addition to the concentration increase that occurred in this industry, there was also a change in the largest players. Figure 4 shows the ten largest firms in the sample, based on sales, in 1975, 1985, and 1995. As can be seen, there was a lot of change in the names of the firms that are ranked in the top ten based on sales.

2.2 Firm Locations and Movements

Many of the discount department store chains in the industry were regionally located. In 1975, Kmart was the only true national chain. In 1996, Kmart, Wal-Mart and to a more limited extent Target and Marshalls could be considered national chains. The chain that experienced the most dramatic growth during the period 1975 to 1996 was Wal-Mart. Wal-Mart grew from a regional chain to the largest retailer in the United States during the period. Figures 5,6,7 & 8 show Wal-Mart store locations at the beginning of 1975, 1985, 1990 & 1996 respectively.[3]

It is interesting to examine the behavior of incumbent chains when Wal-Mart entered their local markets. Figure 9 shows store locations for Sky City and Wal-Mart at the beginning of 1981. As can be seen, Sky City was a regional discount department store chain. Wal-Mart entered one of Sky City's markets between the

beginning of 1980 and 1981. By the beginning of 1990 Wal-Mart had blanketed Sky City's markets with stores. Store locations at the beginning of 1990 for Wal-Mart and Sky City are shown in Figure 10. Sky City, unlike Wal-Mart, did not change store locations much during the period of 1981 – 1990. In 1990, Sky City exited the industry.

Figure 11 shows store locations for TG&Y and Wal-Mart at the beginning of 1977. Wal-Mart and TG&Y started competing between the beginning of 1976 and 1977 when TG&Y entered the industry by converting variety stores to discount department stores. By the beginning of 1986, Wal-Mart was competing in many of TG&Y's markets. Figure 12 shows store locations at the beginning of 1986. TG&Y, unlike Sky City did expand against Wal-Mart. However, in 1986, TG&Y also exited the discount department store industry.

Duckwall was already competing with Wal-Mart in a couple of markets at the beginning of 1975. Figure 13 shows store locations at the beginning of 1975 for Duckwall and Wal-Mart. Unlike the other two chains, Duckwall has been able to survive in the industry and still exists today. Duckwall primarily expanded away from Wal-Mart by going West in the late 1970's and 1980's. Store locations for both chains at the beginning of 1996 are shown in Figure 14. When looking at Figure 14, it is evident that Wal-Mart has not penetrated some of the markets that Duckwall is located in

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The maps show all of the 5 digit zip codes in which Wal-Mart had at least 1 store in the given year.

to the same extent that they penetrated some of the markets that the other two competitors were located in.

The rest of the dissertation examines both sides of the strategic interaction. First, which firm and market specific characteristics determine incumbents' expansion decisions as a response to Wal-Mart's entry into their local markets? Second, which markets does Wal-Mart perceive are weaker and penetrate quicker?

2.3 Summary

In this chapter, the discount department store industry was defined. Over the past twenty years there has been consolidation both in the form of fewer players, as well as a change in the largest firms within the industry. Most of the firms in the industry over the past twenty years have been regionally located. Firms exhibit different responses when they are attacked by Wal-Mart at the local market level. It appears that some responses may be better at curtailing Wal-Mart's penetration into a firm's local markets.

CHAPTER 3

The Effect of High Managerial Ownership, Focus and Capital Structure On Firm Aggressiveness in the Product Market

3.1 Introduction

Financial economists have recently started researching the linkages between firm characteristics and product market competition. Recent empirical research has investigated how changes in capital structure affect firm behavior in the product market.[4] This chapter of my dissertation builds on previous research by examining the impact of ownership structure as well as capital structure and other firm and market specific factors as determinants of firm responses when facing a severe new competitive threat.

Fershtman and Judd (1987) show that incentive contracts affect the level of managerial aggressiveness in the product market. They show that in oligopolistic situations, owners can make managers produce more (than in conventional oligopoly models) by giving them contracts that put weight not only on profits but also on sales. This finding is especially meaningful in industries with

[4] For example, see Phillips (1995), Chevalier (1995), and Opler and Titman (1994).

higher strategic substitutability.[5] Existing papers that attempt to empirically document the relationship between incentive contracts and firm aggressiveness do so indirectly. Kedia (1997) and Aggarwal and Samwick (1997) test to see whether firms whose outputs are strategic substitutes provide contracts with low managerial ownership.[6] Both of these papers document that as suggested by theory, the weight in the contract on firm profits reduces with the extent of substitutability.

In this paper I test the relationship between managerial ownership and firm aggressiveness directly. I look at the actual expansion decisions of competing firms, with different levels of managerial ownership, in response to a common threat. If managerial ownership is an important determinant of firm aggressiveness, then we should be able to observe that firms with higher ownership are less aggressive then competitors with lower ownership when facing the same threat.

I also examine the role other firm specific characteristics play in shaping a firm's behavior in the product market. A firm's capital structure, degree of focus, profitability, size, market share, and dependence on the market may also affect their response to a new competitive threat.

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[5] Reitman (1993) extends this research by showing that stock options can be used to control the degree of aggression.

[6] The implication is that lower weight on ownership translates into higher weight on other variables, possible sales related as suggested by Fershtman and Judd (1987).

The data set that I use is from the discount department store industry. From 1975-1996 Wal-Mart grew from a small regional discount department store chain to being the largest retailer in the U.S. During their expansion across the U.S. they competed with 69 different discount department store chains. Because discount department stores carry essentially homogeneous merchandise yet are surprisingly heterogeneous in firm level characteristics, this data set provided me the opportunity to study the impact of managerial ownership and other firm specific characteristics on incumbent firm decisions keeping the industry, product and threat relatively constant across all observations. Also, since Wal-Mart expanded across the U.S. through connected regions, their entry into a market can be seen as exogenous. This avoids some of the endogeneity problems faced by other studies in this area that attempt to see if one firm decision causes another firm decision. For example, Chevalier (1995) examines whether firms undertaking a LBO are weaker in the subsequent period than their less levered rivals.[7]

First I look at extreme levels of ownership by comparing expansion decisions of privately held and publicly traded firms as a response to new entry by Wal-Mart. I find that private firms are less likely to expand in response to the new threat than public firms.

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[7] Also, see Phillips (1995) and Kovenock and Phillips (1997). Chevalier tries to control for possible endogeneity of the LBO decision by doing some robustness checks. Kovenock and Phillips use a two-stage

However, these two organizational forms differ on other dimensions like access to capital, and inherent differences on the amount of information that is available to the market. To control for this, I run similar tests on the sub-sample of public firms. This allows me to check whether it is managerial ownership that is driving the results for the private firms. I find that public firms with higher levels of managerial ownership are less likely to expand then public firms with lower levels of managerial ownership. This suggests that high ownership is making both public and private firms less aggressive in the product market when facing a new competitive threat. Other significant results are that firms with lower amounts of debt in their capital structure are more likely to expand as are more focused firms. Firms with a high market share in a market, as well as firms that are highly dependent on a market are also more likely to expand in that market. The more profitable firms are also more likely to expand as a response to new entry by Wal-Mart into their markets. These results are robust to changes in the profitability measure, the addition of regional dummies, and the addition of time dummies.

The remainder of this chapter is organized as follows: Section 3.2 discusses the research design. Section 3.3 describes the data. Section 3.4 presents the methodology and empirical results. Section 3.5 presents robustness checks, and Section 3.6 is the summary.

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regression to control for this problem.

3.2 Research Design

During the period of 1975-1996 Wal-Mart transformed itself from a regional chain consisting of 125 stores in eight states to a national chain consisting of 2,234 stores in all fifty states.[8] Figures 5 through 8 show Wal-Mart store locations at the beginning of 1975, 1985, 1990 and 1996 respectively.[9] When looking at the maps it is apparent that Wal-Mart expanded throughout the U.S., and that they expanded through connected regions.

Competition between discount department stores takes place at the local level. Following Chevalier (1995) the United States is broken down into local markets. The local markets used in this study are 862 3-digit zip code areas. Rand McNally Zip Code Finder defines the five digits of the zip code. The first digit of the zip code identifies the geographic region of the country. The second digit identifies a portion of the geographic region. The third digit identifies a sectional center or multi-coded city within that portion of the geographic region. A sectional center is usually the natural center of local transportation and serves the smaller post offices surrounding it. A multi-coded city is a main city post office that serves post office branches within a city. The fourth and fifth digits in the zip code identify the individual post office branches

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[8] Number of store data is from Discount Merchandiser. Locations of stores by states is from The Directory of Discount Department Stores.

[9] The maps show all of the 5 digit zip codes in which Wal-Mart had at least one store in the given year. The store locations came from The Directory of Discount Department Stores.

that are served by the sectional center or multi-coded city office. Because the sectional centers and multi-coded cities are usually the natural center of local transportation, the three-digit zip code area served by them is felt to be a reasonable economic market.

In 1975 Wal-Mart had discount department stores in 45 of the 862 local markets. By the beginning of 1996, Wal-Mart had entered another 655 local markets for a total of 700 markets.[10] During the period of 1975-1996, 69 different discount department store chains owned by 76 different firms competed against Wal-Mart in the United States at the local market level.[11] A couple of these were national chains, while the rest were regional. These chains were surprisingly heterogeneous in characteristics at the firm level. The local markets differed not only on which of the chains were competing but also on total number of stores. While some markets were being served by only one chain, in other markets competition between 6-7 different chains was not uncommon.

One of the problems well recognized in the literature is that firm specific characteristics may be caused by the same exogenous factors that determine investment decisions. Hence, a major concern in developing the research design of the paper is to minimize this endogeneity problem. I adopt the methodology used in Opler and Titman (1994). Instead of trying to establish whether

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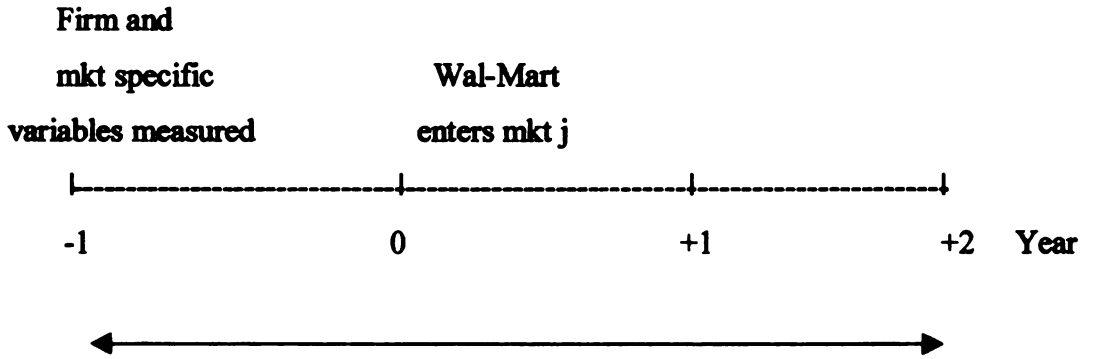
[10] In calendar 1996 and 1997, Wal-Mart continued to expand in the United States.

one decision (say a LBO) causes another decision (say investment), firm specific characteristics are measured prior to an external threat. Subsequent investment decisions are then examined to see if any of these characteristics determined the subsequent investment decisions.[12] In this paper, the threat is new entry by Wal-Mart into a local market where some other firms in the discount department store industry are incumbents. The investment decision is expansion or no expansion by each incumbent firm i in the local market j when first invaded by Wal-Mart.

A time line illustrating the empirical set-up is shown below.



Year 0 is defined as the beginning of the year in which Wal-Mart first has a store in 3-digit zip code market j. The firm and market specific variables are measured at the beginning of Year –1 to avoid spurious correlation between the variables and the subsequent

[11] LBO's, spin-offs, and going public were not counted as firm changes here, only acquisitions were counted.

[12] As in Opler and Titman (1994), this implicitly assumes that ex ante firm specific characteristics are exogenous.

expansion decision. If they are flow variables (from the income statement), they are measured over the fiscal year ending at the beginning of Year –1.[13] If they are non-flow variables (balance sheet items and market specific variables), the values are measured at the end of the fiscal year which is at the beginning of Year -1.[14] The economic activity variable and incumbent expansion decisions are examined from Year

–1 to Year +2.

This data set has a number of advantages. First, given that most of the local markets experienced entry by Wal-Mart during the period examined I am able to generate a large number of observations where incumbent firms face an exogenous threat. Second, I am able to keep the threat constant, since I only study the response of incumbents to new entry by Wal-Mart into their local markets.[15] Third, discount department stores carry essentially non-differentiated merchandise and are thus homogeneous in that respect. This reduces problems of differential product quality across firms. Also, this data set provides me with a reliable measure of profitability "sales per square foot" for both public and private chains. This enables me to include privately owned firms in many of the tests. Since this data set permits us to keep industry, product

[13] In this industry, almost all of the retailers had a fiscal year ending January 31 of the given year over the time period examined.

[14] The exception here is LBO's. If a firm underwent a LBO in the years preceeding Year –1, then it was treated as a LBO firm in Year –1.

and threat constant across all observations, I can develop reasonably clean tests on how different firm and market characteristics affect incumbent firms' responses to Wal-Mart's entry.

Normally, you might not expect firms to expand in response to new entry if the local markets are in equilibrium. This industry, however was growing due to the fact that the industry was taking sales away from other retailers. The question being addressed is thus, "Which chains are trying to grab part of the growing market in the face of Wal-Mart's entry?"

3.3 Data

A trade journal called Discount Merchandiser was used to identify major discount chains during the period of 1975 - 1996. They define a discount department store as "a departmentalized retail establishment utilizing many self-service techniques to sell hard goods, health-and-beauty aids, apparel and other soft goods and other general merchandise. It operates at uniquely low margins, has a minimum annual volume of $1 million ($500,000 in the 1970's), and has at least 10,000 square feet of total space." A list was compiled of all of the discount store chains that Discount Merchandiser had on the "Leading Discounters" list in at least one year during the time period of 1975 - 1996. To be on the "Leading

[15] It can be argued that a smaller Wal-Mart in earlier years posed a different threat than a larger Wal-Mart later on. I control for this through time and region dummies.

Discounters" list they had to have sales of at least $100 million ($50 million in the 1970's). This procedure eliminated the very small "mom and pop" type chains which have very little public information available.[16]

A trade journal called The Directory of Discount Department Stores was then used to determine store locations for all of these chains for each year in which they operated in the industry during the period of 1975 – 1996.[17] Thus, a discount department store chain had to be on the "Leading Discounters" list in Discount Merchandiser and located in The Directory of Discount Department Stores to be included in the sample. The net result was store location data for 113 discount chains. The "Alphabetical Index" of the directory lists all cities within each state in which a discount chain has at least one store open or any planned openings at the beginning of the year.[18] Each of the cities was then converted to a five-digit zip code.[19] The first digit of a zip code identifies the geographic region of the country. The second digit tells you the portion of a State or States the area is located in. The third digit is

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[16] Variety stores are smaller than discount department stores and are not in the The Directory of Discount Department Stores or the sample. Also, only standard discount department stores were used. No membership/warehouse clubs or hyper-markets were included in the sample.

[17] If two or more chains were owned by a firm at the same time, they were combined into one chain. The net result was 113 chains.

[18] For 1984 - 1986 no "Alphabetical Index" exists, so the extended listings of The Directory of Discount Department Stores for those years were used to construct a similar list.

[19] The Rand McNally 1996 Zip Code Finder was used first to convert cities to zip codes. If a city could not be found, the Time Zip Code Directory 1994 edition was used. If there were more then two cities with the same name in the same state the extended listings of The Directory of Discount Department Stores was used to determine the correct county. Once the correct county was known the correct city could be identified. After this process, a tiny fraction of zip codes could not be found. (less than 1%)

the sectional center of a multi-coded city, and the last two digits tell you the individual post office branch.[20] The zip codes were then plotted on a map using a mapping program. A visual inspection of Wal-Mart's movements and other firms' expansion and retrenchment decisions was then possible.

To generate local markets, the last two digits of the zip codes were dropped generating 3-digit zip code area markets. Within the time period of 1975-1996, 862 of these local 3-digit zip code markets had at least one discount store during at least one year and 69 of the 113 chains competed with Wal-Mart in at least one of the local markets. Between 1976 and 1994, Wal-Mart entered 540 of these local 3-digit zip code markets and attacked 59 different chains owned by 62 different firms.

The trade journals give the chain name and the immediate company that owns the discount store chain. Oftentimes the immediate company that owns a chain is a 100% owned subsidiary of a parent company. In order to determine if there was a parent firm, and if a company was privately held or publicly traded, Dun & Bradstreet's Million Dollar Directory, The Directory of Corporate Affiliations Who Owns Whom, and Wards Business Directory were used in that order. A firm was classified as "public" if their stock, or the stock of their parent was traded on the NYSE, ASE or in the OTC market. Otherwise they were classified as "private". There

[20] This definition of the meaning of zip codes is from the Rand McNally 1996 Zip Code Finder.

was sometimes a one or two year lag between when ownership actually changed and when it showed up in one of the above sources. The NYSE, ASE, and OTC Daily Stock Price Records books were checked to see if a firm was still trading on January 1 of a given year. This way it could be identified in which year the ownership changes occurred. When the name of the firm owning a chain changed, Discount Merchandiser was used to identify the underlying reason for the name change. Each name change was identified as being due to a LBO, being acquired by another firm, going public, a spin-off from a parent or to simply to change the firm's image.[21] The 69 chains that competed with Wal-Mart between 1975-1996 were owned by 76 different firms during the years of competition with Wal-Mart.[22] The 76 firms consisted of 40 firms that were always public, 21 that were always private, 13 that were both (not at the same time) , and 2 that were foreign held during the 1975 – 1996 period. The foreign held firms were dropped from the sample, as detailed information regarding ownership was not easily available.

Discount sales per square foot came from The Directory of Discount Department Stores. Occasionally total square footage was not shown for a given firm for a given year. The average square

[21] Quarterly editions of Mergers and Acquisitions for 1981 – 1989 were used to verify that this process did not omit any mergers or LBO's.

[22] LBO's, spin-offs and going public were not counted as firm changes here, only acquisitions were counted.

footage of a store for that firm in a surrounding year was then used to determine sales per square foot.[23] The number of stores in the discount department store industry and sales per square foot (based on selling space) for the discount department store industry came from Discount Merchandiser. Total parent firm sales for both public and private firms were found in the Million Dollar Directory, The Directory of Corporate Affiliations Who Owns Whom, and Wards Business Directory in that order. Firm level discount sales came from The Directory of Discount Department Stores except for 1975 through 1978 where they came from Discount Merchandiser. Insider ownership was taken from Proxy Statements or Value Line Investment Survey.[24] A firm's total debt to total assets ratio and operating profit margin came from Compustat.

3.4 Empirical Results

3.4.1 Explanatory Variables

Several factors other than managerial ownership can be identified that might be expected to contribute to the expansion decision by public firms in a local market. Several theoretical models hypothesize that capital structure will impact a firm's behavior in the product market. One group of models predicts that

[23] In a few cases, (particularly observations from the 1970's), sales or the number of stores in a chain were not listed in The Directory of Discount Department Stores. Discount Merchandiser was used in these cases to find this information.

[24] Ownership labeled as "insider", "directory", "family-owned" or "an individual" were included in the insider ownership values.

higher financial leverage leads to more aggressive product market behavior.[25] Another group of models predicts that higher financial leverage leads to less aggressive product market behavior due to decreased access to capital.[26] Recent empirical papers support the premise that higher debt leads to less aggressive behavior on the part of the high debt firms.[27]

Access to internal capital may also affect managers' decisions. Meyer, Milgrom and Roberts (1992) and Scharfstein and Stein (1997) propose that divisions of diversified firms may be subsidized sub-optimally by more profitable divisions. This could result in less investment in divisions with good prospects and more investment in divisions with poor prospects relative to focused firms. However, Stein (1997) argues that managers of diversified firms are better able to distinguish between better and worse divisions than outside capital markets and are thus more likely to restrict funding to poorly performing units than outside lenders if these divisions were stand-alone firms. This implies that when divisions face a tough competitor, and hence face lower future profits for that division, that division's funding from headquarters may be restricted. This could lead to less aggressive investment and output behavior when facing a new competitive threat.

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[25] See Brander and Lewis (1986), Maksimovic (1988), and Rotemberg and Scharfstein (1990)
[26] See Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990)
[27] See Phillips (1995), Chevalier (Sept. 1995), Opler and Titman (1994), and Safieddine and Titman (1997)

Existing empirical studies have documented that there is a value loss associated with diversification. Comment and Jarrell (1995) document that firms that increase focus have positive abnormal stock returns. Berger and Ofek (1995) show that the value of diversified firms is less than the value of a similar set of stand-alone firms. Recent empirical studies have examined the question of whether it is sub-optimal cross-subsidization which is driving the value loss. Berger and Ofek (1995) find evidence that diversified firms over-invest and provide subsidies to failing segments. More recently, Scharfstein (1997) finds that diversified firms invest more than stand-alone firms in low Q industries, but invest less than stand-alone firms in high Q industries implying there is "socialism" in allocating funds across divisions.

Additional firm specific factors as well as market specific factors and economic conditions may also contribute to the decision of a firm to expand against Wal-Mart after being attacked. Firm size may play a significant role in determining a firm's strategic response to a new competitive threat. Consistent with theoretical models in the strategic management literature, Chen and Hambrick (1995) find that in the airline industry, large firms are more likely to respond when attacked than small firms, and small firms are more likely to initiate competitive actions than are large firms. A firm's response to new competition may also be determined by a firm's

dependence on the market under attack. Chen and MacMillan (1992) build and test a model which shows that the greater the dependence of a firm on the market under attack, the more likely they will respond to an attack. Rivalry variables like the market share of a firm in a local market as well as the local market's Herfindahl index may also be important determinants of firm expansion decisions at the local level (see Chevalier (June 1995)) and need to be included in the model specification. Economic conditions over the window when an incumbent's expansion decisions are being examined may also determine whether or not a firm expands and needs to be controlled for.

Chevalier (June 1995) also includes demand variables like the number of households, and median income at the local market level (MSA's). Unfortunately, reliable population statistics only exist at the zip code level for 1990.[28]

3.4.2 Significance of Managerial Ownership: Private Versus Public Firms

The discount retail store industry contains a large number of privately held firms. The trade journals have store locations, discount sales, and sales per square foot for both public and private firms. This provides the unique opportunity to examine the

[28] Population numbers also exist for 1980 at the zip code level, but the U.S. Census Bureau discourages their use as they claim the 1980 numbers are unreliable.

decisions of firms with extreme levels of insider ownership. If insider ownership is a determinant of how firms respond to the new competitive threat, any differences should be the largest by contrasting private firms with public firms.

Using a univariate probit methodology similar to that of Chevalier (June 1995), I test to see whether public versus private ownership determines whether or not incumbent firms will expand when Wal-Mart enters one of their 3-digit zip code area markets. Year 0 is the year in which Wal-Mart is first seen competing in a particular 3-digit zip code area j. The dependent variable is one if incumbent firm i ever increases the number of cities in which it has stores in zip code market j during three year period from Year −1 to Year +2. Otherwise the dependent variable is zero. Year 0 can be any year in the range of 1976-1994.[29]

Firm focus was not included here as an explanatory variable as the private firms were highly focused, and it could act as a proxy for public/private ownership. The model specification is as follows:

$$\begin{aligned}\text{Probability of Expansion}_{ij} = {} & \alpha + \beta_1 \text{ Private/Public Dummy}_i + \beta_2 \text{ LBO/No LBO Dummy}_i \\ & + \beta_3 \text{ Chain Size}_i + \beta_4 \text{ Sales/Sq. Ft.}_i + \beta_5 \text{ Mkt Shr}_{ij}(\text{Herfindahl}_j) \\ & + \beta_6 \text{ Dependence Mkt}_{ij} + \beta_7 \text{ Strength of Wal-Mart Dummy} \\ & + \beta_8 \text{ Avg. Industry Growth} + \varepsilon_{ij}\end{aligned}$$

[29] I have store location data from 1975-1996. However, I need data one-year prior and two years following the event to create the event window.

The independent variables used in this specification are defined as follows:

Firm Specific Variables:

Public/Private Dummy$_i$: 1 = privately held; 0 = public. This is recorded at the beginning of Year -1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[30]

LBO vs No LBO Dummy$_i$: 1 = LBO done by firm i in the three years prior to Year −1; otherwise 0. This is recorded for the three years prior to the beginning of Year −1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[31]

Chain Size$_i$: The number of five-digit zip codes in which firm i has at least one store. This is recorded at the beginning of Year -1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.

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[30] If the company that owns the chain is a subsidiary or a division of a parent company then this pertains to the parent.

[31] Actual debt ratios are unavailable for private firms. Chevalier also divided her sample into "low" and "high" debt firms based on whether or not they had undergone a LBO as she also had private firms in her sample.

Inflation Adjusted Sales per Square Foot$_i$: Firm i's inflation adjusted discount "sales per square foot" stated in 1974 dollars for the fiscal year ending at the beginning of Year –1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[32]

Rivalry Variables:

Market Share$_{ij}$: Market share of firm i in zip code j. This is recorded at the beginning of Year -1 for firm i who is first seen competing with Wal-Mart in zip code j at the beginning of Year 0.[33]

Modified Herfindahl Index$_j$: This is the sum of the squares of the market shares (defined above) in zip code j. This is recorded at the beginning of Year –1 for zip code j when the first reported entry by Wal-Mart into zip code j is at the beginning of Year 0.

Dependence on Mkt$_{ij}$: The fraction of firm i's stores competing in zip code j at the beginning of Year -1 for firm i who is first seen

[32] This is a measure of operating profitability. Operating income is not available for private firms. Due to the fact that profit margins are small in this industry, this should be a fairly good proxy for operating profitability. If sales per square foot was missing for one year, the value for the previous year was used.
[33] This is done using the number of different 5-digit zip codes in which firm i has stores in 3- digit zip code market j divided by the same calculation for the other companies in zip code market j. Also, the Herfindahl could be used here instead of market share as they are highly correlated.

competing against Wal-Mart in zip code j at the beginning of Year 0.[34]

Strength of Wal-Mart Dummy: 1 = Year 0 is in the range of 1986-1994; 0= Year 0 is in the range of 1976-1985. Year 0 is the year in which Wal-Mart is first seen competing in zip code j.[35]

Economy Variable:

Avg. Industry Growth: Arithmetic average of the annual growth in the total square footage of discount stores in the discount store industry during Years –1 through +2 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.

The first test includes all firm i market j pairs where firm i is an incumbent when Wal-Mart enters zip code market j for the first time between 1976 – 1994. All observations where firm i switches from public to private or from private to public during Year -1 to Year +2 are dropped. Table 1 shows the fifty-nine different firms that are represented in the sample for this specification.[36] Table 2 provides the summary statistics for all of the variables used in this specification. There are 1506 firm i, market j observation pairs.

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[34] This is done using the number of different 5-digit zip codes in which firm i has stores in the 3-digit zip code market j divided by the total number of different 5-digit zip codes in which firm i has stores.

[35] A decade dummy is used here to represent the fact that Wal-Mart may have been a stronger competitor in 1986-1994 when they were larger than they were from 1976-1985.

198 of these observations are for private firms. Table 3 shows the simple correlations between the explanatory variables.[37] The variance inflation factors are all under 1.6 and the condition index is 15.5.[38]

Results for the expansion univariate probit are shown in Model 1 of Table 4. Public firms are more likely to expand than private firms. The public/private dummy is negative and significant at less than 1%. The marginal effect using the infinitesimal change based adjustment at the means of the independent variables is -9.7%. The infinitesimal change based adjustment can be improved when the explanatory variable is a dummy. To do this the probability of expansion for public firms versus private firms is calculated directly using the means of the other variables. Using that methodology being private decreases the probability of expansion by 8.1%. This result is consistent with an ownership explanation. It is also consistent with the hypothesis that private firms have restricted access to external capital markets. The result could also be due to differences in the amount of information that is available to the market between the groups. Later I will test between these alternative explanations by looking only at public firms.

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[36] Some firms had to be dropped as they first started competing with Wal-Mart after 1994, or their sales per square foot data was unavailable. This left 59 firms.

[37] It can be seen that the market share of firm i in market j and the modified Herfindahl index for market j have a high simple correlation with each other. Thus, the specification is run with just the market share variable first.

[38] Some rules of thumb are that VIF's over 10 or a condition index over 30 indicate possible harmful multicollinearity.

Firms that undergo LBO's in the period prior to Year 0 are more likely to expand when attacked. The LBO dummy is positive and significant at 4.2%. The marginal effect using the infinitesimal change based adjustment is 15.9% at the means of the independent variables. Once again, the infinitesimal change based adjustment can be improved on in the case of a dummy variable. This is done by calculating the probability of expansion for firms that have recently undergone LBO's versus those who have not using the means of the other variables. Using that methodology recently undertaking a LBO increases the probability of expansion by 21.6%. This is consistent with the models that hypothesize that higher financial leverage leads to more aggressive product market behavior. It is also possible that the firms who were already more aggressive did LBO's. These findings are the opposite of what was reported in Chevalier (1995). She reported that LBO's made the product market softer. However, the only firm specific factor that Chevalier controlled for was firm size.[39] Also, the LBO results need to be interpreted with caution, as there are only 20 observations where firms undertook LBO's representing 3 firms. In addition the reason for the LBO's needs to be considered.

Firms that have more discount stores are also more likely to expand. This result is consistent with Chen and Hambrick (1995)

[39] For example, it is likely that many firms that undergo LBO's are converting from public to private ownership.

who find that large firms are more likely to respond when attacked. However, this result is significant at the 8.7% level. Firms that generate higher industry adjusted sales per square foot are more likely to expand. This is consistent with the idea that firms that have the best prospects and chance of successfully competing are more likely to expand. The more dependent firms are on a market, the more likely they are to expand when attacked. This variable is positive and significant at 1.1%. This is consistent with the model developed by Chen and MacMillan (1992) which shows that the greater the dependence of a firm on the market under attack, the lower the likelihood that they will not respond. Firms with a higher market share are less likely to expand when attacked. They may feel comfortable with the stronghold they have on the market or may feel they already have the best store locations. Firms are also less likely to attack in the 1985-1994 period when Wal-Mart is larger as the decade dummy is negative and significant at less than 1%. Firms also appear less likely to expand the faster the growth in sales per square foot for the industry. This is consistent with firms buying stores from other retailers when economic growth is down and some retailers are exiting. This is when they can expand quickly and relatively cheaply as this is when the prices on stores or leaseholds are likely to be attractive.

A Lagrange Multiplier test statistic was calculated to check

for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. As an additional check, the specification was re-run using White's robust estimator of variance as it provides an appropriate estimator for the variance even when the precise nature of the heteroskedasticity is unknown. The p-values are virtually identical to the p-values without the heteroskedasticity robust estimator and thus are not shown.

The specification was re-run using the modified Herfindahl index for market j instead of the market share of firm i in market j. The results are shown as Model 2 in Table 4. The sign on the modified Herfindahl index is negative as was the sign on the market share of firm i in market j, but it is not significant. The other results remain similar to those using the market share variable instead of the Herfindahl variable.[40]

It is generally a good idea with large number of firms and a small number of time periods to allow for separate intercepts for each time period. This allows for aggregate time effects that may influence the dependent variable. The nineteen-year period represented in the sample was broken into 8 groups of two-year

[40]The market share variable and Herfindahl are not run together in the specification as they are highly correlated with each other.

intervals and 1 group consisting of a three-year interval.[41] The first specification was re-run adding 8 time dummies. Time dummies using one-year intervals could not be done as some years had very few observations and no incumbent expansions. The results are shown in Table 5. None of the time dummies is significant. The main differences between this specification and the one without the time dummies (see Table 4) is that the decade dummy, the industry growth in square footage, and the LBO/No LBO dummy are no longer significant. The LBO/No LBO does have a p-value of 10.5%. It is not surprising that these three variables are no longer significant when time dummies are included, as they are the ones that would be expected to change over time. The private/public dummy, chain size, inflation adjusted sales per square foot, market share of a firm in a market, and a firm's dependence on a market are still of the same sign and have similar significance as in the specification without the time dummies.

A Lagrange Multiplier test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99% level. The specification was re-run using White's robust estimator of variance as the null hypothesis of homoskedasticity could be rejected at the

[41] Two does not go into nineteen evenly. There are 8 time dummies representing two-year intervals and one time dummy representing the three year interval of 1976-1978.

95% level. The robust p-values are shown in the third column of Table 5. There were only small differences between the robust and non-robust p-values.

3.4.3 Determinants of Private Firm Expansion

The previous set of tests showed that public firms were more likely to expand against Wal-Mart than private firms. It is still not clear if this is due to differences in the ownership levels, differences in the organizational forms or differences in access to capital between the two groups. It is possible that private firms have less access to capital, both from less access to external capital as well as the absence of an internal capital market. If this is true, then we might expect higher operating cash flows to be a more important determinant of higher investment for private firms.

The same univariate probit specification was run on firm i, market j pairs for private firms only with the exception of the public/private dummy for ownership. The model specification is as follows:

$$\begin{aligned}\text{Probability of Expansion}_{ij} = \alpha &+ \beta_1 \text{ LBO/No LBO Dummy}_i + \beta_2 \text{ Chain Size}_i \\ &+ \beta_3 \text{ Sales/Sq. Ft.}_i + \beta_4 \text{ Mkt Shr}_{ij} + \beta_5 \text{ Dependence Mkt}_{ij} \\ &+ \beta_6 \text{ Strength of Wal-Mart Dummy} \\ &+ \beta_7 \text{ Avg. Industry Growth} + \varepsilon_{ij}\end{aligned}$$

Table 6 provides the summary statistics for all of the variables used in this specification. There are 198 firm i, market j

observations. 24 private firms are in the sample. Any cases where a private firm went public between Year –1 and Year +2 were dropped.

Results for the expansion univariate probit are shown in Table 7. All of the coefficients have the same sign as the previous regression that had both the public and private incumbents. Only two variables are still significant for private firms. The LBO dummy and inflation adjusted sales per square foot. The LBO dummy is still positive and is significant at 5.7%. This again is consistent with the models of Brander and Lewis (1986) and Rotemberg and Scharfstein (1990) who hypothesize that higher financial leverage leads to more aggressive product market behavior. Inflation adjusted sales per square foot is positive and significant at 3.3%. This supports the idea that private firms may be using internal capital markets to fund growth. However, the magnitude and significance level of this coefficient are very similar to those for the specification using both public and private firms. This would imply that both public and private firms rely on funding from operating cash flows in a similar manner.

The dependence of a firm on zip code market j is statistically significant only at the 10.2% level. This provides weak support for the Chen and MacMillan (1992) model which shows that the greater

the dependence of a firm on the market under attack, the lower the likelihood that they will not respond.

3.4.4 The Significance of Managerial Ownership: Public Firms Only

The previous section showed that both public and private firms rely on internal cash flows in a similar fashion. It is possible that the differences in aggressiveness between public and private firms is due to restricted access to external capital for private firms or inherent differences between the two organizational forms rather than a difference in insider ownership. It is also possible that the difference could be due to the lack of an internal capital market for private firms as they are more focused then the public firms.

To test these things a similar univariate probit specification is run on public firms only. More information is available for public firms, so better specified models can be used. First, the public/private dummy is replaced with the actual percentage of insider ownership. If managerial ownership is driving the differences in aggressiveness between public and private firms then this same effect should be visible within the group of public firms as well. It could also be that private firms have different levels of debt than public firms. It is possible that differences in aggressiveness between the two groups may be caused by differences in the debt levels between the two groups. The second

change to the model is to replace the LBO/No LBO dummy with the actual total debt ratios of the firms to control for this. The third change is to include the fraction of sales coming from discounting as an explanatory variable. It could be that private firms are less aggressive than public firms due to the lack of an internal capital market. The inclusion of this variable will control for this possibility. The new firm specific independent variables are defined as follows:

% Insider Ownership$_i$: The fraction of shares held by insiders, directors, family members and individuals that is reported in Value Line Investment Survey or from a firm's proxy statement.[42] This is recorded at the beginning of Year -1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[43]

Total Debt/Total Assets$_i$: This was calculated as total assets (Compustat Item #A6) minus Stockholder Equity (Compustat Item #A216) divided by total assets (Compustat Item #A6). It is thus the book value of total debt divided by the book value of total assets and was calculated at the beginning of Year –1 for firm i who is

[42] Value Line was used first. If insider ownership was not listed there, then I went to the proxy statements.
[43] If inside ownership was not available at the beginning of Year –1 I went as far back as Year –4 and as far forward as Year +2 to get it as this variable is quite stable over time.

first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[44]

Focus$_i$: Discount sales divided by total firm sales for the fiscal year ending at the beginning of Year –1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0.[45]

The model specification is as follows:

$$\begin{aligned}\text{Probability of Expansion}_{ij} = \alpha &+ \beta_1 \,\%\text{ Insider Ownership}_i + \beta_2 \text{ Total Debt Ratio}_i \\ &+ \beta_3 \text{ Focus}_i + \beta_4 \text{Chain Size}_i + \beta_5 \text{ Sales/Sq. Ft.}_i \\ &+ \beta_6 \text{ Mkt Shr}_{ij} + \beta_7 \text{ Dependence Mkt}_{ij} \\ &+ \beta_8 \text{ Strength of Wal-Mart Dummy} \\ &+ \beta_9 \text{ Avg. Industry Growth} + \varepsilon_{ij}\end{aligned}$$

As before, all observations were dropped if the firm either changed from public to private or from private to public during the interval of Year –1 to Year +2. Table 8 provides the summary statistics for all of the variables used in this specification. There are 1209 firm i market j observation pairs.[46] 38 public firms are

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[44] Two firms, Hecks and S.E. Nichols could not be found on Compustat. This ratio was calculated from statements located in Moody's Industrial Manuals instead.

[45] Sometimes this ratio was greater than 1 as total firm sales and discount sales came from different sources. Whenever this happened 1 was used.

[46] Some observations for public firms were dropped. All observations prior to 1978 were dropped due to a lack of Compustat data. Also, some observations were dropped due to a lack of ownership data.

represented in the sample.[47] Table 9 shows the simple correlations among the explanatory variables. All nine variance inflation factors are less than 2.3 and the condition index is 22. [48]

Table 10 shows the results for the expansion univariate probit using inflation adjusted sales per square foot as a measure of operating profitability. The percentage of inside ownership is negative and significant at less than 1%. This implies that the higher the inside ownership, the less likely the firm is to expand in market j when they are attacked there. This lends support to an ownership explanation rather than an access to capital or a difference in organizational form explanation as the reason why private firms are not as likely to expand as public firms. If the difference between public and private firms had been access to capital, or differences in organizational form, we would expect this variable to be insignificant for public firms.[49]

The total debt to total assets ratio is negative and significant at less than 1%. This implies that the higher the total debt ratio, the less likely firm i is to expand in market j when they are attacked. This is consistent with the models of Bolton and Scharfstein (1990) and Fudenberg and Tirole (1986). They

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[47] A few firms were public some of the time and private some of the time. Hence, the number of public firms represented (38 firms) plus the number of private firms represented (24 firms) exceeds the total number of firms in the sample (59 firms).

[48] Some rules of thumb are that VIF's over 10 or a condition index over 30 indicate possible harmful multicollinearity.

hypothesize that financial leverage leads to less aggressive product market behavior on the part of the firm. It may also be the case that weaker firms have taken on debt. However, the proxy for industry adjusted profitability in the regression specification should help mitigate this possibility.

The focus variable is positive and statistically significant at less than 1%. This means that more focused a firm, the more likely it is to expand when they are attacked by Wal-Mart in a local market. This appears inconsistent with Meyer, Milgrom, and Roberts (1992) as they hypothesize that for diversified firms, divisions can easily subsidize other units. These results are perhaps more consistent with Stein (1997) who argues that diversified firms can allocate less resources to divisions with poor prospects forcing poorly performing units to receive funding that is less than they could obtain as stand alone firms. These findings are also consistent with the empirical work of Lang and Stulz (1994) who find evidence that firms diversify to seek better growth opportunities. Perhaps when tough competition hits, firms invest in divisions where the competition is less tough. The evidence also supports an argument similar to the one proposed by Chen and MacMillan (1992) regarding the dependence of a firm on a market. Firms who are only in the discount department store industry are more likely to expand

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[49] This is also consistent with Kaplan and Zingales (1995) who find that in only 15% of firm years is there some question as to the ability of a firm to have access to internal or external funding. However, their

as that is all they have to rely on. Also, the dependence of firm i on local zip code market j, and industry growth in square footage of store space both remain significant.

Lagrange Multiplier test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. As an additional check, the specification was re-run using White's robust estimator of variance. The p-values were virtually identical to the non-robust p-values and are not shown.

It is generally a good idea with a large number of firms and a small number of time periods to allow for different intercepts for each time period. This allows for aggregate time effects that may influence the dependent variable. The nineteen-year period represented in the sample was broken into eight groups of two-year intervals and one group consisting of a three-year interval. [50] The specification was re-run adding eight time dummies. Time dummies using one-year intervals could not be done as some years had very few observations and no incumbent expansions. The results are shown in Table 11. None of the time dummies is significant. The results are almost identical to those without the time dummies included.

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study only looks at public firms.

3.5 ROBUSTNESS CHECKS

3.5.1 Operating Profit Margin Instead of Discount Sales per Square Foot

Due to the fact that profit margins are small in the industry, inflation adjusted discount sales per square foot should be a fairly good measure of operating profitability. However, it is possible that discount sales per square foot is measuring an attempt to increase market share instead. As a robustness check the public incumbent firm specification was re-run using total firm operating profit margin instead of inflation adjusted discount sales per square foot as the operating profitability measure. The summary statistics for operating profit margin are in Table 8. The results from the probit are in Table 12.[51] The results are similar to the results using inflation adjusted discount sales per square foot as the measure of operating profitability.

3.5.2 Parent Firm Size

Both Demsetz and Lehn (1985) and Mikkelson and Partch (1989) report an inverse relationship between insider holdings and firm size. In the earlier specifications chain size was used. It is possible that chain size is not fully capturing the parent size as

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[50] Two does not go into nineteen evenly. There are 8 time dummies representing two-year intervals and one time dummy representing the three year interval of 1976-1978.

insider ownership is measured at the parent level. Thus it is possible that the significance of the insider ownership coefficient is due to parent size instead. As a check, inflation adjusted total assets of the parent firm is added to the specification for the public firms. The variable is measured as follows:

Inflation Adjusted Total Assets of Parent$_i$: Firm i's parent's inflation adjusted total assets 1974 dollars at the beginning of Year -1 for firm i who is first seen competing against Wal-Mart in zip code j at the beginning of Year 0. Total assets came from Compustat (Item #A6), and were then adjusted for inflation using the consumer price index.

The results of the probit are in Table 13. The coefficient and significance of the insider ownership variable remain unchanged. It is still significant at less than 1%. All other variables have similar coefficients and significance levels except the focus variable. It is now significant at 4.3% instead of less than 1%. It appears that the previous specification had already captured the effects of parent firm size.

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[51] One firm was dropped as its operating profit margin was an outlier. When that firm is included, operating profit margin is positive and significant at less than 1%. The other coefficients and significance

3.5.3 Unmodeled Market Heterogeneity

Because the specifications use local market level data, the concern arises that there could be unmodeled local market heterogeneity that is correlated with the other independent variables. For example, it is possible that firms with low ownership happened to be incumbents in markets where expected growth was higher. Unfortunately, the results could not be re-estimated with three-digit zip code or even state dummy variables because there are not enough observations per geographic area. However, regional dummies can be put in the regressions. The regions are Northeast, Southeast, Foundry, Midwest, Rocky Mountain, and West Coast.[52] Because Wal-Mart moved around region by region, they primarily attacked most markets in a given region during the same years. Hence, these dummies are basically proxies for a region during a certain time period.

The probit results for all incumbents both public and private are shown in Table 14. The results are similar to those done for all incumbents without the regional dummies. The public/private ownership dummy is now significant at 2.4% instead of at the 1% level. The LBO/No LBO dummy is now significant at 1.2% instead of 4.2%. The market share of firm i in market j is now significant at 2.4% instead of 6.9%. Also the significance on the Wal-Mart

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levels remain virtually unchanged.

strength dummy and industry growth in square footage are also slightly less, but this is to be expected as they vary through time. A Lagrange Multiplier test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was also re-run using White's robust estimator of variance as the null hypothesis of homoskedasticity can be rejected at the 95% level. The robust p-values are virtually identical to the non-robust p-values and are shown in Table 14. One regional dummy is significant at the 1% level. Another regional dummy is significant at the 10% level.

The regional dummies were also put in the regression using public firms only. The results are shown in Table 15. Again the results are similar to the earlier results without the regional dummies. The fraction of insider ownership, the debt ratio, the focus measure, inflation adjusted sales per square foot and the dependence of the firm on the market under attack are all still significant at the same levels that they were without the regional dummies. The only noticeable change is that the market share of firm i in market j is now significant. One regional dummy is significant at the 1% level, and another is significant at the 5%

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[52] These regions were selected using The Nine Nations of North America as a way to divide the United States into economic regions.

level. A Lagrange Multiplier test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. The specification was also re-run using White's robust estimator of variance. The robust p-values are virtually identical to the non-robust p-values and are not shown.

Another way to try to control for local market growth is use changes in population levels at the zip code level. Unfortunately, reliable population data only exists at the zip code level for 1990.[53] However, population numbers do exist at the state level for 1980 – 1996. Changes in the state population in which market j is located during the three-year event window can be included as an independent variable to control for changes in demand in local market j. Because the state population data exists only from 1980-1996, all observations where Wal-Mart enters a market prior to 1981 were dropped.[54] The variable is measured as follows:

State Population Change$_j$: The state population change in thousands from Year –1 to Year +2 for the state in which zip code market j resides where Wal-Mart enters zip code market j for the

[53] Population numbers also exist for 1980 at the zip code level, but the U.S. Census Bureau discourages their use. They claim that the 1980 values are unreliable.

[54] Recall the three year event window goes from Year –1 to Year +2 where Year 0 is the year when Wal-Mart first enters zip code market j.

first time at the beginning of Year 0. State population numbers came from the U.S. Census Bureau.

The probit results for all incumbents both public and private are shown in Table 16. State population change is positive and significant at less than 1% (t statistic is 5.577). This implies that firms are more likely to expand when population is increasing in the state in which zip code market j resides. Comparing the results to Table 4 which shows the basic results for the public and private incumbents without state population changes we see that the magnitude and significance of the public/private ownership dummy is virtually unchanged. The LBO dummy, market share, and dependence on market j are all stronger under the new specification. Chain size, inflation adjusted sales per square foot, the decade dummy and industry growth in square footage are weaker under the new specification.

The null hypothesis of no multiplicative heteroskedasticity cannot be rejected at the 99.5% level using a Lagrange Multiplier test statistic. The specification was also re-run using White's robust estimator of variance. The robust p-values are virtually identical to the non-robust p-values and are shown in Table 16.

The specification for public firms alone was also re-run adding state population change as an independent variable. The

results are shown in Table 17. When comparing the results to the previous results for public firms in Table 10 some changes are apparent. First, state population change is positive and significant at less than 1% which implies that firms are more likely to expand when the local market is in a state that is experiencing population growth over the event window. Second, fraction of insider ownership, the total debt ratio, and the focus measure are all still significant but now at the less than 5% level instead of the less than 1% level. Third, inflation adjusted sales per square foot is now not significant, but the market share of a firm in a given market is now significant at the less than 1% level.

The time period of 1981-1994 was divided into seven groups of two consecutive years. The specification was re-run using six of the seven time dummies as independent variables. The results are similar and are not reported.

The specification for public firms alone was also re-run adding state population change as an independent variable and replacing the market share variable with the modified Herfindahl Index for market j. The results are shown in Table 18. The Herfindahl Index is negative and significant at the less than 5% level. Otherwise the results are very similar to those shown in Table 17 using market share instead of the Herfindahl Index.

As with the previous test, the specification was re-run using six of the seven time dummies as independent variables. The results are similar and are not reported.

The null hypothesis of no multiplicative heteroskedasticity cannot be rejected at the 99.5% level using a Lagrange Multiplier test statistic for the specifications in Table17 and Table 18. The specifications were also re-run using White's robust estimator of variance. The robust p-values are virtually identical to the non-robust p-values and are shown in the respective tables.

3.5.4 The Importance of Managerial Ownership Controlling for Firm Size and Economic Growth

As a test of agency theory, it would be helpful to see if ownership is a significant determinant of the probability of an incumbent firm expanding controlling for firm size and economic growth. Other firm specific variables are excluded as they could be decision variables. The public specification is re-run using managerial ownership, firm size, how dependent a firm is on a local market (as this is correlated with firm size), and economic growth along with the time dummies. The estimation results are shown under Model 1 in Table 19. As can be seen, managerial ownership is negative and significant at 1.7%. Controlling for firm size and economic growth, as well as aggregate time effects, high ownership

public firms make different investment decisions than low ownership public firms.

The specification is re-run on public and private firms. The managerial ownership variable is replaced with a private/public dummy. The results are shown under Model 2 in Table 19. The results on the ownership dummy are negative and significant. Controlling for firm size and economic growth, as well as aggregate time effects, private firms make different decisions than public firms. Also, the private firms are making similar expansion decisions as the high ownership public firms.

3.6 SUMMARY

The main result of this chapter of my dissertation is that incumbent firms with high managerial ownership are less aggressive when facing a new competitive threat then firms with low managerial ownership. The result holds for public versus private firms as well as within the sub-sample of public firms. I provide evidence that suggests differences in the expansion decision are due to managerial ownership and not differences in access to capital or organizational form. Other results are that firms with higher debt levels are less aggressive when facing a new competitive threat as are diversified firms.

CHAPTER 4

Incumbent and Market Specific Determinants of an Entrant's Penetration Into New Local Markets

4.1 Introduction

In Chapter 3, firm and market specific determinants of incumbent investment decisions were examined as a response to a new competitive threat. This chapter looks at the other side of the strategic interaction. Which firm and market specific factors led to a lower market penetration by Wal-Mart after they had already entered a market? This way of measuring which types of firms are making "good" or "bad" decisions avoids the possible endogeneity that could be present if a firm's performance was measured following a specific firm decision. It also avoids the need to collect data regarding the decisions that the firms made which may be difficult or impossible to do in some cases. Also, firms can fight in many ways. They can increase output, expand against Wal-Mart, use aggressive pricing, or fight zoning approvals for new stores. It would be difficult to gather information regarding all of these types of decisions.

Agency theory predicts that managers with high ownership will make value- maximizing decisions.[55] This suggests that they will be more efficient. This efficiency could lead to higher switching costs for customers and quicker responses on their part. It may be difficult to gain market share from such firms.[56] It is also possible that managers with low ownership are over-investing in market share as an empire building activity. If this is the case, they may be setting prices too low and maximizing market share instead of profits. This could make the markets they are in tougher to compete in. It is thus an empirical question to determine whether high or low managerial ownership deters market share gains by the new entrant, Wal-Mart. A finding that supports either of these two hypotheses being true is important at it would suggest that managerial ownership has real product market effects.

It is also of interest to examine whether or not Wal-Mart has an easier or a harder time gaining market share in highly concentrated markets. Highly concentrated markets may be difficult to penetrate if the incumbent firms have barriers to entry and expansion. They may also be easier to penetrate if competition is not as fierce and there are profit opportunities.

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[55] Jensen and Meckling (1976)

[56] Others have examined whether managerial ownership impacts firm decisions when firms face a threat. For example, see Berger, Ofek and Yermack (1997), Khanna and Poulsen (1995), and Song and Walking (1993). These papers, however, are not in the context of a product market setting.

4.2 Research Design

Chapter 3 presented evidence that certain firm and market specific factors do determine expansion decisions by firms when facing a new competitive threat (entry by Wal-Mart into an incumbent firm's local market). Firms can compete in other ways too. For example, incumbent firms can compete on price, invest in advertising, or try to influence zoning decisions regarding expansion by the new entrant. If firm and market specific factors determine different responses by incumbents, a logical extension is to try to determine which of these characteristics imply potential profits to the new competitor.

One of the problems well recognized in the literature is that firm specific characteristics may be caused by the same exogenous factors that determine their decisions. Hence, a major concern in developing the research design of this chapter is to minimize this endogeneity problem. The methodology of Opler and Titman (1994) is employed. Instead of trying to establish whether one decision (say undertaking a LBO) causes weakness in the product market, firm specific characteristics are measured prior to an exogenous threat. Because this minimizes the reverse causality problem, one is better able to decipher if any of these characteristics determine subsequent product market performance.

The threat is new entry by Wal-Mart into a local market where some other firms in the discount department store industry are incumbents. Entry by Wal-Mart can be thought of as exogenous because of the way Wal-Mart expanded and the fact that by the end of the sample period they had entered virtually every market. During the period of 1975-1996 Wal-Mart transformed itself from a regional chain consisting of 125 stores in eight states to a national chain consisting of 2,234 stores in all fifty states. Figures 5 through 8 show Wal-Mart store locations at the beginning of 1975, 1985, 1990 and 1996 respectively.[57] As can be seen, Wal-Mart expanded throughout the United States through connected regions.

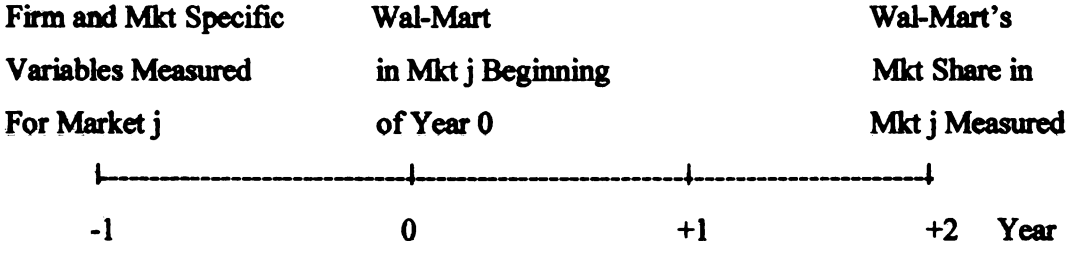
Competition between discount department stores takes place at the local level. Following Chevalier (1995) the United States is broken down into local markets. The local markets used in this study are 862 3-digit zip code areas. Rand McNally Zip Code Finder defines the five digits of the zip code. The first digit of the zip code identifies the geographic region of the country. The second digit identifies a portion of the geographic region. The third digit identifies a sectional center or multi-coded city within that portion of the geographic region. A sectional center is usually the natural center of local transportation and serves the smaller post offices surrounding it. A multi-coded city is a main city post office

[57] The maps show all of the 5 digit zip codes in which Wal-Mart had at least one store in the given year. The store locations came from The Directory of Discount Department Stores.

that serves post office branches within a city. The fourth and fifth digits in the zip code identify the individual post office branches that are served by the sectional center or multi-coded city office. Because the sectional centers and multi-coded cities are usually the natural center of local transportation, the three-digit zip code area served by them is felt to be a reasonable economic market. In 1975 Wal-Mart had discount department stores in 45 of the 862 local markets. By the beginning of 1996, Wal-Mart had entered another 655 local markets for a total of 700 markets.

To employ this methodology, firm and market specific characteristics for a local market are measured prior to entry by the new competitor, Wal-Mart. The penetration rate of Wal-Mart into a local market at the end of a subsequent period is then measured to determine how well firms successfully prevented losses in market share to Wal-Mart once Wal-Mart entered the local market. In other words, which firm and market specific characteristics determined "toughness" in product market competition as measured by penetration rate of the new entrant.

A time line illustrating the empirical set-up is shown below.



The trade journal used gives store location data at the beginning of each year. Year 0 is defined as the first year in which Wal-Mart has a store in 3-digit zip code market j. The firm and market specific variables are measured at the beginning of Year −1 to avoid spurious correlation between the variables and the subsequent penetration of Wal-Mart. If they are flow variables (from the income statement), they are measured over the fiscal year ending at the beginning of Year −1.[58] If they are non-flow variables (balance sheet items and market specific variables), the values are measured at the end of the fiscal year which is at the beginning of Year -1.[59] The economic activity variable is examined from Year −1 to Year +2.

This data set has a number of advantages. First, given that most of the local markets experienced entry by Wal-Mart during the period examined I am able to generate a large number of observations. Second, I am able to keep the threat constant, since I only study the entry and penetration of Wal-Mart into local markets. Third, discount department stores carry essentially non-differentiated merchandise and are thus homogeneous in that respect. This reduces problems of differential product quality or product differentiation across markets. Also, this data set provides

[58] In this industry, almost all of the retailers had a fiscal year ending January 31 of the given year over the time period examined.

store location data and a reliable measure of profitability "sales per square foot" for both public and private chains. This enables me to include privately owned firms in many of the tests. Since this data set permits us to keep industry, product and threat constant across all observations, I can develop reasonably clean tests on how different firm and market characteristics affect Wal-Mart's penetration into local markets.

4.3 Data

A trade journal called Discount Merchandiser was used to identify major discount chains during the period of 1975 - 1996. They define a discount department store as "a departmentalized retail establishment utilizing many self-service techniques to sell hard goods, health-and-beauty aids, apparel and other soft goods and other general merchandise. It operates at uniquely low margins, has a minimum annual volume of $100 million ($50 million in the 1970's), and has at least 10,000 square feet of total space." A list was compiled of all of the discount store chains that Discount Merchandiser had on the "Leading Discounters" list in at least one year during the time period of 1975 - 1996. This procedure

[59] The exception here is LBO's. If a firm underwent a LBO in the years preceeding Year –1, then it was treated as a LBO firm in Year –1.

eliminated the very small "mom and pop" type chains which have very little public information available.[60]

A trade journal called The Directory of Discount Department Stores was then used to determine store locations for all of these chains for each year in which they operated in the industry during the period of 1975 – 1996.[61] Thus, a discount department store chain had to be on the "Leading Discounters" list in Discount Merchandiser and located in The Directory of Discount Department Stores to be included in the sample. The net result was store location data for 113 discount chains. The "Alphabetical Index" of the directory lists all cities within each state in which a discount chain has at least one store open or any planned openings at the beginning of the year.[62] For 1980 –1996 I was able to get exact counts of stores for each firm in each city.[63] The city and firm location data was updated to reflect this information. Each of the cities was then converted to a five-digit zip code.[64]

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[60] Variety stores are smaller than discount department stores and are not in the The Directory of Discount Department Stores or the sample. Also, only standard discount department stores were used. No membership/warehouse clubs were included in the sample.

[61] If two or more chains were owned by a firm at the same time, they were combined into one chain. The net result was 113 chains.

[62] For 1984 - 1986 no "Alphabetical Index" exists, so the extended listings of The Directory of Discount Department Stores for those years were used to construct a similar list.

[63] For 1980 – 1993 the extended company listings were used. For 1994 – 1996 no extended company listings existed so state extended listings were used.

[64] The Rand McNally 1996 Zip Code Finder was used first to convert cities to zip codes. If a city could not be found, the Time Zip Code Directory 1994 edition was used. If there were more then two cities with the same name in the same state the extended listings of The Directory of Discount Department Stores was used to determine the correct county. Once the correct county was known the correct city could be identified. After this process, a tiny fraction of zip codes could not be found. (less than 1%)

To generate local markets, the last two digits of the zip codes were dropped generating 3-digit zip code local markets. The methodology used requires data for one year prior to and two years following Year 0. Because exact the number of stores for each firm in each city is known for 1980 –1996, only local markets who first had Wal-Mart in them at the beginning of 1981 – 1994 were used in the sample. Between 1981 and 1994 Wal-Mart entered 488 of these 3-digit zip code local markets.

Data was needed on the incumbent firms in the markets entered by Wal-Mart. The trade journals give the chain name and the immediate company that owns the discount store chain. Oftentimes the immediate company that owns a chain is a 100% owned subsidiary of a parent company. In order to determine if there was a parent firm, and if a company was privately held or publicly traded, Dun & Bradstreet's Million Dollar Directory, The Directory of Corporate Affiliations Who Owns Whom, and Wards Business Directory were used in that order. A firm was classified as "public" if their stock, or the stock of their parent was traded on the NYSE, ASE or in the OTC market. Otherwise they were classified as "private". There was sometimes a one or two year lag between when ownership actually changed and when it showed up in one of the above sources. The NYSE, ASE, and OTC Daily Stock Price Records books were checked to see if a firm was still trading

on January 1 of a given year. This way it could be identified in which year the ownership changes occurred. When the name of the firm owning a chain changed, Discount Merchandiser was used to identify the underlying reason for the name change. Each name change was identified as being due to a LBO, being acquired by another firm, going public, a spin-off from a parent or to simply to change the firm's image.[65]

Discount sales per square foot came from The Directory of Discount Department Stores. Occasionally total square footage was not shown for a given firm for a given year. The average square footage of a store for that firm in a surrounding year was then used to determine sales per square foot.[66] The number of stores in the discount department store industry and sales per square foot (based on selling space) for the discount department store industry came from Discount Merchandiser. Total parent firm sales for both public and private firms were found in the Million Dollar Directory, The Directory of Corporate Affiliations Who Owns Whom, and Wards Business Directory in that order. Firm level discount sales came from The Directory of Discount Department Stores. Insider ownership was taken from Proxy Statements or Value Line

[65] Quarterly editions of Mergers and Acquisitions for 1981 – 1989 were used to verify that this process did not omit any mergers or LBO's.

[66] In a few cases, sales or the number of stores in a chain were not listed in The Directory of Discount Department Stores. Discount Merchandiser was used in these cases to find this information.

Investment Survey.[67] A firm's total debt to total assets ratio came from Compustat.

4.4 Empirical Results

4.4.1 New Entrant Penetration: The Importance of Incumbent Ownership

Agency theory predicts that there are value losses associated with having less than 100% ownership. The prediction is that the higher the managerial ownership, the lower the value losses. It seems reasonable to predict that firms with low managerial ownership might behave differently in the product market. However, managers who have low ownership may be given incentive contracts and be monitored to try to minimize the agency problem. If agency problems cannot be mitigated with incentive contracts, we might expect that the new entrant, Wal-Mart, would view firms with lower managerial ownership as being weaker competitors and may penetrate their markets quicker. It is also possible that managers with low ownership may over-invest in market share at the expense of profits. If this is the case, there may be higher switching costs, and it may be tougher to gain market share from low ownership firms.

[67] Ownership labeled as "insider", "directory", "family-owned" or "individual" were included in the insider ownership values. If insider ownership was not in Value Line, proxy statements were used.

Indirect tests of Agency Theory can be done. I first test to see if managerial ownership unconditionally determines the market share of the new entrant (Wal-Mart) after a three-year period.

The methodology here is to measure the market share that Wal-Mart has in a local market j in Year +2 where Wal-Mart has entered market j sometime between the beginning of Year −1 and the beginning of Year 0. Wal-Mart's market share is measured by determining the fraction of total stores in local market j at the beginning of Year +2 that are Wal-Marts. The dependent variable will be denoted as "pen_j". This is felt to be a reasonable proxy for the unobservable sales based market share.[68] The underlying assumption is that the local market was in equilibrium before Wal-Mart entered, then a new equilibrium is established after entry. This new equilibrium may have more stores if for example the population is expanding over the period. Pen_j is capturing the fraction of total stores that exist at the beginning of Year +2 owned by Wal-Mart. Thus it is a measure of market share at that point in time. The independent managerial ownership variable is defined as follows:

fracpri$_j$: The fraction of stores in local market j at the beginning of Year −1 owned by firms that are privately held.

[68] Many chains have different size stores for different size markets. Hence it is not unreasonable to assume that chains have similar sized stores in similar sized markets.

The Model 1 specification to be estimated using OLS is as follows:

$$Pen_{j,+2} = \alpha + \beta_1 \text{ fracpri}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

Wal-Mart entered 488 local markets between 1981 and 1994. All local markets were dropped from the sample that had any foreign held firms in them, or that had no stores in them at the beginning of Year –1. This left 471 local markets. The first estimation of the model uses all 471 of these local market observations. Annual time dummies are included in the model to allow for aggregate time effects that may influence the dependent variable, but their coefficients are not shown.

The results are shown in Table 20 for Model 1. Standard errors are White's heteroskedasticity robust standard errors. The higher the fraction of stores owned by privately held firms in local market j, at the beginning of Year –1, the lower Wal-Mart's market share at the beginning of Year +2. This result is significant at 3.6% and implies that Wal-Mart finds product market competition to be tougher in markets where there are a large fraction of privately held firms.

An alternative assumption is that the market is in equilibrium prior to Wal-Mart entering, and Wal-Mart is trying to capture some of the existing stores. If one assumes that the equilibrium number

of stores is static, then another possible dependent variable would be to determine what fraction of the stores in a market at the beginning of Year –1 are owned by Wal-Mart at the beginning of Year +2. Therefore, as a robustness check, the results were re-estimated using the number of stores that Wal-Mart has in local market j at the beginning of Year +2 divided by the total number of stores in local market j at the beginning of Year –1. This dependent variable will be denoted as "penbase$_j$". The Model 2 specification to be estimated using OLS is as follows:

$$\text{Penbase}_j = \alpha + \beta_1 \text{ fracpri}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

All 471 market observations are used again. Annual time dummies are again included, but their coefficients are not shown. The estimation results are shown in Table 20. The higher the fraction of stores owned by privately held firms in local market j, at the beginning of Year –1, the lower Wal-Mart's market share at the beginning of Year +2 as a fraction of the number of stores that existed immediately prior to Wal-Mart's entry. This result is significant at 2.5% and implies that Wal-Mart finds product market competition to be tougher in markets where there are a large fraction of privately held firms.

Will managerial ownership be a determinant of Wal-Mart's penetration into markets with only public firms in them? As mentioned earlier, Wal-Mart entered 488 local markets between 1981 and 1994. All local markets were dropped from the sample that had any foreign held firms in them, or that had no stores in them at the beginning of Year -1. This left 471 local markets. About half of these markets, 233 to be exact, had only public firms in them at the beginning of Year -1 and had ownership data available for all firms in the local market at the beginning of Year -1. The two specifications are re-run using these only these 233 local market observations and changing the fraction stores in the market owned by privately held firms to the weighed average of the managerial ownership levels of the firms in local market j. The new managerial ownership variable is defined as:

w owp$_j$: The weighted average of insider ownership of the firms with at least one store in local market j at the beginning of Year -1. Insider ownership is measured as the fraction of shares held by insiders, directors, family members and individuals that is reported in Value Line Investment Survey or from a firm's proxy statement.[69]

[69] Value Line was used first. If insider ownership was not listed there, then I went to the proxy statements.

This is recorded at the beginning of Year -1 for firm i.[70] This variable is reported in decimal form.

The Model 3 & Model 4 specifications to be estimated using OLS are as follows:

$$Pen_{j,+2} = \alpha + \beta_1 w owp_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

$$Penbase_j = \alpha + \beta_1 w owp_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

The results are shown in Table 20. In both of the specifications, using only markets that have all public firms, managerial ownership is negative and significant at less than 1%. Wal-Mart has less penetration into local markets that have higher managerial ownership irrespective of whether these are publicly traded or privately held firms. Annual year dummies were included in all four of the model estimations, but their coefficients are not shown. The standard errors used in all three models are White's heteroskedasticity robust standard errors.

There is the possibility that there are some market size and firm size factors that can jointly affect the penetration of Wal-Mart into a local market and managerial ownership and thus may induce a

[70] If inside ownership was not available at the beginning of Year –1 I went as far back as Year –4 and as far forward as Year +2 to get it as this variable is quite stable over time.

spurious correlation between them. To control for firm size and market size three additional variables were added as controls:

lnstrs$_j$: This is the natural log of the number of stores in local market j at the beginning of Year –1. It is done to scale for market size. One would expect that it is physically easier to get a higher penetration rate in smaller markets.

proplg$_j$: This is the proportion of stores in local market j that belong to firms in the upper quartile based on chain size at the beginning of Year –1. This variable is reported in decimal form. There may be economies of scale to being large. It is difficult for the managers to own a large part of a bigger firm, raising the possibility that managerial ownership is a proxy for firm size.

w dep$_j$: The weighted average of how dependent a firm is on a local market j for the firms with at least one store in local market j at the beginning of Year –1. ". The weights were calculated by determining what fraction of the total stores in local market j firm i had at the beginning of Year –1. How dependent firm i is on local market j is defined as the fraction of firm i's total stores competing in zip code j at the beginning of Year –1. This variable is reported in percent form. Some in the management strategy literature have

argued that the more dependent a firm is on a market, the tougher they may fight. However, firms that are more dependent on a given local market tend to be smaller firms. Hence, this may be another measure of firm size.

The four model specifications were re-run using these three additional variables. All four of the model specifications are shown below and were estimated using OLS:

Model 1:

$$Pen_{j,+2} = \alpha + \beta_1 \, fracpri_{j,-1} + \beta_2 \, lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 \, w\,dep_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

Model 2:

$$Penbase_j = \alpha + \beta_1 \, fracpri_{j,-1} + \beta_2 \, lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 \, w\,dep_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

Model 3:

$$Pen_{j,+2} = \alpha + \beta_1 \, w\,owp_{j,-1} + \beta_2 \, lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 \, w\,dep_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

Model 4:

$$Penbase_j = \alpha + \beta_1 \, w\,owp_{j,-1} + \beta_2 \, lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 \, w\,dep_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

The summary statistics for all markets and for the public markets only are shown in Tables 21 & 22 respectively. The estimation results are shown in Table 23. All models have t-statistics using White's heteroskedasticity consistent standard errors. All models include annual time dummies, but their coefficients are not shown. In all four models, the measure of managerial ownership is negative

In all four models, the measure of managerial ownership is negative and significant at less than 5%. This implies that holding firm size and market size constant, Wal-Mart has a harder time gaining market share in markets with higher managerial ownership.

In Models 1 & 2, the fraction of stores in a local market owned by private firms is negative and significant at 1.8% and 1.3% respectively. The results also show that Wal-Mart has a harder time gaining market share in markets that have more stores. This is to be expected due to the physical effort of adding stores. In Models 3 & 4, the fraction of shares held by insiders is negative and significant at 2.9% and less than 1% respectively. Again, the results also show that Wal-Mart has a harder time gaining market share in markets that have more stores. In Model 1, the marginal effect is that a 10% increase in the fraction of private firms in a local market leads to about a 1% decrease in Wal-Mart's penetration rate. In Model 3, the marginal effect is that a 10% increase in weighted managerial ownership in a local market leads to about a 2% decrease in Wal-Mart's penetration rate.

The results suggest that firms with high managerial ownership do make different decisions in the product market than firms with low managerial ownership, and that Wal-Mart has a harder time gaining market share from the firms with low managerial ownership.

4.4.2 An Indirect Test for Managerial Entrenchment

Morck, Shleifer and Vishny (1988) document a changing slope when they regress managerial ownership on Tobin's Q. They argue agency problems decrease as ownership increases but managerial entrenchment may set in for some range of ownership values.[71] They use two thresholds, 5% ownership and 25% ownership to test for the entrenchment hypothesis. They do find some evidence of entrenchment and agency problems using a piecewise linear regression when they control for size, industry, and intangible assets. They concede, however, that Tobin's Q is undoubtedly a noisy signal of managerial performance.

It is possible that entrenchment could affect the decisions that managers make when fighting Wal-Mart, and thus affect Wal-Mart's penetration in local markets. Given this industry is very competitive, and that there is low barriers to entry, it would be expected that entrenchment would be unlikely in this industry. As an indirect test of managerial entrenchment, a spline regression, using the same thresholds as Morck, Shleifer and Vishny(1988) was run to examine the relationship between managerial ownership and Wal-Mart's penetration. The test was run using the markets that had only public firms, controlling for local market and firm size. The model specifications are shown below and were estimated using constrained least squares:

Model 1:

$$Pen_{j,+2} = \alpha + \beta_1 w\,owp_{j,-1} + \delta_1 d_1(owp_{j,-1} - .05) + \delta_2 d_2 (owp_{j,-1} - .25) + \beta_2 lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 w\,dep_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

where $d_1 = 1$ if owpj,-1 greater than or equal to 5%; otherwise = 0
$d_2 = 1$ if owpj,-1 greater than or equal to 25%; otherwise = 0

Model 2:

$$Penbase_j = \alpha + \beta_1 w\,owp_{j,-1} + \delta_1 d_1(owp_{j,-1} - .05) + \delta_2 d_2 (owp_{j,-1} - .25) + \beta_2 lnstrs_{j,-1} + \beta_3 proplg_{j,-1} + \beta_4 w\,dep_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

where $d_1 = 1$ if owpj,-1 greater than or equal to 5%; otherwise = 0
$d_2 = 1$ if owpj,-1 greater than or equal to 25%; otherwise = 0

The results are shown in Table 24. In both models have t-statistics were calculated using White's heteroskedasticity consistent standard errors. Both models include annual time dummies, but their coefficients are not shown. In Model 1, neither of the threshold variables is significant individually. This implies that there is not a statistically significant change in the slopes between group one and group two or group two and group three. A test of the hypothesis that the slope of the function is constant across all three groups is tested with a joint test of $\delta_1 = \delta_2 = 0$. The null hypothesis that the slope is constant cannot be rejected at the 99% level. In Model 2, the threshold variable at 5% ownership is statistically significant. This means that the slope between group one and group two is significantly different, but the slope between

[71] See Fama and Jensen (1983) regarding the entrenchment hypothesis.

group two and group three is not significantly different. This implies that ownership greater than 5% does increase penetration by Wal-Mart versus what it is when ownership is less than 5%. Given that the slope coefficients are statistically different between groups one and two, another estimation is done to estimate the slope coefficients for each of the three groups using $penbase_j$ as the dependent variable. The model specification is shown below and was estimated using constrained least squares (piecewise linear regression):

$$Penbase_j = \alpha + \beta_1 \text{ w owp}_{j,-1} \text{ 0 to .05} + \beta_2 \text{ w owp}_{j,-1} \text{ .05 to .25} + \beta_3 \text{ w owp}_{j,-1} \text{ over .25} + \beta_4 \text{ lnstrs}_{j,-1} + \beta_5 \text{ proplg}_{j,-1} + \beta_6 \text{ w dep}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

where $\text{w owp}_{j,-1}$ 0 to .05 $= \text{w owp}_{j,-1}$ if $\text{w owp}_{j,-1} < .05$
$= .05$ if $\text{w owp}_{j,-1}$ is > or = .05

$\text{w owp}_{j,-1}$ .05 to .25 $= 0$ if $\text{w owp}_{j,-1}$ is < .05
$= \text{w owp}_{j,-1}$ minus .05 if .05 < or = $\text{w owp}_{j,-1} < .25$
$= .20$ if $\text{w owp}_{j,-1} >$ or = .25

$\text{w owp}_{j,-1}$ over .25 $= 0$ if $\text{w owp}_{j,-1} < .25$
$= \text{w owp}_{j,-1}$ minus .25 if $\text{w owp}_{j,-1} >$ or = .25

The results are shown in Table 25. The slope coefficient is negative on the ownership measures in all three groups in the piecewise regression. However, it is only statistically significant in the less than 5% ownership group.

4.4.3 New Entrant Penetration: Markets With Only Public Incumbent Firms

This section is an attempt to determine why Wal-Mart finds firms with lower managerial ownership to be easier prey in the product market. Only markets with all public incumbent firms at the beginning of Year –1 are used, as debt ratios are only available for public firms.

Firms with lower managerial ownership may have more debt in their capital structures as debt can be used as an incentive device to lower the agency problem. The use of debt, however, may increase predatory behavior on the part of the other competitors.[72] Wal-Mart may find markets with high debt firms to have "softer" product market competition. However, there also is a strand of literature that argues that firms may take on more debt to commit to more aggressive output behavior in the product market.[73] Hence, Wal-Mart could find competition to be "tougher" when there are a large fraction of high debt firms in a local market. All of these papers suggest that debt is a choice variable. This may not be the case. There is some evidence in the sample that debt may be used as an incentive device. Table 26 shows the simple correlation matrix for the variables in the sample with the 233 public incumbent firm observations. As can be seen in Table 26, markets whose stores are

[72] See for example Bolton and Scharfstein (1990)
[73] See for example Brander and Lewis

owned by firms with low managerial ownership are markets whose stores are owned by firms that use more debt.

Firms with lower managerial ownership may be more diversified. They may be "building empires" to satisfy their own perquisites. There is some evidence in the sample that this is the case. Markets whose stores are owned by firms with low managerial ownership are markets whose stores are owned by firms that have a lower fraction of their sales coming from discounting. Theoretical work differs on its predictions here as to how this will impact the "toughness" of product market competition. One group of models predicts that failing divisions may be subsidized sub-optimally by more profitable divisions.[74] This would argue that diversified firms may fight longer and harder than focused stand-alone firms. Stein (1997) argues that firms that are diversified into related areas can more easily judge relative profitability and may take funds away from divisions where future prospects are relatively poor. This would imply that diversified firms could retrench quicker when threatened.

It is also possible that either high or low ownership firms tend to be located in high Herfindahl markets. In this sample, high Herfindahl markets are negatively correlated with the level of managerial ownership of firms in the markets. It is not clear if Wal-Mart will gain a higher or lower market share in high

[74] For example see Meyer, Milgrom and Roberts (1992) and Scharfstein and Stein (1997)

Herfindahl markets. If the incumbents cooperate we would expect higher penetration. Wal-Mart may expect collusion in these markets, and the incumbents do collude. If the incumbents have mechanisms to block entry and expansion we would expect lower penetration in high Herfindahl markets. With respect to low Herfindahl markets, it may be easier for Wal-Mart to expand in these markets, as it may be easier to eliminate marginal performers due to Wal-Mart's cost advantage. On the other hand, it may be harder for Wal-Mart to penetrate low Herfindahl markets as switching costs would be expected to be higher. Competitors may be more efficient in these markets, and the marginal benefits would be low to customers to drive farther to get better prices. This effect may be particularly pronounced in local markets with higher income populations.

It is also possible that other ownership incentive contracts which can affect output and entry decisions may also impact the penetration of Wal-Mart into local markets that consist of firms that have such contracts. Hence, managerial ownership may still determine new entrant penetration even after controlling for the other variables discussed.[75]

Other variables that will be used as control variables as they may impact the ability of Wal-Mart to gain market share are incumbent firm profitability, firm size, firm dependency on the

local market under attack, and the size of the market. The new variables are defined as follows:

w foc$_j$: The weighted average focus of the firms with at least one store in local market j at the beginning of Year –1. The weights were calculated by determining what fraction of the total stores in local market j firm i had at the beginning of Year –1. Focus is calculated as discount sales divided by total firm sales for the fiscal year ending at the beginning of Year –1 for firm i.[76] This variable is reported in decimal form.

w debt$_j$: The weighted average total debt ratio of the firms with at least one store in local market j at the beginning of Year –1. The weights were calculated by determining what fraction of the total stores in local market j firm i had at the beginning of Year –1. The total debt ratio is calculated as total assets (Compustat Item #A6) minus Stockholder Equity (Compustat Item #A216) divided by total assets (Compustat Item #A6). It is thus the book value of total debt divided by the book value of total assets and was calculated at the

[75] For example, see Khanna (1998) and Fershtman and Judd (1987)
[76] Sometimes this ratio was greater than 1 for a given firm i as total firm sales and discount sales came from different sources. Whenever this happened 1 was used.

beginning of Year –1 for firm i.[77] This variable is reported in decimal form.

w ssq$_j$: This is a measure of profitability. The weighted average inflation adjusted sales per square for the firms with at least one store in local market j at the beginning of Year –1. Inflation adjusted sales per square foot is measured in 1974 dollars for the fiscal year ending at the beginning of Year –1 for firm i.[78]

mod herf$_j$: This is a measure of market concentration. It is calculated as the sum of the squared market shares of the firms in each local market j. The market share of each firm in a local market j is defined as the fraction of stores in the local market owned by firm i.[79]

The first set of tests in this section will use "pen$_j$" as the dependent variable. The model specification to be estimated using OLS is as follows:

$$Pen_{j,2} = \alpha + \beta_1 \, w\,foc_{j,-1} + \beta_2 \, w\,debt_{j,-1} + \beta_3 \, w\,owp_{j,-1} + \beta_4 \, w\,dep_{j,-1} + \beta_5 \, w\,ssq_{j,-1} + \beta_6 \, proplg_{j,-1} + \beta_7 \, mod\,herf_{j,-1} + \beta_8 \, lnstrs_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

[77] Two firms, Hecks and S.E. Nichols could not be found on Compustat. This ratio was calculated from statements located in Moody's Industrial Manuals instead.

[78] Due to the low margins and homogenous goods in this industry, higher turnover leads to higher profitability. This measure of profitability is the only one available for both public and private firms.

[79] Recall that the very small chains are not in the sample. Only chains that met the size criteria stated in the data section are in the sample.

The level of debt is not available for privately held firms. As mentioned earlier, Wal-Mart entered 488 local markets between 1981 and 1994. All local markets were dropped from the sample that had any foreign held firms in them, or that had no stores in them at the beginning of Year –1. This left 471 local markets. About half of these markets, 233 to be exact, had only public firms in them at the beginning of Year –1 and had debt and ownership data available for all firms in the local market at the beginning of Year -1. The first few specifications are run using these 233 local markets.

Table 27 shows the summary statistics for all of the variables used in this first specification. Table 28 shows the estimation results for three models. OLS estimation was used in all of the models.[80] Annual year dummies were included in all three of the model estimations, but their coefficients are not shown. In all three models the Cook-Weisberg (1983) test rejects the null hypothesis of no homoskedasticity at 5%. Hence, the standard errors used in all three models are White's heteroskedasticity robust standard errors.

Model 1 is the full model where the estimation is run using all of the variables. The results show that Wal-Mart has an easier time penetrating local markets if the incumbent firms have high debt levels prior to new entry by Wal-Mart into local market j. This

[80] Since the dependent variable is bounded between zero and one, a Tobit estimation procedure might be appropriate. However, observations at either extreme are rare, so OLS estimation is used as it is considered

result is significant at less than 1% and is consistent with predatory behavior on the part of the new entrant. A ten percent increase in the weighted average debt ratio of the market will lead to about a 7% increase in Wal-Mart's penetration rate. Wal-Mart also has an easier time gaining market share in local markets that have higher Herfindahls prior to Wal-Mart entering, controlling for market size. This result is also significant at less than 1%. Ex-ante it is unclear whether Wal-Mart would have an easier or a harder time penetrating high Herfindahl markets. The results suggest that either there is co-operative behavior in the higher Herfindahl markets or there are higher switching costs in the low Herfindahl markets.

Wal-Mart has a harder time penetrating local markets if the incumbent firms are highly focused prior to entry by Wal-Mart into the local market. This result is significant at 6.6%. A ten percent increase in the weighted average focus of the firms in a market leads to a 1.2% decrease in Wal-Mart's penetration rate. Meyer, Milgrom and Roberts(1992), and Scharfstein and Stein (1997) both argue that firms may sub-optimally finance poorly performing divisions. The implication is that there is more investment in poorly performing divisions and less investment in good performing divisions relative to stand-alone firms. From Chapter 3 it is known that diversified firms are less likely to expand than focused firms. It may also be that they are less likely to initiate price wars or

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to be consistent.

influence zoning decisions. The findings here would be more consistent with the predictions for good performing divisions, as it appears that the diversified firms do not fight as hard as the focused firms. However, this does not seem plausible given that many of these firms entered Chapter 11 and/or exited the industry after competing against Wal-Mart. This would imply that future prospects would have been poor for many firms.

The results are more consistent with Stein who argues that funding may be restricted to those divisions that are expected to perform poorly relative to other divisions. He argues that this is most relevant for firms that are diversified in related industries. Most of the diversified firms in this industry are diversified retailers and thus are diversified in related areas. The results are also consistent with diversified firms lacking a credible threat to fight, as they have lower opportunity costs.

Once firm debt levels, firm focus levels, firm profitability, market Herfindahls have been added to the regression specification, the significance of the managerial ownership variable disappears. From the correlation matrix in Table 26 it can be seen that markets whose stores are owned by firms with higher managerial ownership have stores with lower debt levels, and higher focus than markets whose stores are owned by firms with lower managerial ownership. Since lower debt and higher focus each marginally make Wal-Mart's

penetration more difficult, this appears to be what was driving the ownership results before the additional variables were entered.

With respect to Model 1, the Ramsey RESET test cannot reject the null hypothesis that the model has no omitted variables at the 5% level. Multicollinearity does not appear to be too large a problem. The VIF's for all of the variables other than the annual year dummies are less than three. The highest VIF is 16.0 for one of the annual year dummies. Regional dummies were also put in the model to see if there was any un-modeled market heterogeneity. The United States was divided into six regions, the Northeast, Southeast, West, Foundry, Mid-West, and the Empty region. Five of them were put in the regression, and none of them was significant. An F test was done to test the joint significance of the regional dummies. The null hypothesis that the coefficients are all zero cannot be rejected at the five percent level. Thus, the results with the regional dummies included in the specification are not shown.

Local markets that have a high fraction of stores owned by focused firms also tend to have a high fraction of stores owned by profitable firms as these two variables are positively correlated. The model was re-estimated first dropping the profitability measure w ssq_j (Model 2), then dropping the focus variable, w foc_j (Model 3). When one of these variables is dropped, the significance of the other is increased. When the profitability measure is dropped, the

focus variable becomes significant at less than 1%. When the focus variable is dropped, the profitability variable remains negative but becomes significant at 2%. This implies that Wal-Mart has a harder time penetrating markets with focused firms in them, and these markets tend to have more profitable firms in them. Note that none of the other variables' coefficients or significance levels change much when either of these variables is dropped.

A graph was done plotting the residuals versus the fitted values. There was no curvature or pattern in the residuals. The assumption that the penetration of Wal-Mart is linear in the independent variables appears to be reasonable.

The results are basically consistent with the results in Chapter 3 and imply that expanding against Wal-Mart in a local market reduces Wal-Mart's penetration in that market. In Chapter 3, the findings show that incumbents with higher debt, and higher market shares (higher market Herfindahl's) are less likely to expand against new entrant, Wal-Mart, in local market j. Wal-Mart gains higher market share in markets that consist of high amounts of firms with these traits. The findings in Chapter 3 show that incumbents with higher focus and higher profits are more likely to expand against new entrant, Wal-Mart, in local market j. Wal-Mart gains lower market share in markets that consist of high amounts of firms with these traits less. However, another result from Chapter 3 was that

incumbent firms with high insider ownership or low dependence on a market were less likely to expand against new entrant, Wal-Mart in local market j controlling for the other variables.

It is assumed that when Wal-Mart enters a new market that they disturb the equilibrium and a new equilibrium will eventually emerge. It is not clear that the new equilibrium is in place in a local market by the beginning of Year +2. As a robustness check, the results were re-estimated using Wal-Mart's market share in local market j at the beginning of Year +4. However, a potential problem exists with a longer time window. With a longer window, various factors may change and other variables may determine Wal-Mart's market share other than the firm and market specific variables measured at the beginning of Year −1. Wal-Mart's market share is measured by determining the fraction of total stores in local market j at the beginning of Year +4 that are Wal-Marts. The dependent variable will be denoted as "penfive$_j$". All other variables remain unchanged. All observations where Wal-Mart is first seen competing in a local market at the beginning of 1993 or 1994 now have to be dropped as I only have store location data until the beginning of 1996. This lowers the number of observations from 233 to 176. The model specification to be estimated using OLS is as follows:

$$\text{penfive}_{j,4} = \alpha + \beta_1 \text{ w foc}_{j,-1} + \beta_2 \text{ w debt}_{j,-1} + \beta_3 \text{ w owp}_{j,-1} + \beta_4 \text{ w dep}_{j,-1} + \beta_5 \text{ w ssq}_{j-1} + \beta_6 \text{ proplg}_{j,-1} + \beta_7 \text{ mod herf}_{j,-1} + \beta_8 \text{ lnstrs}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

Summary statistics are located in Table 29. Table 30 shows the estimation results for three models. OLS estimation was used in all of the models.[81] Annual year dummies were included in all three of the model estimations, but their coefficients are not shown. In all three models the Cook-Weisberg (1983) test rejects the null hypothesis of no homoskedasticity at 5%. Hence, the standard errors used in all three models are White's heteroskedasticity robust standard errors.

Model 1 is the full model where the estimation is run using all of the variables. All of the coefficients have the same sign as they did using the shorter event window except the coefficient on the weighted ownership variable, which is still not significant. The results are stronger for the coefficients on the weighted firm debt variable, the Herfindahl variable, and the weighted firm profitability variable (wssq).

The coefficient on the firm focus variable is no longer significant, but on inspection, the correlation of this variable with weighted firm profitability is higher in this smaller sample. Due to the correlation between these two variables, the model was re-estimated first dropping the profitability measure w ssq_j (Model 2), then dropping the focus variable, w foc_j (Model 3). When one of these variables is dropped, the significance of the other is

[81] Since the dependent variable is bounded between zero and one, a Tobit estimation procedure might be appropriate. However, observations at either extreme are rare, so OLS estimation is used as it is believed to

increased. When the profitability measure is dropped, the focus variable becomes significant at less than 1%. When the focus variable is dropped, the profitability variable remains negative but becomes significant at less than 1%. This implies that Wal-Mart has a harder time penetrating markets with focused firms in them, and these markets tend to have more profitable firms in them. Note that as before, none of the other variables' coefficients or significance levels change much when either of these variables is dropped.

It would be reasonable to conclude that widening the event window from three to five years made the results slightly stronger. It appears that a new equilibrium was relatively established after the three-year period.

If one assumes that the equilibrium number of stores is static, then a third possible dependent variable would be to determine what fraction of the stores in a market at the beginning of Year –1 are owned by Wal-Mart at the beginning of Year +2. As a robustness check, the results were re-estimated using the number of stores that Wal-Mart has in local market j at the beginning of Year +2 divided by the total number of stores in local market j at the beginning of Year –1. This dependent variable will be denoted as "$penbase_j$". All other variables remain unchanged. The model specification to be estimated using OLS is as follows:

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be consistent.

$$penbase_j = \alpha + \beta_1 \, w\, foc_{j,-1} + \beta_2 \, w\, debt_{j,-1} + \beta_3 \, w\, owp_{j,-1} + \beta_4 \, w\, dep_{j,-1} + \beta_5 \, w\, ssq_{j-1} + \beta_6 \, proplg_{j,-1} + \beta_7 \, mod\, herf_{j,-1} + \beta_8 \, lnstrs_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

The summary statistics are the same as those shown in Table 27, as these are the same observations used in the first specification. Only the dependent variable has changed. Table 31 shows the estimation results for three models. OLS estimation was used in all of the models. Annual year dummies were included in all three of the model estimations, but their coefficients are not shown. The standard errors used in all three models are White's heteroskedasticity robust standard errors.

Model 1 shows the results using all of the variables. The results are similar to earlier results. Wal-Mart gains a higher fraction of the number of stores that existed at the beginning of Year –1 by the beginning of Year +2 in local markets that have higher Herfindahls and that have firms with higher debt. As before, having focused firms in a market increases the "toughness" of a market as Wal-Mart gains a lower fraction of the number of stores that existed in the beginning of Year –1 in local markets that have highly focused firms in them. In this case the dependent variable does not adjust for increases in the number of stores by any other firms in the event window. It assumes that a local market is in equilibrium and will stay the same size. It makes sense that Wal-Mart would want to add more stores to markets that have firms that

are more profitable with this dependent variable. It may be that these firms are more profitable because they are in markets that are under-stored. The competitors may also be expanding in these markets. The other dependent variables, pen_j and $penfive_j$ automatically adjust for this possibility. In Models 2 & 3, where weighted sales per square foot and weighted firm focus are each dropped, only market herfindahls and market size remain significant.

4.4.4 Incumbent Penetration: Markets With Both Public and Private Firms

In Section 4.4.1, tests showed that Wal-Mart had a harder time gaining market share in local markets the higher the proportion of stores in the market owned by private firms. When looking at local markets consisting of only public firms, Wal-Mart had a harder time gaining market share in local markets that had firms with higher weighted managerial ownership. These results held even after controlling for local market size and firm size. In Section 4.4.3, the results using local markets with only public firms were examined more closely to determine why Wal-Mart had a difficult time gaining market share in the markets consisting of stores with high levels of firm managerial ownership. In this section all local

markets are examined, including those with private firms, to see if private firms act similarly to high ownership public firms.

The specifications run on markets with stores owned by only public firms, are re-estimated using all markets and making some variable changes. As in the earlier tests done in Sections 4.4.1, the fraction of private firms in the local market is used to see if having extreme measures of managerial ownership is important. The information needed to create the focus variable was not available for all of the private firms, and thus this variable was not used in the first tests to be shown below. Debt ratios are not available for private firms, but a LBO dummy variable is used if a market has at least one store in it at the beginning of Year –1 that is owned by a firm that has recently done a LBO. This variable is defined as follows:

LBO dummy$_j$: Equals 1 if local market j has at least one stores owned by a firm that has done a LBO in the three years prior to the beginning of Year –1; Otherwise = 0.

All other variables are the same as were used in earlier specifications. The models to be estimated are as follows and differ only with respect to the dependent variable:

Model 1:

$$Pen_{j,+2} = \alpha + \beta_1 \text{LBO dummy}_j + \beta_2 \text{fracpri}_{j,-1} + \beta_3 \text{w dep}_{j,-1} + \beta_4 \text{w ssq}_j + \beta_5 \text{proplg}_{j,-1} + \beta_6 \text{ mod herf}_j + \beta_7 \text{lnstrs}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

Model 2:

$$Penfive_{j,+4} = \alpha + \beta_1 \text{LBO dummy}_j + \beta_2 \text{fracpri}_{j,-1} + \beta_3 \text{w dep}_{j,-1} + \beta_4 \text{w ssq}_j + \beta_5 \text{proplg}_{j,-1} + \beta_6 \text{ mod herf}_j + \beta_7 \text{lnstrs}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

Model 3:

$$Penbase_j = \alpha + \beta_1 \text{LBO dummy}_j + \beta_2 \text{fracpri}_{j,-1} + \beta_3 \text{w dep}_{j,-1} + \beta_4 \text{w ssq}_j + \beta_5 \text{proplg}_{j,-1} + \beta_6 \text{ mod herf}_j + \beta_7 \text{lnstrs}_{j,-1} + \beta_t \text{ annual time dummies} + \varepsilon_j$$

A potential problem exists when including markets with privately held firms in the sample. The debt ratios for the privately held firms are not available. Also, the focus variable is not available for all private firms. This could least to biased estimates of the remaining coefficients.

Table 32 shows the simple correlation matrix using the observations for all local markets. These relationships between variables can be compared to those using local markets consisting of stores owned by only public firms in Table 26. The correlations between markets with a high fraction of stores owned by private firms in them and other variables are very similar to the correlations between markets with stores owned by firms with high managerial ownership and those variables. Local markets with a high fraction of stores owned by private firms tended to be low Herfindahl markets, have less profitable firms in them, and have smaller firms

in them. However, the correlations with profitability and Herfindahl are close to zero. The markets with stores owned by public firms only, with high managerial ownership, tended to have smaller firms in them, have less profitable firms in them, be in low Herfindahl markets, have more focused firms in them, and have firms with lower debt in them.

The summary statistics are shown in Table 33. Table 34 shows the estimation results using the three different dependent variables. OLS estimation was used in all of the models. Annual year dummies were included in all three of the model estimations, but their coefficients are not shown. The standard errors used in all three models are White's heteroskedasticity robust standard errors.

In all three models, the fraction of private firms in the market is negative and significant at 1.4%, less than 1% and at 6.6%. This implies that Wal-Mart has a harder time penetrating markets with a high fraction of private firms in them. Modified Herfindahl is still positive and significant at less than 1%, and the size of the market, $lnstrs_{j,\,1}$ is still negative and significant at less than 1%. The LBO dummy is not significant in any of the specifications.

The specifications can be run adding the focus variable. Six local markets have to be dropped due to a lack of information regarding the focus variable for at least one firm in the local market.

Model 1:

$$Pen_{j,+2} = \alpha + \beta_1 fracpri_{j,-1} + \beta_2 \, w\, foc_j + \beta_3 \, w\, dep_{j,-1} + \beta_4 \, w\, ssq_j + \beta_5 proplg_{j,-1} + \beta_6 \, mod\, herf_j + \beta_7 \, lnstrs_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

Model 2:

$$Pen_{j,+2} = \alpha + \beta_1 \, w\, owp_{j,-1} + \beta_2 \, w\, foc_{j,-1} + \beta_3 \, w\, dep_{j,-1} + \beta_4 \, w\, ssq_{j,-1} + \beta_5 proplg_{j,-1} + \beta_6 \, mod\, herf_{j,-1} + \beta_7 \, lnstrs_{j,-1} + \beta_t \, annual\ time\ dummies + \varepsilon_j$$

The results are shown in Table 35. In both specifications, the managerial ownership variable is negative and significant at less than 1%. This implies that Wal-Mart has a harder time penetrating markets with a high fraction of stores owned by private firms, and a harder time penetrating markets with only public firm owned stores in them when the firms owning the stores have high managerial ownership. This again supports that private firms are apparently taking similar actions, and Wal-Mart finds these actions to be "tougher". In both specifications Wal-Mart has a tougher time gaining market share in markets that have more profitable firms in them. When the debt variable is omitted, the focus variable becomes positive and significant. In the earlier specification when debt was included for the public only markets, focus was negative and significant. The switch in the sign on the focus variable is probably due to an omitted variable bias. Given that the public and private market coefficients are very similar to those for public firms only, it again appears that private firms are taking actions similar to high managerial ownership public firms.

4.4.5 Herfindahls and Profitability

Earlier results showed that Wal-Mart gained higher penetration in high Herfindahl markets then in low Herfindahl markets. It was unclear whether this was due to more co-operative behavior on the part of the incumbents in the high Herfindahl markets or if it was due to higher switching costs in the low Herfindahl markets. It would be beneficial to empirically test to see if high Herfindahl markets had high profits. If they do, this would support co-operative behavior in these markets. It would also be instructive to see what happens to market Herfindahls and market profits when Wal-Mart enters a local market.

The correlation matrices show a positive simple correlation coefficient between market Herfindahl's and the profitability of the firms that are in the high Herfindahl markets (see Tables 26 & 32). The problem with this is that the Herfindahl is based on only the local market j, while the firm profitability is based on the firm-wide profits of the firms who have stores in local market j and is not the firm profits in market j alone. Unfortunately, profits at the 3-digit zip code level are unavailable. The empirical results shown earlier demonstrate that Wal-Mart ends up with a higher market share in the markets that have high Herfindahls. This provides some evidence of profit potential in these markets and cooperation. If Wal-Mart had a lower market share in high Herfindahl markets after a few years of

competing in those markets, this would provide some evidence that the incumbents in these markets had effective mechanisms to block entry and expansion.

Discount Merchandiser, a trade journal for the discount department store industry, reports sales per square footage of selling space for standard discount department stores for every State, for every year during the sample period. I calculated Herfindahl's for every local market for the earlier tests that were reported. The arithmetic average of the Herfindahls for all of the local markets within each State was then calculated. The ending result was the creation of the average local market Herfindahl for each State for each year. With a measure of profitability per State and a measure of market concentration per State for each year, tests can be done to see if higher Herfindahl markets have higher profits. The variables of interest are defined as follows:

herf$_{it}$: The arithmetic average of the local market (3-digit zip code) modified Herfindahls as defined in section 4.4.2 for every 3-digit zip code in State i for year t.

infssq$_{it}$: The sales per square footage of selling space for standard discount department stores for every State i, for every year t as reported in Discount Merchandiser.

propwal$_{it}$: The number of Wal-Marts as a fraction of the total number of stores in State i during year t. (Stated in percentage form.)

propwal$_{it}$ sqd : This is propwal$_{it}$ raised to the second power.

Table 36 shows summary statistics for these variables. The data consists of observations on all fifty states for 1980 – 1995. The first specification tests to see if States with higher average local market Herfindahls have higher profits. The model to be estimated by pooled OLS is:

$$infssq_{it} = \alpha + \beta_1 herf_{it} + \beta_t \text{ annual year dummies} + \varepsilon_{it}$$

The results are shown in Table 37. Annual year dummies were put in the specification to control for any aggregate time effects. The results show that States with higher average local market Herfindahls have higher profits (inflation adjusted sales per square foot).

The second specification tests to see if the proportion of Wal-Marts in a State determines the average herfindahl for the State. The proportion of Wal-Mart's in the state squared is also included

to control for any non-linearities. The model to be estimated by pooled OLS is:

$$herf_{it} = \alpha + \beta_1 \text{ propwal}_{it} + \beta_2 \text{ propwal}_{it} \text{ sqd} + \beta_t \text{ annual year dummies} + \varepsilon_{it}$$

The results are shown in column two of Table 37 and imply a u shaped effect on Herfindahl. The Herfindahl measure falls when the proportion of Wal-Marts in a State increases but then rises.

The third specification tests to see if the proportion of Wal-Marts in a State determines the profitability levels in the State. The proportion of Wal-Mart's in the state squared is also included to control for any non-linearities. The results imply a u shaped effect on profitability within the State. The profitability in the State first falls when the proportion of Wal-Marts in a State increases but then rises.

4.5 Summary

This chapter explored the relationship between firm and market specific characteristics and Wal-Mart's ability to gain market share. The findings suggest Wal-Mart had a difficult time gaining market share in markets with a high proportion of high ownership firms. This result holds even after controlling for firm and market size and whether the high ownership firms are publicly

or privately held. There does not appear to be any support for the entrenchment hypothesis, but this is not surprising given that this is a competitive industry with low barriers to entry.

The results also support predatory behavior on Wal-Mart's part when entering markets whose stores are owned by firms with high amounts of debt. Interestingly, Wal-Mart also has an easier time penetrating markets whose stores are owned by diversified firms. There is also some evidence that Wal-Mart has a tougher time gaining market share in local markets whose stores belong to firms that are more profitable.

Another finding is that Wal-Mart gains higher market share in more highly concentrated markets. Evidence is presented that these markets are more profitable as well.

CHAPTER 5

Summary

In this dissertation I extend existing research in the product market literature area by studying how managerial ownership as well as other firm and market specific characteristics affect firm aggressiveness in the product market. Very little empirical work has been done to test varying firm specific determinants of product market interactions.

I find that several firm and market specific characteristics do determine investment decisions on the part of incumbent firms when they face a new competitive threat. I find that private firms are less likely to expand then public firms. I also find that public firms with high managerial ownership are less likely to expand then public firms with low managerial ownership. I present evidence suggesting the results are due to differences in managerial ownership and not differences in access to capital, or organizational form. Other results that emerge are that a higher level of debt decreases the likelihood of expansion, a higher level of focus increases the likelihood of expansion, and the more dependent a firm is on the market under attack, the greater the likelihood of expansion.

I also find that several firm and market specific characteristics determine Wal-Mart's ability to gain market share. Wal-Mart has a more difficult time gaining market share in local markets whose stores are owned by firms with high managerial ownership. This result holds even after controlling for firm and market size. This provides support for agency theory. The implication here is that managerial incentives and/or monitoring cannot totally mitigate agency problems. A spline function was also estimated to test for the entrenchment hypothesis, but no evidence supporting it was found.

Other results are that the new entrant, Wal-Mart, does prey on firms with high debt levels. Firms that are focused as well as the more profitable firms also tend to deter Wal-Mart's penetration into their markets.

Higher Herfidahl markets are more profitable, and Wal-Mart gains higher market share in these markets. This provides support for cooperative behavior occurring in these markets.

APPENDICES

APPENDIX A

APPENDIX A- TABLES

Table 1

Chains Attacked by Wal-Mart

The chain names are shown below. If more than one firm owned a chain during the period, then the firm name is shown in parentheses.

Ames
Anderson's
Bargain Town USA (Bargain Town)
Bargain Town USA (Kinder-Care)
Bradlees
Caldor
Clover
Cook United
Danners
Duckwall-Alco
Gold Circle & Richway
Fishers Big Wheel
Fred Meyer
Gambles (Gamble-Skogmo)
Gambles (Wickes)
Gaylords
Gee Bee
GI Joe
Giantway
Grandpa's
Harts (Big Bear Inc)
Harts (Penn Traffic)
Hecks
Hills
Howard Brothers
Jacks
Jamesway
Jefferson Ward
Kings
Kmart
Kuhns
Lechmere
Magic Mart
Maloneys
Marshalls
Maxway
Meijer
Murphy G.C.
Pamida
Prangeway
Quality
Rich's
Roses
Schottenstein
SE Nichols
Shopko
Sky City
Stein Mart
Stuarts
Swallens
Target
TG&Y
Treasury
Van Leunens
Variety W.
Venture
Whitney
Woolco
Zayre

Table 2

Summary Statistics: Public and Private Incumbent Firms.

Summary statistics for 1506 firm i, market j pairs where Wal-Mart was first seen competing in a 3-digit zip code market j between 1976 – 1994, and in which firm i was already an incumbent. 59 firms are represented in the sample.

Explanatory Variables	Mean	Minimum	Maximum	Std Dev
Private/Public Dummy $_i$ 1 = private 0 = public	.1315	0	1.0	.3380
LBO/No LBO Dummy $_i$ 1 = LBO 0 = No LBO	.0126	0	1.0	.1116
Chain Size $_i$	636.4655	4	1811	693.8854
Inflation Adjusted Sales per Square Foot $_i$	60.5824	15.0816	204.7293	20.3759
Market Share of Firm I in Market j	.2925	.0256	1.0	.1960
Modified Herfindahl Index $_i$	.3399	.1224	1.0	.1592
Dependence of Firm i on Market j	.0164	.0006	.3333	.0323
Strength of Wal-Mart Dummy: 1 = 1986–1994 0 = 1976 – 1985	.7118	0	1.0	.4531
Avg. Industry Growth in Square Feet	.0227	.0062	.0469	.0098

Table 3

Simple Correlation Matrix: All Observations Public and Private

Using 1506 firm i, market j pairs where Wal-Mart was first seen competing in a 3-digit zip code market j between 1976 – 1994, and in which firm i was already an incumbent. 59 firms are represented in the sample.

	Pri/ Pub Dum_i	LBO/ No LBO Dum_i	Chain Sz_i	S/Sq Ft_i	Mkt Shr_{ij}	Mod. Herf. $Index_j$	Dep_{ij}	Decade Dum.	Ind. Growth
Pri/ Pub Dum_i	1.00								
LBO/ No LBO Dum_i	.220	1.00							
Chain Sz_i	-.322	-.086	1.00						
S/Sq Ft_i	-.021	-.137	.356	1.00					
Mkt Shr_{ij}	-.131	-.037	.351	.058	1.00				
Mod. Herf. $Index_j$	-.116	-.005	.225	.060	.765	1.00			
Dep_{ij}	.508	.006	-.373	-.046	- .095	-.162	1.00		
Decade Dum.	.096	.072	.094	.048	- .017	-.038	.004	1.00	
Ind. Growth	-.114	-.092	.024	.007	.110	.124	-.054	.082	1.00

Table 4

Univariate Probit: Public and Private Incumbent Firms

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2, otherwise $y_{ij} = 0$. There are 1506 firm i market j observations. Expansion occurred in 219 observations. 59 firms are represented in the sample. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effect value.

Explanatory Variables	Model 1 Coefficients	Marg. Effects dprob[y=1]/dx	Model 2 Coefficients	Marg. Effects Dprob[y=1]/dx
Constant	-1.4148 *** (0.000)	- 0.3131	-1.4315 *** (0.000)	-0.3176
Private/Public Dummy$_i$ 1= private 0 = public	- 0.4385 *** (0.009)	-0.0970 -0.0807	-0.4297 *** (0.0097)	-0.0953 -0.0800
LBO/No LBO Dummy$_i$ 1 = LBO 0 = No LBO	0.7169 ** (0.042)	0.1586 0.2160	0.7198 ** (0.041)	0.1597 0.2176
Chain Size$_i$	0.00012* (0.087)	0.00003	0.00008 (0.2137)	0.00002
Inflation Adjusted Sales Per Square Foot$_i$	0.0048 ** (0.024)	0.0011	0.0050 ** (0.017)	0.0011
Market Share of Firm i in Market j	-0.4230 * (0.069)	- 0.0936		
Modified Herfindahl Index$_j$			-0.2182 (.4182)	-0.0484
Dependence of Firm i on Market j	3.6565 ** (0.011)	0.8091	3.3618 ** (0.0195)	0.7460
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	-0.2440 *** (0.005)	- 0.0540 - 0.0570	-0.2407 *** (0.006)	-0.0534 -0.0563
Industry Growth in Sq. Ft	-8.4801 * (0.0505)	-1.8765	-8.9678 ** (0.038)	-1.9899
Significance Level (Ho: $\beta = 0$)	0.00008		0.00025	
Pseudo R-squared N	.317 1506		.315 1506	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level for the specification using market share. The null hypothesis of homoskedasticity cannot be rejected at the 97.5% level for the specification using modified herfindahl. The specifications were re-run using White's robust estimator of variance. The p-values are virtually identical to those shown above for both specifications. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 5

Univariate Probit: Public and Private Incumbent Firms Time Dummies Included

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1506 firm i market j observations. Expansion occurred in 219 observations. 59 firms are represented in the sample. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value. The sample was broken into 8 two-year periods and 1 three-year period. 8 time dummies were included in the specification, but the coefficients are not shown below.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx	Coefficients Robust p-values (White's)
Constant	- 1.8029 *** (0.006)	- 0.3871	- 1.8029 *** (0.005)
Private/Public Dummy$_I$ 1= private 0 = public	- 0.4332 ** (0.011)	-0.0930 -0.0772	- 0.4332 *** (0.009)
LBO/No LBO Dummy$_I$ 1 = LBO 0 = No LBO	0.5702 (0.113)	0.1224 0.1598	0.5702 (0.105)
Chain Size$_I$	0.00013 * (0.082)	0.00003	0.00013 * (0.073)
Inflation Adjusted Sales Per Square Foot$_I$	0.0060 *** (0.007)	0.0013	0.0060 *** (0.004)
Market Share of Firm i in Market j	- 0.5089 * (0.034)	- 0.1093	- 0.5089 * (0.040)
Dependence of Firm i on Market j	3.7834 *** (0.009)	0.8123	3.7834 *** (0.005)
Wal-Mart Strength Dummy 1 = 1986-1994 0 = 1976-1985	- 0.2311 (0.317)	- 0.0496 - 0.0524	- 0.2311 (0.317)
Industry Growth in Sq. Ft	- 1.7699 (0.900)	-0.3800	- 1.7699 (0.897)
Significance Level (Ho: $\beta = 0$)	0.00000		0.00000
Pseudo R-squared N	.336 1506		

Statistically significant at the 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99% level. None of the 8 time dummies is significant. The specification was re-run using White's robust estimator of variance. The p-values are shown above. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 6

Summary Statistics: Private Incumbent Firms.

Summary statistics for 198 firm i, market j pairs where Wal-Mart was first seen competing in a 3-digit zip code market j between 1976 – 1994, and in which firm i was already an incumbent. 24 firms are represented in the sample.

Explanatory Variables	Mean	Min.	Max.	Std.Dev.
LBO/No LBO Dummy 1 = LBO 0 = No LBO	.0758	0	1.0	.2653
Chain Size	62.19	4	162	49.79
Inflation Adjusted Discount Sales per Square Foot	59.50	19.98	204.73	34.08
Market Share of Firm i in Market j	.2265	.0476	1.0	.1800
Dependence of Firm i on Market j	.0585	.0062	.3333	.0642
Strength of Wal-Mart Dummy 1 = 1986-1994 0 = 1976-1985	.8232	0	1.0	.3824
Avg. Industry Growth in Square Feet	.0198	.0062	.0376	.0085

Table 7

Univariate Probit: Private Incumbent Firms

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 198 firm i market j observations. Expansion occurred in 21 observations. 24 firms are represented in the sample. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value.

Explanatory Variables	Coefficients	Marginal Effects dProb[y=1]/dx
Constant	-1.8529 *** (0.001)	-0.3034
LBO/No LBO Dummy$_i$ 1 = LBO 0 = No LBO	0.8290 * (0.057)	0.1358 0.2038
Chain Size$_i$	0.0031 (0.390)	0.0005
Inflation Adjusted Sales Per Square Foot$_i$	0.0076 ** (0.033)	0.0012
Market Share of Firm i in Market j	-0.3192 (0.725)	-0.0523
Dependence of Firm i on Market j	3.5922 (0.1024)	0.5883
Decade Dummy 1 = 1986-1994 0 = 1976-1985	-0.3921 (0.231)	-0.0642 -0.0757
Industry Growth in Sq. Ft.	-0.0589 (0.997)	-0.0096
Significance Level (Ho: $\beta = 0$)	0.1607	
Pseudo R-squared	.3176	
N	198	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. The specification was re-run using White's robust estimator of variance. The p-values are virtually identical to those shown above except for inflation adjusted sales per square foot which has a p-value of .018 and the dependence of firm i on market j which has a p-value of .053. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 8

Summary Statistics: Public Incumbent Firms

Summary statistics for 1209 firm i, market j pairs where Wal-Mart was first seen competing in a 3-digit zip code market j between 1976 – 1994, and in which firm i was already an incumbent. 38 public firms are represented in the sample.

Explanatory Variables	Mean	Min.	Max.	Std. Dev.
% Insider Ownership $_i$	0.1056	0.0009	.7548	0.1763
Total Debt to Assets $_i$	0.6445	.2894	1.1530	0.1537
Focus $_i$	0.7360	.0077	1.0	0.3090
Chain Size $_i$	765.65	19	1811	715.81
Inflation Adjusted Sales per Sq. Ft. i	62.18	15.08	110.55	17.06
Operating Profit Margin $_{i\ (1209\ obs)}$	.0649	-.0598	.5247	.0753
*Operating Profit Margin$_{i\ (1178\ obs)}$	.0535	-.0598	.1740	.0266
Market Share of Firm i in Mkt j	0.2988	.0256	1.0	0.1934
Dependence on Market j	0.0099	.0006	.1739	0.0167
Strength of Wal-Mart Dummy 1 = 1986–1994 0 = 1976–1985	0.7378	0	1.0	0.4400
Avg. Industry Growth in Square Feet	0.0228	.0062	.0376	0.0097

* NOTE: One firm had an operating profit margin that was much larger than that of the other firms in the sample. It was dropped in the specification that uses operating profit margin.

Table 9

Simple Correlation Matrix: Public Firm Observations

Using 1209 firm i, market j pairs where Wal-Mart was first seen competing in a 3-digit zip code market j between 1976 – 1994, and in which firm i was already an incumbent. 38 firms are represented in the sample.

	% Mgr Owp	Debt to Assets	Chain Size	S/Sq ft.	Mkt. Shr	Dep J	Decade Dum	Ind Growth	Focus
% Mgr Owp	1.00								
Debt to Assets	-.048	1.00							
Chain Size	-.412	-.083	1.00						
S/Sq. Ft.	-.297	-.159	.426	1.00					
Mkt. Shr.	-.102	.038	.390	.123	1.00				
Dep J	.328	-.032	-.454	-.264	-.070	1.00			
Decade Dum	-.146	.214	.081	.080	.020	-.054	1.00		
Ind. Growth	.006	.231	.005	-.006	.045	-.021	.126	1.00	
Focus	.247	.234	.358	.077	.212	-.237	-.049	.061	1.00

Table 10

Univariate Probit: Public Incumbent Firms

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. The specification has 1209 firm i mkt j observations. Expansion occurred in 173 obs. 38 firms are represented in the sample. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value.

Explanatory Variables	Coefficients	Marg. Effects dProb[y=1]/dx
Constant	-0.7896 ** (0.015)	-0.1684
% Insider Ownership$_i$	-1.2025 *** (0.002)	-0.2565
Total Debt to Assets$_i$	-1.1979 *** (0.002)	-0.2555
Focus$_i$	0.5493 *** (0.0099)	0.1172
Chain Size$_i$	0.000005 (0.962)	0.000001
Inflation Adjusted Sales Per Square Ft$_i$	0.0065 ** (0.031)	0.0014
Market Share of Firm i in Market j	-0.4319 (0.104)	-0.0921
Dependence of Firm i on Market j	10.135*** (0.0004)	2.1620
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	-0.0529 (0.614)	-0.0113 -0.1145
Industry Growth in Sq. Ft	- 7.6560 (0.121)	-1.6331
Significance Level (Ho: $\beta = 0$)	0.000002	
Pseudo R-squared N	.334 1209	

Statistically significant at 10% *, at 5% **, at 1% ***

LM test statistics were done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. The specification was re-run using White's robust estimator of variance. The p-values are virtually identical to those shown above and are not shown. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 11

Univariate Probit: Public Incumbent Firms Time Dummies Included

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1209 firm i mkt j observations. Expansion occurred in 173 obs. and 38 firms are represented in the sample. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value. The sample was broken into 8 two-year periods and 1 three-year period. 8 time dummies were included in the specification, but the coefficients are not shown below.

Explanatory Variables	Coefficients	Marg. Effects dProb[y=1]/dx	Coefficients Robust p-values (White's)
Constant	-0.6778 (0.384)	-0.1405	-0.6778 (0.363)
% Insider Ownership$_i$	-1.3176 *** (0.001)	-0.2731	-1.3176 *** (0.001)
Total Debt to Assets$_i$	-1.1548 *** (0.004)	-0.2394	-1.1548 *** (0.007)
Focus$_i$	0.5522 ** (0.013)	0.1145	0.5522 *** (0.007)
Chain Size$_i$	0.00003 (0.785)	0.000006	0.00003 (0.762)
Inflation Adjusted Sales Per Square Ft$_i$	0.0058 * (0.069)	0.0012	0.0058 ** (0.039)
Market Share of Firm i in Market j	-0.5270 * (0.053)	-0.1092	-0.5270 * (0.063)
Dependence of Firm i on Market j	9.820 *** (0.0008)	2.0355	9.820 *** (0.000)
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	-0.2785 (0.260)	-0.0577	-0.2785 (0.269)
Industry Growth in Sq. Ft	-2.8889 (0.867)	-0.5988	-2.8889 (0.857)
Significance Level (Ho: $\beta = 0$)	0.00000		
Pseudo R-squared N	.3512 1209		

Statistically significant at 10% *, at 5% **, at 1% ***

LM test statistics were done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity can be rejected at the 99.5% level. The specifications were re-run using White's robust estimator of variance. The p-values are shown above. None of the 8 time dummies is significant in either of the regressions. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 12

Univariate Probit: Public Incumbent Firms Using Operating Profit Margin

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. The specification has 1178 firm i mkt j observations. Expansion occurred in 168 obs. and 37 firms are represented in the sample. (One firm was dropped as its opm was a large outlier.) The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value.

Explanatory Variables	Coefficients	Marg. Effects dprob[y=1]/dx
Constant	-0.5841 * (0.0556)	-0.1228
% Insider Ownership$_i$	-1.3937 *** (0.0005)	-0.2930
Total Debt to Assets$_i$	-1.7112 *** (0.00008)	-0.3598
Focus$_i$	0.8572 *** (0.0003)	0.1802
Chain Size$_i$	0.00002 (0.8736)	0.000005
Operating Profit Margin$_i$	3.444 * (0.0949)	0.7241
Market Share of Firm i in Market j	-0.5210 * (0.0577)	-0.1095
Dependence of Firm i on Market j	10.5099 *** (0.0003)	2.2096
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	0.0898 (0.419)	0.0189 0.1842
Industry Growth in Sq. Ft	- 7.0078 (0.156)	-1.4733
Significance Level (Ho: $\beta = 0$)	0.00000	
Pseudo R-squared N	.3422 1178	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. The specification was re-run using White's robust estimator of variance. The p-values are virtually identical to those shown above and are not shown. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 13

Univariate Probit: Public Incumbent Firms Parent Size Added

Maximum likelihood estimation results for expansion at the 3-digit zip code level for public incumbents. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1209 firm i mkt j observations. Expansion occurred in 173 obs. The values in parentheses are p-values. 38 public firms are represented in the sample. Marginal effects are calculated at the means of the X's.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx (at mean of X)
Constant	-0.7799 ** (0.016)	-0.1664
% Insider Ownership	-1.1989 *** (0.002)	-0.2558
Total Debt to Assets	-1.1684 *** (0.003)	-0.2493
Focus	0.4819 ** (0.043)	0.1028
Chain Size	-0.00009 (0.600)	-0.00002
Inflation Adjusted Discount Sales Per Square Foot	0.0066 ** (0.028)	0.0014
Market Share of Firm i in Market j	-0.4344 (0.102)	-0.0927
Dependence of Firm i on Market j	10.085 *** (0.0004)	2.1517
Wal-Mart Strength Dummy 1 = 1986-1994 0 = 1976-1985	-0.0486 (0.645)	-0.0104
Industry Growth in Sq. Ft	-6.8498 (0.180)	-1.4614
Inflation Adjusted Parent Total Assets	-0.00003 (.552)	-0.000006
Significance Level (Ho: $\beta = 0$)	.000005	
Pseudo R-squared	.3335	
N	1209	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level.

Table 14

Univariate Probit: Public and Private Incumbents Regional Dummies

Maximum likelihood estimation results for expansion at the 3-digit zip code level for private and public incumbents. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2, otherwise $y_{ij} = 0$. There are 1506 firm i mkt j observations. Expansion occurred in 219 observations. The values in parentheses are p-values. Observations were divided into 6 geographic regions and 5 regional dummies were used. The coefficients on the regional dummies are not shown. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value.

Explanatory Variables	Coefficients	Marg. Effects dprob[y=1]/dx	Coefficients Robust p-values (White's)
Constant	-1.5743 *** (0.000)	-0.3388	-1.5743 *** (0.000)
Public/Private Dummy 1= private 0 = public	- 0.3927 ** (0.024)	- 0.0845 - 0.0715	- 0.3927 ** (0.025)
LBO/No LBO Dummy 1 = LBO 0 = No LBO	1.0223 ** (0.012)	0.2200 0.3297	1.0223 ** (0.011)
Chain Size	0.0001 * (0.085)	0.00003	0.0001 * (0.069)
Inflation Adjusted Discount Sales Per Square Foot	0.0051 ** (0.023)	0.0011	0.0051 ** (0.025)
Market Share of Firm i in Market j	-0.5729 ** (0.024)	-0.1233	-0.5729 ** (0.022)
Dependence of Firm i on Market j	3.3741 ** (0.021)	0.7260	3.3741 ** (0.012)
Wal-Mart Strength Dummy 1 = 1986-1994 0 = 1976-1985	-0.1912 * (0.059)	-0.0412 -0.0430	-0.1912 * (0.057)
Industry Growth in Sq. Ft	-8.2697 * (0.070)	-1.7794	-8.2697 * (0.061)
Significance Level (Ho: $\beta = 0$)	0.0000		
Pseudo R-squared N	.3373 1506		

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was re-run using White's robust estimator of variance. The p-values are shown above. One regional dummy is significant at the 1% level. Another regional dummy is significant at the 10% level.

Table 15

Univariate Probit: Public Incumbents Regional Dummies

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1209 firm i mkt j observations. Expansion occurred in 173 obs. The values in parentheses are p-values. 38 public firms are represented in the sample. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value. Observations were divided into 6 geographic regions and 5 regional dummies were used. The coefficients on the regional dummies are not shown.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx (at mean of X)
Constant	- 1.2094 *** (0.002)	-0.2496
% Insider Ownership$_i$	- 1.4680 *** (0.0003)	-0.3029
Total Debt to Assets$_i$	- 1.0684 *** (0.007)	-0.2205
Focus$_i$	0.6764 *** (0.002)	0.1396
Chain Size$_i$	-0.000008 (0.936)	-0.000002
Inflation Adjusted Discount Sales Per Square Foot$_i$	0.0067 ** (0.040)	0.0014
Market Share of Firm i in Market j	- 0.5800 ** (0.048)	-0.1197
Dependence of Firm i on Market j	11.3364 *** (0.0001)	2.3392
Wal-Mart Strength Dummy 1 = 1986-1994 0 = 1976-1985	0.0170 (0.886)	0.0035 0.0035
Industry Growth in Sq. Ft	- 7.0386 (0.180)	-1.4524
Significance Level (Ho: $\beta = 0$)	.000000	
Pseudo R-squared	.3541	
N	1209	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 95% level. The specification was re-run using White's robust estimator of variance. The p-values are virtually identical to those shown above and are not shown. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975). One regional dummy and the constant are significant at the 1% level. Another regional dummy is significant at the 5% level.

Table 16

Univariate Probit: Public and Private Incumbents State Population Changes

Maximum likelihood estimation results for expansion at the 3-digit zip code level for private and public incumbents. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2, otherwise $y_{ij} = 0$. There are 1422 firm i mkt j observations. Expansion occurred in 205 observations. The values in parentheses are p-values. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown below the classic marginal effects value.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx	Coefficients Robust p-values (White's)
Constant	-1.4771 *** (0.000)	-0.3172	-1.4771 *** (0.000)
Public/Private Dummy$_i$ 1= private 0 = public	-0.4517 *** (0.0097)	-0.0970 -0.0802	-0.4517 ** (0.012)
LBO/No LBO Dummy$_i$ 1 = LBO 0 = No LBO	1.0729 *** (0.007)	0.2304 0.3493	1.0729 *** (0.008)
Chain Size$_i$	0.0001 (0.145)	0.00002	0.0001 (0.140)
Inflation Adjusted Discount Sales Per Square Foot$_i$	0.0027 (0.227)	0.0006	0.0027 (0.230)
Market Share of Firm i in Market j	-0.6242 ** (0.015)	-0.1340	-0.6242 ** (0.019)
Dependence of Firm i on Market j	4.5467 *** (0.002)	0.9764	4.5467 *** (0.001)
Wal-Mart Strength Dummy 1 = 1986-1994 0 = 1976-1985	-.2077 ** (0.032)	-0.0446 -0.0473	-.2077 ** (0.035)
Industry Growth in Sq. Ft	-6.3177 (0.175)	-1.3567	-6.3177 (0.172)
State Population Change$_j$	0.0006 *** (0.000)	0.0001	0.0006 *** (0.000)
Significance Level (Ho: $\beta = 0$)	0.0000		
Pseudo R-squared N	.3313 1422		

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was re-run using White's robust estimator of variance. The p-values are shown above.

Table 17

Univariate Probit: Public Incumbents State Population Changes

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1155 firm i mkt j observations. Expansion occurred in 160 obs. The values in parentheses are p-values. 38 public firms are represented in the sample. Marginal effects are calculated at the means of the x's.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx	Coefficients Robust p-values (White's)
Constant	-0.9417 *** (0.005)	-0.1930	-0.9417 *** (0.002)
% Insider Ownership$_i$	-0.8159 ** (0.043)	-0.1672	-0.8159 ** (0.045)
Total Debt to Assets$_i$	-0.9433 ** (0.016)	-0.1933	-0.9433 ** (0.025)
Focus$_i$	0.4663 ** (0.036)	0.0956	0.4663 ** (0.035)
Chain Size$_i$	0.0001 (0.240)	0.0002	0.0001 (0.205)
Inflation Adjusted Discount Sales Per Square Foot$_i$	0.0026 (0.435)	0.0005	0.0026 (0.392)
Market Share of Firm i in Market j	-0.8441 *** (0.004)	-0.1730	-0.8441 *** (0.008)
Dependence of Firm i on Market j	12.9963 *** (0.000)	2.6636	12.9963 *** (0.000)
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	0.0445 (0.700)	0.0091	0.0445 (0.718)
Industry Growth in Sq. Ft	-7.4920 (0.152)	-1.5355	-7.4920 (0.145)
State Population Change$_j$	0.0007 *** (0.000)	0.0001	0.0007 *** (0.000)
Significance Level (Ho: $\beta = 0$)	0.0000		
Pseudo R-squared	.3381		
N	1155		

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was re-run using White's robust estimator of variance. The robust p-values are shown above. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 18

Univariate Probit: Public Incumbents State Population Changes Herfindahl Instead of Market Share

Maximum likelihood estimation results. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1155 firm i mkt j observations. Expansion occurred in 160 obs. The values in parentheses are p-values. 38 public firms are represented in the sample. Marginal effects are calculated at the means of the x's.

Explanatory Variables	Coefficients	Marginal Effects dprob[y=1]/dx	Coefficients Robust p-values (White's)
Constant	-0.8400 ** (0.013)	-0.1731	-0.8400 ** (0.007)
% Insider Ownership$_i$	-0.8574 ** (0.033)	-0.1767	-0.8574 ** (0.034)
Total Debt to Assets$_i$	-0.9823 ** (0.012)	-0.2024	-0.9823 ** (0.021)
Focus$_i$	0.4351 ** (0.0499)	0.0896	0.4351 ** (0.046)
Chain Size$_i$	0.00004 (0.644)	0.000009	0.00004 (0.621)
Inflation Adjusted Discount Sales Per Square Foot$_i$	0.0030 (0.355)	0.0006	0.0030 (0.312)
Modified Herfindahl $_j$	-0.7419 ** (0.033)	-0.1529	-0.7419 ** (0.037)
Dependence of Firm i on Market j	11.3573 *** (0.000)	2.3400	11.3573 *** (0.000)
Wal-Mart Strength Dummy 1 = '86-'94 0 = '76-'85	0.0376 (0.744)	0.0077	0.0376 (0.761)
Industry Growth in Sq. Ft	-7.1080 (0.174)	-1.4645	-7.1080 (0.169)
State Population Change$_j$	0.0007 *** (0.000)	0.0001	0.0007 *** (0.000)
Significance Level (Ho: $\beta = 0$)	0.0000		
Pseudo R-squared			
N	1155		

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was re-run using White's robust estimator of variance. The robust p-values are shown above. Pseudo R-Squared was calculated in Limdep using a formula given by Zavoina and McKelvey (1975).

Table 19

Univariate Probit: The Importance of Ownership Controlling for Firm Size, and Economic Growth

Maximum likelihood estimation results. Model 1 using public firms only. Model 2 uses both public and private firms. The dependent variable $y_{ij} = 1$ if firm i ever expands during Years –1 to +2; otherwise $y_{ij} = 0$. There are 1209 firm i mkt j observations. Expansion occurred in 173 obs. The values in parentheses are p-values. 38 public firms are represented in the sample. Marginal effects are calculated at the means of the x's. In the case of dummy variables, the marginal effects for the discrete change of the dummy from 0 to 1 is shown. The sample was broken into 8 two-year periods and 1 three-year period. 8 time dummies were included in the specification, but the coefficients are not shown below.

Explanatory Variables	Model 1 Coefficients Robust p-values (White's)	Model 1 Marginal Effects dprob[y=1]/dx	Model 2 Coefficients Robust p-values (White's)	Model 2 Marginal Effects dprob[y=1]/dx
Constant	-0.5177 (0.408)		-1.3669 ** (0.026)	
% Insider Ownership$_I$	-0.8122 ** (0.017)	-0.1741		
Public/Private Dummy$_i$ 1= private 0 = public			-0.3082 ** (0.047)	-.0592
Chain Size$_I$	0.0001** (0.047)	0.00003	0.0001 ** (0.035)	0.00003
Dependence of Firm i on Market j	7.2150 *** (0.007)	1.5468	3.4149 ** (0.013)	0.7459
Industry Growth in Sq. Ft	-4.2646 (-0.792)	-0.9143	-3.3955 (0.801)	-0.7417
Significance Level (Ho: β =0)	0.0000		0.0000	
N	1209		1506	

Statistically significant at 10% *, at 5% **, at 1% ***

A LM test statistic was done to check for multiplicative heteroskedasticity using all of the right hand side variables except the constant. The null hypothesis of homoskedasticity cannot be rejected at the 99.5% level. The specification was re-run using White's robust estimator of variance. The robust p-values are shown above.

Table 20

OLS Regressions Explaining Wal-Mart's Market Share as a Function of Ownership in a Local Market

The dependent variable for Model 1 & Model 3 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 (pen_j). The dependent variable for Models 2 & 4 is the number of stores owned by Wal-Mart in local market j at the beginning of Year +2 as a fraction of the total number of stores in local market j at the beginning of Year –1 ($penbase_j$). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients $y_j = pen_j$ (All Markets)	Model 2 Coefficients $y_j = penbase_j$ (All Markets)	Model 3 Coefficients $y_j = pen_j$ (Public Markets)	Model 4 Coefficients $y_j = penbase_j$ (Public Markets)
constant	0.414 *** (7.407)	1.026 *** (3.103)	0.559 *** (8.377)	1.059 *** (7.981)
$fracpri_j$	- 0.072 ** (-2.105)	- 0.165 ** (-2.241)		
$w\ owp_j$			- 0.320 *** (-3.398)	- 0.984 *** (-3.733)
Number of Obs.	471	471	233	233
R-squared	.149	.158	.166	.225

Statistically significant at 10% *, at 5% **, at 1% ***

Table 21

Summary Statistics: All Markets

To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994. 471 obs.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
$fracpri_j$	.1434	.2233	0.0	1.0
$w\ dep_j$	1.565 %	2.031%	.0437%	22.577%
$proplg_j$	.0271	.0951	0.0	1.0
$lnstrs_j$	1.831	.7939	0	3.784

Table 22

Summary Statistics: Markets With All Public Incumbents

To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.
233 obs.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
w owp_i	.0917	.1033	.0038	.5859
w dep_i	.8047 %	.8124 %	.0437%	6.1587%
$proplg_i$	.9315	.1519	0	1.0
$lnstrs_i$	1.6003	.8055	0	3.5264

Table 23

OLS Regressions Explaining Wal-Mart's Market Share as a Function of Ownership in a Local Market: Market and Firm Size Controls Added

The dependent variable for Model 1 & Model 3 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 (pen_j). The dependent variable for Models 2 & 4 is the number of stores owned by Wal-Mart in local market j at the beginning of Year +2 as a fraction of the total number of stores in local market j at the beginning of Year –1 ($penbase_j$). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients $y_j = pen_j$ (All Markets)	Model 2 Coefficients $y_j = penbase_j$ (All Markets)	Model 3 Coefficients $y_j = pen_j$ (Public Markets)	Model 4 Coefficients $y_j = penbase_j$ (Public Markets)
constant	0.630 *** (9.277)	1.387 *** (4.683)	0.642 *** (4.230)	1.113 *** (6.179)
$fracpri_j$	- 0.079 ** (-2.374)	- 0.118 ** (-2.498)		
w owp_j			- 0.198 ** (-2.195)	- .0517 *** (-2.963)
$lnstrs_j$	- 0.122 *** (-14.594)	- 0.273 *** (-12.074)	- 0.145 *** (-9.362)	- 0.282 *** (-12.450)
$proplg_j$	- 0.0008 (-0.014)	0.130 ** (2.382)	0.054 (0.494)	0.235 * (1.923)
w dep_j	0.001 (0.439)	0.001 (0.233)	0.047 ** (2.284)	0.026 (0.244)
Number of Obs.	471	471	233	233
R-squared	0.501	.538	.4817	.607

Statistically significant at 10% *, at 5% **, at 1% ***

Table 24

Constrained Least Squares Spline Regressions Testing For Differences in Slope Coefficients for Different Ownership Groups: Market and Firm Size Controls Added

The dependent variable for Model 1 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 (pen_j). The dependent variable for Model 2 is the number of stores owned by Wal-Mart in local market j at the beginning of Year +2 as a fraction of the total number of stores in local market j at the beginning of Year −1 ($penbase_j$). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients $y_j = pen_j$ (Public Markets)	Model 2 Coefficients $y_j = penbase_j$ (Public Markets)
Constant	0.648 *** (4.245)	1.166 *** (6.841)
w owp_j	- 0.354 (-0.515)	- 3.254 *** (-2.775)
$d_1(owp_j - .05)$	0.135 (0.166)	3.025 ** (2.220)
$d_2(owp_j - .25)$	0.138 (0.352)	0.177 (0.267)
$lnstrs_j$	- 0.144 *** (-9.467)	-0.271 *** (-12.162)
$proplg_j$	0.050 (0.439)	0.221 * (1.770)
w dep_j	0.047 ** (2.278)	0.023 (0.329)
Number of Obs.	233	233
R-squared	.186	.617

Statistically significant at 10% *, at 5% **, at 1% ***

Table 25

OLS Spline Regression: Explaining Wal-Mart's Market Share as a Function of Different Ownership Groups: Market and Firm Size Controls Added

The dependent variable is the number of stores owned by Wal-Mart in local market j at the beginning of Year +2 as a fraction of the total number of stores in local market j at the beginning of Year −1 ($penbase_j$). The model is estimated using constrained least squares with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model Coefficients $y_j = penbase_j$ (Public Markets)
Constant	1.166 *** (6.841)
w $owp_{j,-1}$ 0 to .05	-3.254 *** (-2.775)
w $owp_{j,-1}$ .05 to .25	-0.229 (-0.765)
w $owp_{j,-1}$ over .25	-.052 (-0.111)
$lnstrs_j$	-0.271 *** (-12.162)
$proplg_j$	0.221 * (1.770)
w dep_j	0.023 (0.979)
Number of Obs.	233
R-squared	.617

Statistically significant at 10% *, at 5% **, at 1% ***

Table 26

Simple Correlation Matrix for Independent Variables Using Public Incumbent Markets

There are 233 local market observations in the sample. All 233 markets have only public incumbent firms in them at the beginning of Year –1. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

	W foc_j	W $debt_j$	W owp_j	W dep_j	W ssq_j (1974 dollars)	$Proplg_j$	Mod $Herf_j$	$Lnstrs_j$
W foc_j	1.000							
W $debt_j$	.264	1.000						
W owp_j	.268	-.060	1.000					
W dep_j	-.086	.072	.336	1.000				
W ssq_j (1974 dollars)	.178	-.118	-.357	-.319	1.000			
$Proplg_j$	.030	.036	-.151	-.508	.057	1.000		
Mod $Herf_j$	.186	-.105	-.372	-.369	.338	.125	1.000	
$Lnstrs_j$	-.163	.007	.166	.495	-.103	-.010	-.654	1.000

Table 27

Summary Statistics: Markets With All Public Incumbents

To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994. 233 obs.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
w foc_j	.7728	.1743	.0390	1.0
w $debt_j$	.6660	.1145	.2935	1.0235
w owp_j	.0917	.1033	.0038	.5859
w dep_j	.8047 %	.8124 %	.0437%	6.1587%
w ssq_j (1974 dollars)	59.4619	11.6496	15.5549	90.9609
$proplg_j$	.9315	.1519	0	1.0
mod $Herf_j$	.5079	.2342	.2099	1.0
$lnstrs_j$	1.6003	.8055	0	3.5264

Table 28

OLS Regressions Explaining Wal-Mart's Market Share at Year +2: Markets With Only Public Firms: Dependent Variable is Pen_j

Dependent variable is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 for all models (pen_j). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients	Model 2 Coefficients	Model 3 Coefficients
constant	0.324 **	0.239 **	0.373 ***
	(2.426)	(2.105)	(2.882)
w foc_j	- 0.116 *	- 0.145 ***	
	(-1.848)	(-2.693)	
w $debt_j$	0.678 ***	0.701 ***	0.603 ***
	(7.269)	(7.897)	(6.880)
w owp_j	0.026	0.0757	- 0.081
	(0.327)	(1.035)	(-1.106)
w dep_j	0.014	0.020	0.013
	(0.923)	(1.467)	(0.860)
w ssq_j	- 0.001		- 0.002 **
	(-1.055)		(-2.087)
$proplg_j$	- 0.036	- 0.007	- 0.055
	(-0.455)	(-0.100)	(-0.706)
mod $herf_j$	0.240 ***	0.231 ***	0.216 ***
	(4.421)	(4.283)	(3.920)
$lnstrs_j$	- 0.091 ***	- 0.096 ***	- 0.090 ***
	(-6.050)	(-7.103)	(-5.956)
Number of Obs.	233	233	233
R-squared	0.64	0.63	0.63

Statistically significant at 10% *, at 5% **, at 1% ***

Table 29

Summary Statistics: Markets With All Public Incumbents

To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1992. 176 obs.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
W foc_j	.7522	.1829	.0390	1.0
W $debt_j$	.6488	.1103	.2935	1.0235
W owp_j	.0899	.1026	.0038	.5859
W dep_j	.8147%	.8619%	.0437%	6.1587%
W ssq_j (1974 dollars)	60.6942	12.1748	15.5549	90.9609
$Proplg_j$	.9256	.1606	0	1.0
Mod $Herf_j$	.5191	.2335	.2222	1.0
$Lnstrs_j$	1.5953	.7865	0	3.5264

Table 30

OLS Regressions Explaining Wal-Mart's Market Share at Year +4: Markets With Only Public Firms

Dependent variable is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +4 for all models ($penfive_j$). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1992.

Explanatory Variables	Model 1 Coefficients	Model 2 Coefficients	Model 3 Coefficients
Constant	0.197 (1.401)	0.005 (0.043)	0.221 * (1.700)
w foc_j	- 0.064 (-0.763)	- 0.180 *** (-2.920)	
w $debt_j$	1.022 *** (10.831)	1.033 *** (10.386)	0.999 *** (10.013)
w owp_j	- 0.069 (-0.443)	0.119 (0.889)	- 0.139 (-1.146)
w dep_j	0.017 (1.029)	0.032 * (1.899)	0.017 (1.015)
w ssq_j	- 0.004 ** (-2.477)		- 0.004 *** (-4.212)
$Proplg_j$	- 0.053 (-0.574)	0.008 (0.094)	- 0.060 (-0.689)
Mod $herf_j$	0.310 *** (5.846)	0.284 *** (5.198)	0.297 *** (5.396)
$lnstrs_j$	- 0.065 *** (-3.649)	- 0.081 *** (-4.619)	- 0.064 *** (-3.630)
Number of Obs.	176	176	176
R-squared	0.64	0.63	0.64

Statistically significant at 10% *, at 5% **, at 1% ***

Table 31

OLS Regressions Explaining Wal-Mart's Market Share in Year +2 as a Fraction of Stores in Market in Year –1: Markets With Only Public Firms

Dependent variable is the fraction of total stores at the beginning of Year –1 in local market j owned by Wal-Mart in local market j at the beginning of Year +2 ($penbase_j$). The models is estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specification, but their coefficients are not shown.

Explanatory Variables	Model 1 Coefficients	Model 2 Coefficients	Model 3 Coefficients
Constant	0.538 **	0.805 ***	0.620 ***
	(2.316)	(4.192)	(2.731)
w foc_j	- 0.195 *	-0.105	
	(-1.773)	(-1.044)	
w $debt_j$	0.350 *	0.275	0.224
	(1.935)	(1.620)	(1.559)
w owp_j	0.005	-0.146	-0.176
	(0.031)	(-0.801)	(-1.069)
w dep_j	0.017	-0.002	0.016
	(0.681)	(-0.098)	(0.627)
w ssq_j	0.003 **		0.002
	(2.022)		(1.384)
$Proplg_j$	0.197	0.109	0.165
	(1.541)	(0.916)	(1.289)
Mod $herf_j$	0.456 ***	0.484 ***	0.415 ***
	(4.971)	(5.261)	(4.283)
$Lnstrs_j$	- 0.205 ***	-0.188 ***	-0.203 ***
	(-6.763)	(-6.789)	(-6.720)
Number of Obs.	233	233	233
R-squared	0.66	0.65	.65

Statistically significant at 10% *, at 5% **, at 1% ***

Table 32

Simple Correlation Matrix for Independent Variables Using All Local Markets

There are 471 local market observations in the sample. Markets with stores owned by private firms are included. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

	LBO_j	$Fracpri_j$	$W\ dep_j$	$W\ ssq_j$ (1974 dollars)	$Proplg_j$	$Mod\ Herf_j$	$Lnstrs_j$
$LBO\ dummy_j$	1.000						
$fracpri_j$	.2623	1.000					
$W\ dep_j$	.0803	.4048	1.000				
$W\ ssq_j$ (1974 dollars)	-.0725	-.0548	-.0548	1.000			
$Proplg_j$	-.0977	-.4972	-.5643	.0809	1.000		
$Mod\ Herf_j$	-.1635	-.0708	-.2483	.1460	.2004	1.000	
$Lnstrs_j$	.0765	.0206	.3577	.0174	-.1305	-.6843	1.000

Table 33

Summary Statistics: All local markets

To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994. 471 obs.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
LBO dummy$_j$	.1125	.3163	0.0	1.0
fracpri$_j$	.1434	.2233	0.0	1.0
w dep$_j$	1.5650 %	2.0305 %	.0437 %	22.5768 %
w ssq$_j$ (1974 dollars)	59.2232	11.1508	15.5549	105.7653
proplg$_j$	.8545	.1955	0.0	1.0
mod Herf$_j$	.4288	.2174	.1358	1.0
lnstrs$_j$	1.8313	.7939	0.0	3.7842

Table 34

OLS Regressions Explaining Wal-Mart's Market Share: All Markets No Debt Ratio, No Focus Variable

The dependent variable for Model 1 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 (pen_j). The dependent variable for Model 2 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +4 ($penfive_j$). The dependent variable for Model 3 is the number of stores owned by Wal-Mart in local market j at the beginning of Year +2 as a fraction of the total number of stores in local market j at the beginning of Year –1 ($penbase_j$). All models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients $y_j = pen_j$	Model 2 Coefficients $y_j = penfive_j$	Model 3 Coefficients $y_j = penbase_j$
Constant	0.6000 *** (9.708)	0.681 *** (7.246)	1.004 *** (3.462)
LBO $dummy_j$	-0.00006 (-0.004)	0.003 (0.126)	0.020 (0.764)
$fracpri_j$	-0.076 ** (-2.469)	-0.121 *** (-2.860)	-0.090 * (-1.842)
w dep_j	-0.001 (-0.474)	-0.001 (-0.167)	-0.003 (-0.478)
w ssq_j	-0.001 (-1.491)	-0.001 (-0.856)	0.003 ** (2.289)
$proplg_j$	-0.027 (-0.476)	-0.147 * (-1.852)	0.051 (0.867)
mod $herf_j$	0.140 *** (3.319)	0.212 *** (3.617)	0.401 *** (3.958)
$lnstrs_j$	-0.095 *** (-10.017)	-0.082 *** (-5.767)	-0.196 *** (-8.892)
Number of Obs.	471	370	471
R-squared	.5195	.4121	.5789

Statistically significant at 10% *, at 5% **, at 1% ***

Table 35

OLS Regressions Explaining Wal-Mart's Market Share: All Markets. No Debt Ratio

The dependent variable for both Model 1 & Model 2 is the fraction of total stores owned by Wal-Mart in local market j at the beginning of Year +2 (pen_j). Both models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. To be in the sample, Wal-Mart has to be first seen in a local market between 1981 – 1994.

Explanatory Variables	Model 1 Coefficients $y_j = pen_j$ (All Markets)	Model 2 Coefficients $y_j = pen_j$ (Public Markets)
Constant	0.569 *** (8.908)	0.776 *** (4.774)
$fracpri_j$	-0.090 *** (-2.734))	
w owp_j		-0.285 *** (-3.081)
w focj	0.066 (1.591)	0.124 * (1.877)
w dep_j	-0.002 (-0.552)	0.023 (1.102)
w ssq_j	-0.001 * (-1.821)	-0.003 *** (-2.753)
$proplg_j$	-0.041 (-0.698)	-0.063 (-0.547)
mod $herf_j$	0.144 *** (3.483)	0.141 *** (2.421)
$lnstrs_j$	-0.092 *** (-9.231)	-0.105 *** (-6.008)
Number of Obs.	465	233
R-squared	.5236	.5154

Statistically significant at 10% *, at 5% **, at 1% ***

Table 36

Summary Statistics

Observations for each of the 50 States for each year within 1980 – 1985. 800 observations.

Explanatory Variables	Mean	Standard Deviation	Minimum	Maximum
$Herf_{it}$	.453	.141	.188	1.0
$Infssq_{it}$ (1974 dollars)	67.63	23.98	36.57	232.46
$Propwal_{it}$	13.26%	18.61%	0.0%	75.25%
$Propwal_{it}$ Sqd	5.21	10.35	0.0	56.62

Table 37

OLS Regressions Explaining State Profitability and Herfindahls

The dependent variable is shown at the top of the column below. The models are estimated using OLS with t-statistics in parentheses using White's consistent standard errors. Annual time dummies were included in the specifications, but their coefficients are not shown. There are observations for each of the 50 states for each year in the range of 1980 – 1995.

Explanatory Variables	DepVariable = $infssq_{it}$	Dep Variable = $herf_{it}$	Dep Variable $Infssq_{it}$
Constant	33.029 *** (7.179)	.464 *** (23.236)	64.152 *** (17.534)
$Herf_{it}$	65.211 *** (7.038)		
$Propwal_{it}$		- 0.652 *** (-10.315)	- 0.622 *** (-5.792)
$Propwal_{it}$ sqd		1.378 *** (15.086)	0.835 *** (5.563)
Number of Obs.	800	800	800
R- Squared	.2394	.132	.1242

Statistically significant at 10% *, at 5% **, at 1% ***

APPENDIX B

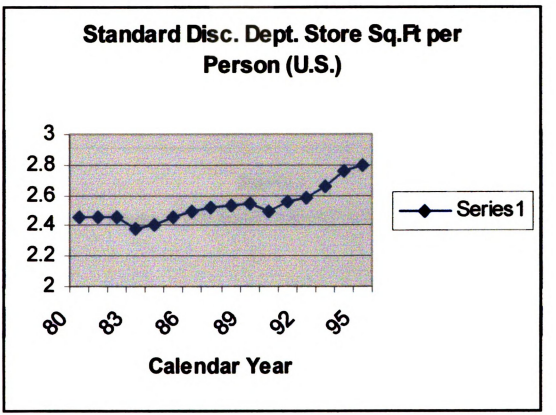

Figure 1

Standard Discount Department Stores Sales per Person (U.S.)

Sources: U.S. Population from U.S. Census Bureau
Industry Sales Data From Discount Merchandiser

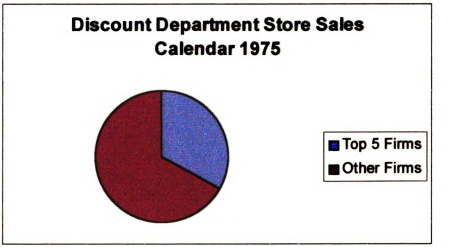

Figure 2

Fraction of 1975 Industry Sales By Top Five Chains

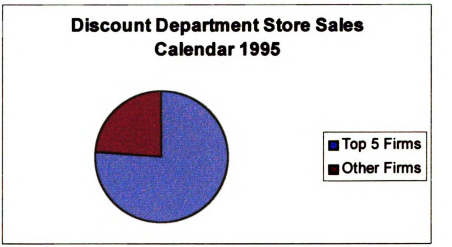

Figure 3

Fraction of 1995 Industry Sales By Top Five Chains

Source: Sales Data From Discount Merchandiser

1975	1985	1995
1. Kmart	1. Kmart	1. Wal-Mart
2. Woolco	2. Wal-Mart	2. Kmart
3. Zayre	3. Target	3. Target
4. Vornado	4. Zayre	4. Meijer
5. Korvette	5. TG&Y	5. Fred Meyer
6. Target	6. Bradlees	6. Marshalls
7. Fred Meyer	7. Fred Meyer	7. Caldor
8. The Treasury	8. Ames	8. Ames
9. Skaggs	9. Caldor	9. Shopko
10. Fed-Mart	10. Marshalls	10. Venture

Figure 4

Top Ten Firms Based on Sales

Source: Sales Data from Discount Merchandiser

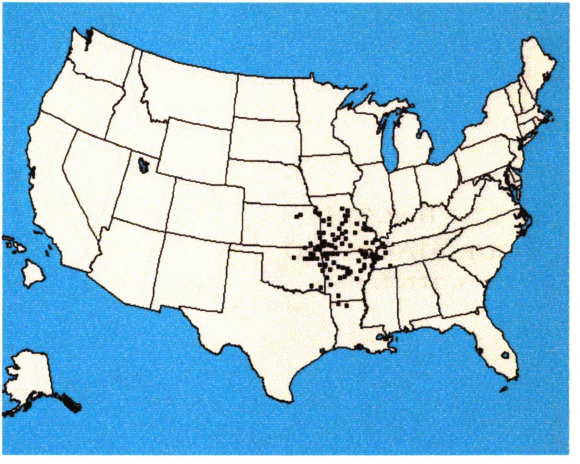

Figure 5

Wal-Mart 1975 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

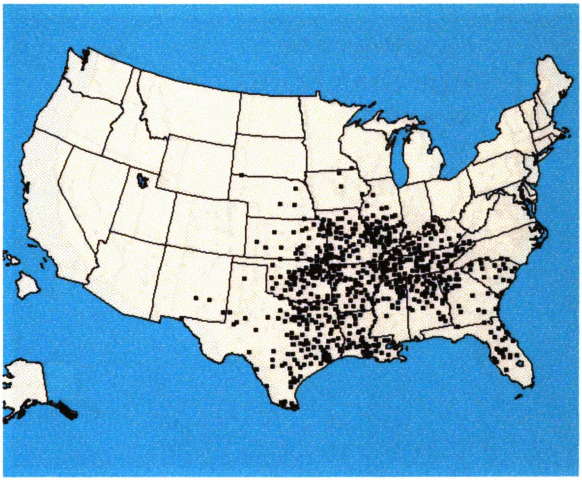

Figure 6

Wal-Mart 1985 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

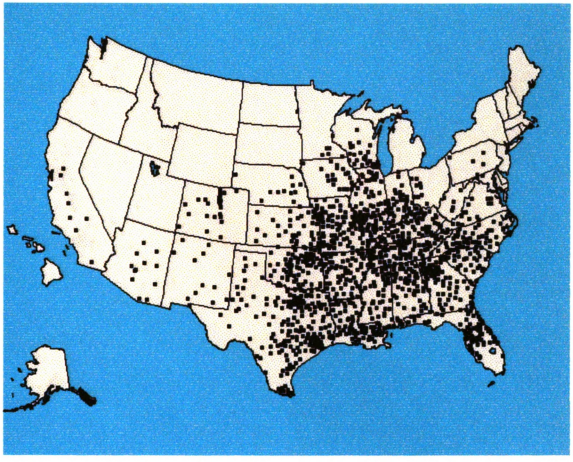

Figure 7

Wal-Mart 1990 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

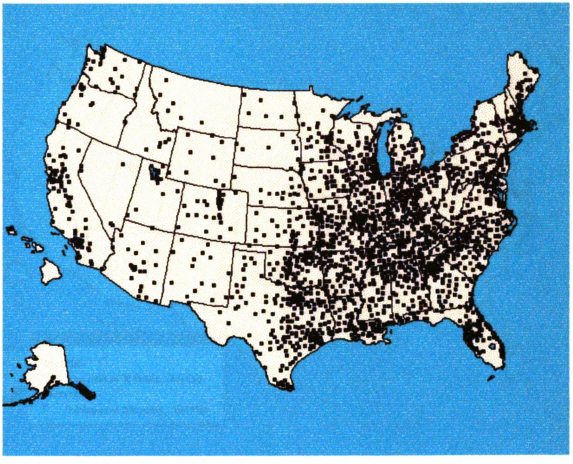

Figure 8

Wal-Mart 1996 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

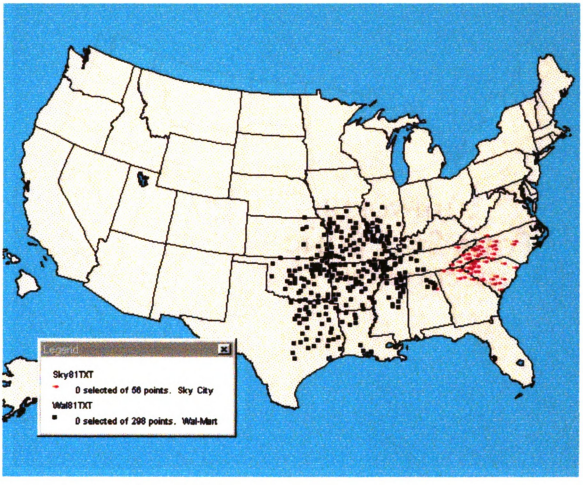

Figure 9

Wal-Mart and Sky City 1981 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

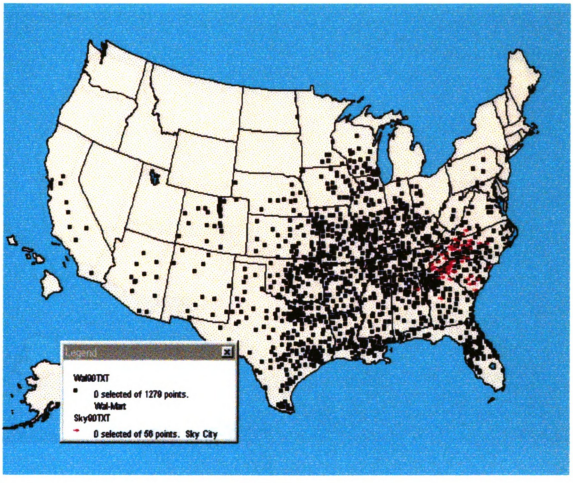

Figure 10

Wal-Mart and Sky City 1990 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

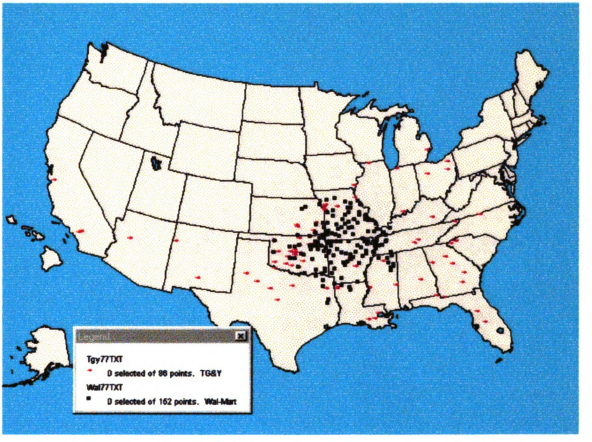

Figure 11

Wal-Mart and TG&Y Store Locations1977

Source: Store Location Data From Directory of Discount Department Stores

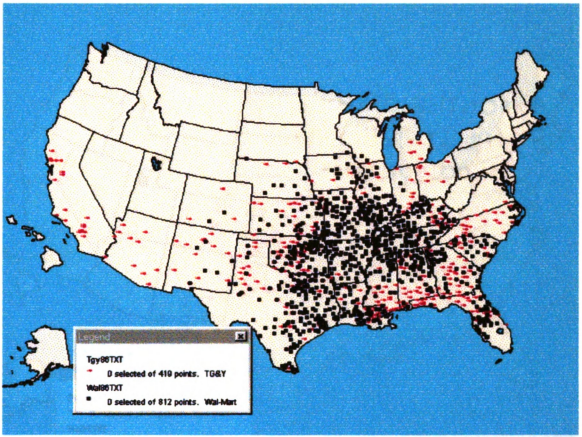

Figure 12

Wal-Mart & TG&Y Store Locations 1986

Source: Store Location Data From Directory of Discount Department Stores

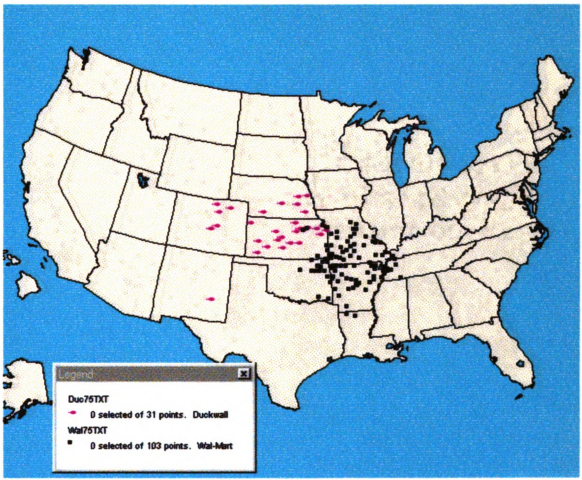

Figure 13

Wal-Mart and Duckwall 1975 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

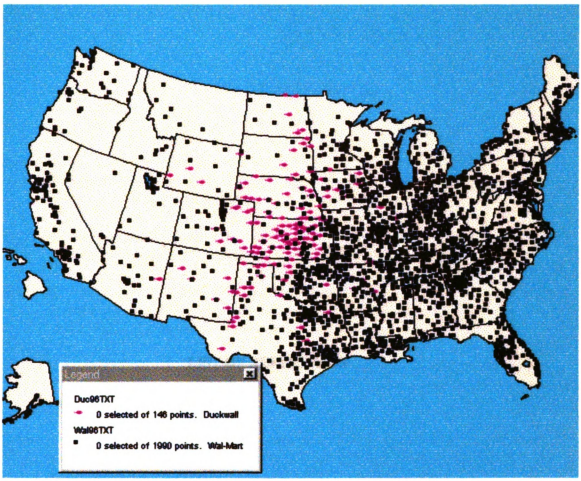

Figure 14

Wal-Mart and Duckwall 1996 Store Locations

Source: Store Location Data From Directory of Discount Department Stores

LIST OF REFERENCES

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