

Strategic Responses of Incumbents to New Entry: The Effect of Ownership Structure, Capital Structure, and Focus

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We examine how certain firm- and market-specific characteristics affect incumbent firms' responses to new entry into their local markets. Data comes from the discount department store industry where Wal-Mart entered a large number of markets in a short period of time. Consistent with existing research, larger and more profitable incumbents respond more aggressively to Wal-Mart's entry, while more highly levered incumbents respond less aggressively. Also, there is evidence that incumbent managers fight harder (possibly overinvest) when their job is at greater risk and high managerial ownership appears to reduce this agency problem. Incumbent firms behave differently in markets under attack by Wal-Mart than in markets not yet threatened, suggesting that some of the documented responses are specific to Wal-Mart's entry.

In recent years, there have been many instances of new chains rapidly expanding into new markets nationwide.¹ Anytime one of these chains enters a new market, the competitive environment facing incumbent firms undergoes a material change, making it necessary for them to respond. The responses, though, are likely to be dependent on both market- and incumbent-specific characteristics. Since the new chains enter numerous markets in different parts of the country, these markets probably differ on characteristics such as population growth rates, degree of competition, and region-specific attributes. Incumbent firms in these markets probably differ on dimensions such as size, profitability, ownership structure, and leverage. With such heterogeneity,

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¹ Examples include Kmart and Radio Shack in the 1970s and more recently, Home Depot, Staples, Best Buy, and Starbucks.

it is likely that incumbents' responses to entry differ not only within markets but also across markets in which they own stores. This raises an interesting question which we address in this article: Is it possible to determine which market- and incumbent-specific characteristics affect how incumbent firms respond to new entry?

For this study, we choose the discount department store industry, since it witnessed a rapid expansion by Wal-Mart into numerous new markets. From 1975 to 1996, Wal-Mart transformed itself from a regional chain with a presence in 8 states to a national chain with stores in all 50 states. During this period it competed against 69 different chains. Some, like Kmart, had stores nationally, but most were regional. Markets differed not only in the total number of stores, but also which chains were present. While some markets were served by only one chain, others had six or seven different chains competing. Firms owning the incumbent chains were also quite heterogeneous. They differed on debt levels, managerial ownership, extent of focus on the discount department store industry, profitability, size, etc.

As expected, incumbent firms' responses to Wal-Mart's entry into their markets varied both within and across markets in which they operated stores. Some responded aggressively by increasing their investment levels in markets entered by Wal-Mart, while others decreased investments in the markets under attack. Some chose to maintain existing levels of investment. Incumbent firms' responses were not necessarily uniform across all markets Wal-Mart entered. Incumbents who responded aggressively in a particular market also maintained or decreased investments in other markets.

In line with existing empirical work, we show that incumbents with higher levels of debt respond to Wal-Mart's entry with a lower level of investment.² However, we get a contrary result to existing literature with respect to firms that undergo leveraged buyouts (LBOs). These firms appear to respond more aggressively, suggesting that in our sample LBO decisions are different from leverage decisions.³ The more profitable incumbents also appear to respond more aggressively. This is consistent with the more profitable firms being the ones with the higher growth potential.⁴ It is also consistent with these firms being more liquid and able to invest more.⁵

² The negative correlation between debt and investments has been shown to exist in various settings. In Lang, Ofek, and Stulz (1996), higher levered diversified firms invest less in their noncore businesses. Opler and Titman (1994) and Zingales (1998) show that conditional on an exogenous shock, higher levered firms invest less and lose market share to less levered firms. In studies like Chevalier (1995), Phillips (1995), and Safieddine and Titman (1999), firms substantially increase leverage to commit to lowering investments in an attempt to increase profits.

³ In Chevalier (1995) and Phillips (1995), LBOs are used as commitment devices to make oligopolistic firms less aggressive. Apparently LBOs or recapitalizations do not serve the same purpose when faced with new entry by a formidable competitor.

⁴ Since the discount industry sells nondifferentiated goods to extremely price sensitive customers, firms compete primarily on cost. Thus profitability is a measure of cost efficiency and of future growth potential.

⁵ See Fazzari, Hubbard, and Peterson (1988). If capital is constrained, more profitable firms being more liquid will on average have higher investments.

Our analysis also shows that incumbents respond more aggressively when they have greater focus on the discount business, or when Wal-Mart attacks their more important markets. Both these findings can result from managerial entrenchment. Since managers are in greater danger of facing dismissal if they lose in their more significant markets or business segment, they are likely to respond more aggressively (possibly overinvest) when these markets or business segments are attacked. The agency explanation is also consistent with our final result: that firms with higher managerial ownership (or privately owned) tend to be less aggressive in their response to Wal-Mart's entry. Higher managerial ownership may be reducing overinvestment by aligning managers and shareholders' objectives.⁶

We are fortunate in our choice of dataset, since the nature of Wal-Mart's expansion makes its entry into new markets somewhat independent of market and incumbent characteristics. Under the "hub and spoke" distribution system, Wal-Mart establishes a distribution center and fills the surrounding areas with stores. When one center gets overextended, another center is opened to service the fringe stores and provide the means to open new stores further away. Expanding over connected regions in this manner provides Wal-Mart with a significant cost advantage over existing chains in the industry. Thus it appears that Wal-Mart enters specific new markets primarily for reasons of distributional efficiency, with incumbent characteristics like debt, ownership, profitability, and focus playing a relatively minor role.

The apparent exogeneity of Wal-Mart's entry decisions makes it unlikely that incumbent firms change their characteristics in an attempt to deter entry. Incumbents are further constrained in their ability to respond by changing firm-specific characteristics because of their multimarket presence. Changing characteristics in response to Wal-Mart's entry into a particular market impacts their interaction with other incumbents not only in that market, but in others as well. With intermarket heterogeneity, the full outcome of a characteristic change is harder to predict, making it less likely that incumbents in the discount industry will attempt it. This helps mitigate a well recognized endogeneity issue facing articles that examine whether one decision (say LBOs or recapitalization) causes another (say new investments, expansions, or R&D expenditures), since both decisions can be caused by the same exogenous factors. Thus our study is similar to Opler and Titman (1994) and Zingales (1998), since we document how firms react to a common shock, allowing us to treat firm-specific variables as somewhat exogenous.

Our work is also related to the growing literature on how capital structure and managerial ownership affect product market competition. Earlier work by

⁶ See Jensen and Meckling (1976). Also see Sharfstein (1997) which documents that segment investments of diversified firms are more in line with those of comparable stand-alone firms, when diversified firms have higher managerial ownership.

Brander and Lewis (1986) and Maksimovic (1988) suggests that higher leverage induces competing firms to be more aggressive in their investment decisions. More recent work by Chevalier and Scharfstein (1996) and Dasgupta and Titman (1998) gives predictions more in line with existing empirical studies of a negative relationship between leverage and investments. Dasgupta and Titman also demonstrate that heterogeneity between competitors can alter conclusions in significant ways. Fershtman and Judd (1987) and Khanna (1998) study the interaction between managerial ownership and product market competition. Fershtman and Judd show that with high substitutability of output, giving managers a higher stake can make them more aggressive. However, in an environment where competing firms have to decide whether or not to invest in a common new opportunity, Khanna shows that giving managers a higher stake has an ambiguous effect on their aggressiveness. While these articles establish that firm-specific variables impact product market competition through their effect on rival firms' reaction curves, they do so in models without new entry. However, since new entry would also impact incumbent reaction curves, some of the trade-offs identified in these models may continue to be relevant.

The rest of the article is organized as follows: Research design is discussed in Section 1; the data are discussed in Section 2; empirical results are given in Sections 3 and 4; and Section 5 concludes.

1. Research Design

1.1 Definition of a market

During the 1975–1996 period, Wal-Mart expanded from 125 stores in 8 states to 2234 stores in all 50 states. Figures 1–3 show Wal-Mart store locations at the beginning of 1975, 1985, and 1996, respectively. It is apparent that Wal-Mart expanded throughout the United States, and that it expanded through connected regions. While expanding, it entered markets where other chains were already operating stores. Since we are interested in the effect of Wal-Mart's entry on investment decisions of incumbents who are directly affected when Wal-Mart enters, we need to define a local market. The local market needs to be small enough for incumbent stores to be in direct competition with each other and the new entrant, but large enough to ensure that consumers in one local market are not likely to use stores in adjacent local markets. We use three-digit zip code markets (the first three digits of the five-digit zip code) as a proxy for local markets.⁷ This breaks the United

⁷ The first digit of the five-digit zip code defines the geographic region of the country. The second digit identifies a portion of the geographic region. The third digit assigns an area to a sectional center or a large multicoded 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. The fourth and fifth digits in the zip code identify the individual post office branches served by the sectional center or the multicoded city office. This definition of zip codes is from the Rand McNally 1996 *Zip Code Finder*.

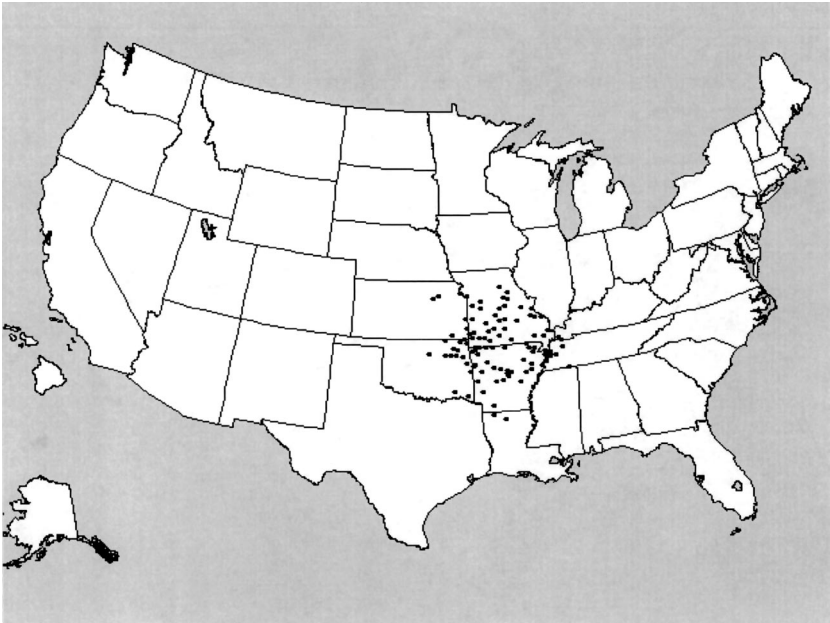


Figure 1

1975 Wal-Mart store locations plotted by city. If there is more than one Wal-Mart store in the same city, only one point is plotted. Store locations come from the *Directory of Discount Department Stores*.

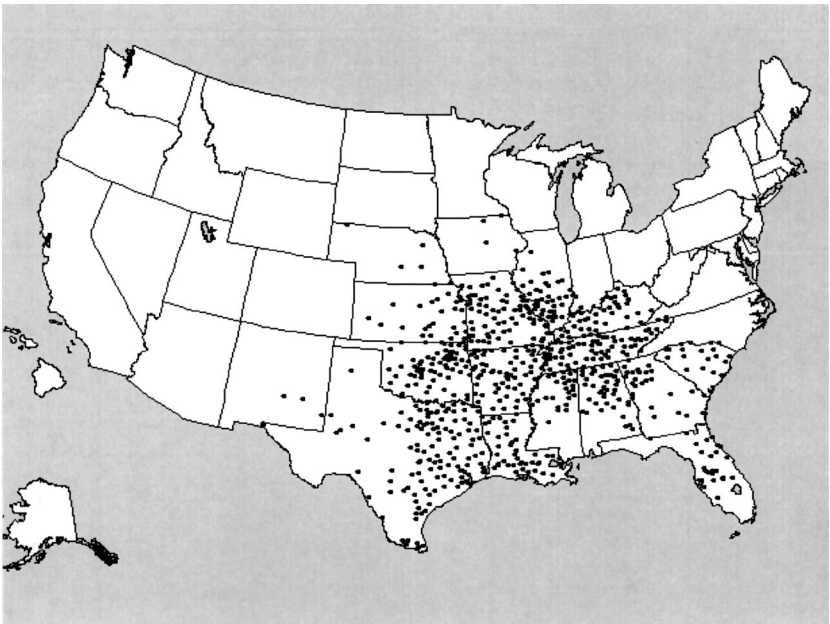


Figure 2

1985 Wal-Mart store locations plotted by city. If there is more than one Wal-Mart store in the same city, only one point is plotted. Store locations come from the *Directory of Discount Department Stores*.

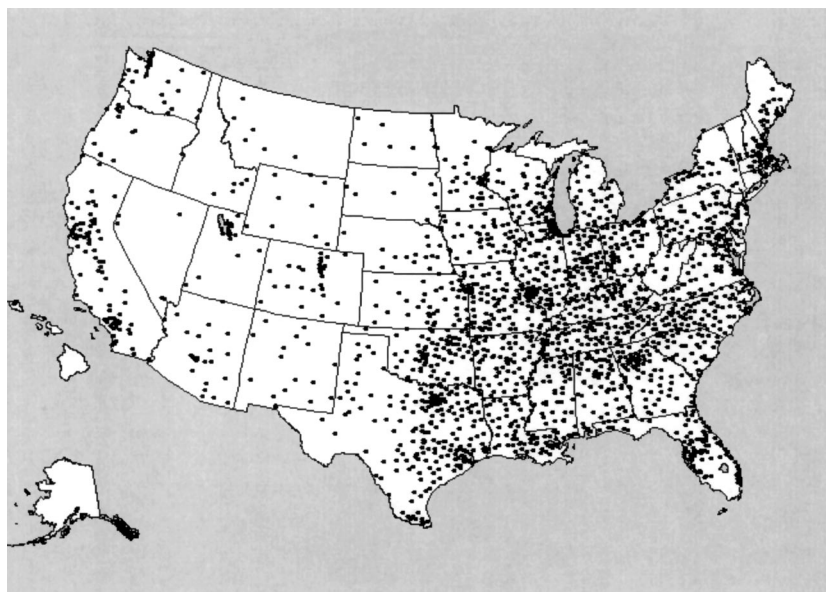


Figure 3

1996 Wal-Mart store locations plotted by city. If there is more than one Wal-Mart store in the same city, only one point is plotted. Store locations come from the *Directory of Discount Department Stores*.

States into 862 different markets with discount department stores. The area covered by a three-digit zip code appears to define a reasonable economic market, because it usually surrounds a population center, and discount department stores tend to be clustered around such centers. Thus intermarket competition is not likely to be an issue in sparsely populated areas since distances between population centers are likely to be large. However, it may be an issue for three-digit zip code markets containing larger cities with more proximate population centers. To control for this possible difference, we classify a three-digit zip code market as urban if it contains a large city.⁸

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. 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. While some were national chains, most were regional. Local markets differed not only on which of the chains were competing, but also on the total number of

⁸ As pointed out by one of our referees, a potentially significant issue is whether Wal-Mart chooses to open its stores in closer proximity to specific incumbents within a three-digit zip code market. Given our dataset, we are unable to control for this.

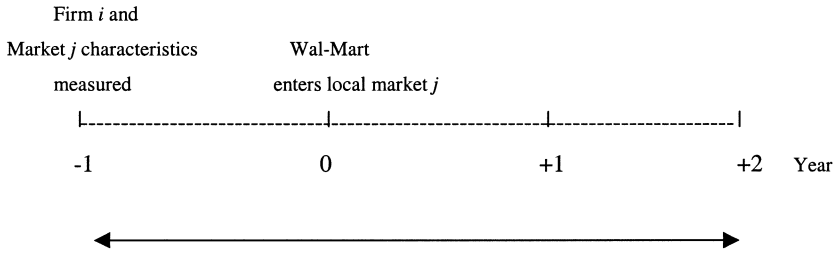


Figure 4
Incumbent firm *i*'s investment decision in local market *j*

stores. While some markets were served by only one chain, in other markets competition between six or seven different chains was not uncommon.

1.2 Research methodology

Our dataset consists of investment decisions by different incumbent firms *i* in different local markets *j* entered by Wal-Mart at different points in time *t*. We study the investment decisions of an incumbent, *i*, in a 3-year window around Wal-Mart's entry into market *j*, with the window starting 1 year before Wal-Mart enters market *j*. The year of Wal-Mart's entry, *t* = 0, is defined as the first year Wal-Mart opens a store in market *j*. We measure the firm and market specific variables at the beginning of year -1 to avoid spurious correlation between the variables and the firm investment decision. Flow variables (from the income statement) are measured over the fiscal year ending at the beginning of year -1. Nonflow variables (balance sheet items and market-specific variables) are measured at the end of the fiscal year; the beginning of year -1. A time line illustrating the empirical setup is shown in Figure 4.

This dataset has a number of advantages. First, given that most local markets experienced entry by Wal-Mart during the period, we have a large number of observations where incumbent firms face reasonably exogenous entry. Second, we keep the threat constant, since we only study the response of incumbents to new entry by Wal-Mart into their local markets.⁹ Third, discount department stores carry essentially nondifferentiated merchandise and are thus homogeneous in that respect. This reduces problems of differential product quality across firms. Fortuitously, this dataset provides us with a reliable measure of profitability "sales per square foot" for both public and private chains. This enables us to include privately owned firms in our tests. Since this dataset permits us to keep industry, product, and threat constant

⁹ It can be argued that a smaller Wal-Mart in earlier years poses a different threat than a larger Wal-Mart later on. We control for this through time and region dummies.

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

2. Data

A trade journal called *Discount Merchandiser* is used to identify major discount chains during the period 1975–1996. The journal defines 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 1970s), and has at least 10,000 square feet of total space.” We compile a list of all of the discount store chains on the “Leading Discounters” in *Discount Merchandiser* for at least one year during the time period 1975–1996. This eliminates the very small “mom and pop”-type chains.

We use the *Directory of Discount Department Stores* to determine store locations for all of these chains for each year in which they operate in the industry during the period 1975–1996.¹⁰ Thus a discount department store chain has 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 “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. We then convert each city to a five-digit zip code.¹¹ To generate local markets, the last two digits of the zip codes are dropped, generating three-digit zip code area markets. Within the time period 1975–1996, 862 three-digit zip code markets had at least one discount store during at least 1 year and 69 chains competed with Wal-Mart in at least one of these local markets.

The trade journals give the chain name and the name of the firm that owns the chain. Often the firm that owns a chain is a 100% owned subsidiary of a parent company. In order to determine if there is a parent firm, and if a company is privately held or publicly traded, Dun & Bradstreet's *Million Dollar Directory*, the *Directory of Corporate Affiliations Who Owns Whom*, and *Wards Business Directory* are used in that order. A firm is classified as “public” if its stock or the stock of its parent is traded on the NYSE, AMEX, or NASDAQ market. Otherwise it is classified as “private.” There is

¹⁰ If two or more chains are owned by one firm at the same time, they are treated as one chain.

¹¹ The Rand McNally 1996 *Zip Code Finder* is used first to convert cities to zip codes. If a city isn't found, the *Time Zip Code Directory 1994* is used. If there are more than two cities with the same name in the same state, the extended listings of the *Directory of Discount Department Stores* is used to determine the correct county. Once the correct county is known the correct city can be identified. After this process, a tiny fraction of zip codes could not be found (less than 1%).

sometimes a 1- or 2-year lag between when ownership actually changed and when it shows up in one of the above sources. The NYSE, AMEX, and NASDAQ daily stock price record books are checked to see if a firm is still trading on January 1 of a given year. This method is used to identify the year of the ownership change. When the name of the firm owning a chain changes, *Discount Merchandiser* is used to identify the underlying reason for the name change. Each name change is identified as being due to a LBO, an acquisition by another firm, going public, a spin-off from a parent, or simply to change the firm's image. The 69 chains that competed with Wal-Mart between 1975 and 1996 were owned by 76 different firms during the period. The 76 firms consist of 40 firms that were always public, 21 that were always private, 13 that were both at different points in time, and 2 that were foreign owned. Fifty-eight of these firms are incumbents attacked by Wal-Mart prior to 1995 and for which data is available for all of the variables. These firms are shown in Table 1.

Sales per square foot comes from the *Directory of Discount Department Stores*. Occasionally square footage is not shown for a given firm for a given year. The average square footage per store for the firm in a surrounding year is then used to determine sales per square foot, as sales and the number

Table 1
Chains attacked by Wal-Mart

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

The discount department store chains that competed with Wal-Mart during 1976–1996 and met our sample criteria. If more than one firm owned a chain during the period, then the firm name is shown in parentheses.

of stores is known for the year in question.¹² Industry data regarding the number of stores and sales per square foot for the discount department store industry are from *Discount Merchandiser*. Total parent firm sales for both public and private firms are from the *Million Dollar Directory*, the *Directory of Corporate Affiliations Who Owns Whom*, and *Wards Business Directory* in that order. Firm level discount sales come from the *Directory of Discount Department Stores*, except for 1975–1978 where they come from *Discount Merchandiser*. Insider ownership is taken from the *Value Line Investment Survey* or proxy statements.¹³ A firm's total debt:total assets ratio and operating profit margin are from Compustat.

3. Empirical Results for Public Incumbents

3.1 Incumbent responses to Wal-Mart's entry

A number of firm- and market-specific factors are likely to impact incumbent investment decisions as a response to Wal-Mart's entry. In addition to debt and inside ownership, firm-specific factors likely to be important are whether the firm is diversified, how dependent a firm is on the specific market under attack, firm profitability, and size. Market factors likely to be important are market concentration, population changes, and whether the market is urban or rural. We use a specification similar to Chevalier (1995), with firm i and market j pairs. Like Chevalier, we measure incumbent firm investment decisions as expansion, retrenchment, or no change in the number of stores.

Firm diversification may be a significant factor since it creates an internal capital market. Meyer, Milgrom, and Roberts (1992) and Scharfstein and Stein (1997) argue that poorly performing divisions of diversified firms are suboptimally subsidized by more profitable divisions. Relative to focused firms, this results in underinvestment in divisions with good prospects and overinvestment in divisions with poor prospects. However, Stein (1997) argues that managers of diversified firms are better able to rank-order projects available to the different divisions (as long as divisions are related), allowing them to "cherry pick" and allocate fewer resources to divisions with poor prospects. Since entry by Wal-Mart into a firm's market is likely to reduce incumbents' prospects in the discount business, we conclude the following: If the extent of diversification leads to a more aggressive response, it is more likely that accessibility to an internal capital market is an important determinant. However, if the extent of diversification results in a less aggressive response, it is less likely that accessibility to internal capital markets is an

¹² In a few cases (particularly observations from the 1970s), sales or the number of stores in a chain are not listed in the *Directory of Discount Department Stores*. *Discount Merchandiser* is used in these cases.

¹³ Ownership labeled as "insider," "director," "family-owned," or "an individual" is included in the insider ownership values.

important determinant and more likely that availability of better investment opportunities in other divisions is the driving force.

Firm size may play a significant role in determining a firm's strategic response to a new competitive threat.¹⁴ Consistent with one strand of the 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. Firm profitability may also explain which firms are more likely to expand against Wal-Mart. Fazzari, Hubbard, and Petersen (1988) provide evidence that investments are positively related to the availability of internally generated funds.

A firm's response to new competition may also be determined by the firm's dependence on the market under attack. Chen and MacMillan (1992) find that the greater the dependence of a firm on a market under attack, the more likely it will be to respond. They argue the incumbent is more aggressive, since it has more to lose by either exiting or losing market share in its more important markets. Market share or market Herfindahl could be important, because it measures intensity of competition. Incumbents in markets with less intense competition (higher Herfindahl) may also react less aggressively to new entry. A decade dummy is also included to represent the fact that Wal-Mart was a stronger competitor in 1986–1994 as compared to 1976–1985. Economic conditions and population changes also need to be considered as possible explanatory variables for expansion/retrenchment decisions. Higher growth markets are unconditionally more likely to see incumbents increasing the number of stores. Since we are studying incumbent responses conditional on Wal-Mart's entry, we need to control for such factors to avoid contaminating our results. Table 2 summarizes the literature and shows the predicted signs for the independent variables.

The expansion/retrenchment decision is modeled as an ordered probit. The ordered probit methodology is selected rather than a multinomial logit to preserve the order of the responses from most aggressive (expansion) to least aggressive (retrenchment). Year 0 is defined as the first year Wal-Mart has at least one store in local market j . Year 0 can be any year in the range of 1976–1994. The dependent variable, Y_{ij} , equals -1 if firm i 's first move in market j during years -1 to $+2$ was to retrench, $+1$ if firm i 's first move in market j during years -1 to $+2$ was to expand, or 0 if firm i never expanded or retrenched in market j during years -1 to $+2$. The independent variables are defined below. Each is recorded at the beginning of year -1 unless otherwise stated.

¹⁴ In the strategic management literature there are two strands. One argues that incumbent size is positively correlated with an aggressive reaction when threatened, because of abundant slack. The other argues that largeness may lead to a less aggressive reaction due to a large bureaucracy, complacency, and structural complexity.

Table 2

Variable definitions and predicted signs for incumbents' responses in related literature

Variable	Variable definitions	Predicted sign
Ownership		
Private _{<i>i</i>}	1=private; 0=public	(-) Fershtman and Judd (1987), Khanna (1998)
Inside Owp _{<i>i</i>}	Fraction of shares owned by insiders, family, directors,	(+) Khanna (1998)
Debt		
LBO _{<i>i</i>}	1 if firm <i>i</i> underwent an LBO between <i>t</i> = -4 and <i>t</i> = -1; otherwise 0	(+) Brander and Lewis (1986), Maksimovic (1988), Rotemberg and Scharfstein (1990), Dasgupta and Titman (1998)
Debt _{<i>i</i>}	Total debt/total assets (Compustat A216/A6)	(-) Myers (1977), Chevalier and Scharfstein (1996), Dasgupta and Titman (1998)
High Debt _{<i>i</i>}	1 if public and debt _{<i>i</i>} ≥ 70% or if private and LBO _{<i>i</i>} = 1; otherwise 0	
Focus		
Focus _{<i>i</i>}	Discount sales firm <i>i</i> / total sales firm <i>i</i>	(+) Stein (1997), Scharfstein and Stein (1997) (-) Lang and Stulz (1994), Meyer, Milgrom, and Roberts (1992), Scharfstein and Stein (1997)
Size		
Chain Sz _{<i>i</i>}	Number of discount department stores owned by firm <i>i</i>	(+) Chen and Hambrick (1995)
Profitability		
S/Sq Ft _{<i>i</i>}	Inflation adjusted sales per square ft. for discount department stores owned by firm <i>i</i>	(+) Fazzari, Hubbard, and Peterson (1988)
Dependence on a Market		
Depend _{<i>ij</i>}	Fraction of firm <i>i</i> 's total discount department stores in market <i>j</i>	(+) Chen and MacMillan (1992)
Market Share		
Mkt Shr _{<i>ij</i>}	Fraction of discount department stores in market <i>j</i> owned by firm <i>i</i>	(+) More aggressive—defend market share (-) Less aggressive—already control good store locations
Population Chg.		
Pop Chg _{<i>j</i>}	Change in population from year -1 to year +2 for the state in which market <i>j</i> resides	(+) Due to increased demand for stores
Decade Dummy		
Decade	1 if year 0 between 1986 and 1994 0 if year 0 between 1976 and 1985	(-) Due to increased strength of Wal-Mart
Economy		
Ind. Growth	Arithmetic mean annual growth rate in U.S. discount department store square footage year -1 to year +2	(+) Expand when economic conditions are good for expanding (-) Less likely to expand if it is Wal-Mart doing the rapid expanding

The dependent variable is defined as follows: $Y_{ij} = -1$ if firm *i*'s first move in market *j* during years -1 to +2 was to retrench, $Y_{ij} = +1$ if firm *i*'s first move in market *j* during years -1 to +2 was to expand, $Y_{ij} = 0$ if firm *i* never expanded or retrenched during years -1 to +2. Subscript *i* denotes the *i*th firm, subscript *j* denotes the *j*th local market. All variables are measured at the beginning of year -1 unless noted. The predicted sign is for whether the incumbent reacts aggressively or not to new entry: (+) signifies aggressive, (-) signifies nonaggressive.

Firm-specific variables.

Inside Owp_{*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.¹⁵

¹⁵ Value Line is checked first. If insider ownership is not listed there, proxy statements are used. If inside ownership is not available at the beginning of year -1 we go as far back as year -4 and as far forward as year +2 to get it, as inside ownership is stable over time. A small number of observations were dropped due to a lack of available inside ownership data.

Debt_{*i*}: Total assets (Compustat item A6) minus stockholder equity (Compustat item A216) divided by total assets (Compustat item A6).¹⁶

Focus_{*i*}: Discount department store sales divided by total firm sales.¹⁷

Chain Size_{*i*}: The number of discount department stores owned by firm *i*. This is measured using the exact number of stores in urban areas and the number of five-digit zip codes in which firm *i* has at least one store in rural areas.¹⁸

Inflation Adjusted Sales per Square Foot_{*i*}: Firm *i*'s inflation adjusted discount "sales per square foot" stated in 1974 dollars.¹⁹

Rivalry variables

Market Share_{*ij*}: The number of discount department stores owned by firm *i* in market *j* divided by the total number of discount department stores in market *j*.

Dependence on Mkt_{*ij*}: The fraction of firm *i*'s stores competing in market *j*.

Decade Dummy: 1 if year 0 is in range of 1986–1994; 0 if year 0 is in the range of 1976–1985.

Economic variables

Avg. Industry Growth: Arithmetic average of annual growth in the total square footage of discount stores in the industry during years -1 through $+2$.

State Population Change_{*j*}: The change in state population from the beginning of year -1 to the beginning of year $+2$ for the state in which local market *j* is located.²⁰

We examine incumbent firm *i*-market *j* pairs where firm *i* is a public firm at time year -1 and Wal-Mart enters zip code market *j* for the first time

¹⁶ Two firms, Hecks and S. E. Nichols could not be found on Compustat. To avoid dropping these firms from the sample, the ratio is calculated from statements in *Moody's Industrial Manuals*.

¹⁷ Sometimes this ratio is greater than 1, as total firm sales and discount sales come from different sources. Whenever this happens, 1 is used. This measure of focus is similar to the measure used by Scharfstein (1997) but different from the one used in Berger and Ofek (1995) and others.

¹⁸ Data for the exact number of stores in rural areas is unreliable. The number of five-digit zip codes with stores is felt to be a reasonable proxy for the number of stores in rural areas. The exact number of stores in urban areas is known only from 1980 on. Thus for specifications using observations from years prior to 1980, the chain size is measured as the number of five-digit zip codes with stores in all markets.

¹⁹ If sales per square foot is missing for any year the value for the previous year is used.

²⁰ Zip code-level population changes would be ideal here. However, reliable population data is available at the zip code level for 1990 only. Reliable state population figures are available from the U.S. Census Bureau annually for 1980–1996. The change in state population for the state in which local market *j* resides is used to proxy population changes in local market *j*. For observations where year 0 is 1978, 1979, or 1980, the growth in population of the state from 1980–1983 is used as a proxy for the growth in population from year -1 to year $+2$.

Table 3

Summary statistics: public incumbent firms

Variable	Mean	Minimum	Maximum	Std. Dev.
Inside Ow _{<i>i</i>}	0.1056	0.0009	0.7548	0.1763
Debt _{<i>i</i>}	0.6445	0.2894	1.1530	0.1537
Focus _{<i>i</i>}	0.7360	0.0077	1	0.3090
Chain Sz _{<i>i</i>}	765.65	19	1811	715.81
S/Sq Ft _{<i>i</i>}	62.18	15.08	110.55	17.06
Mkt Shr _{<i>ij</i>}	0.2988	0.0256	1.0	0.1934
Depend _{<i>ij</i>}	0.0099	0.0006	0.1739	0.0167
Decade	0.7378	0	1	0.4400
Ind. Growth	0.0228	0.0062	0.0376	0.0097
Pop Chg _{<i>j</i>}	349.48	-154	1665	349.48

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

between 1976 and 1994.²¹ Table 3 provides the summary statistics for all of the variables used in this specification. There are 1209 firm *i*-market *j* pairs with 38 public firms represented in the sample.

The results of the ordered probit are shown in Table 4.²² The percentage of insider ownership is negative and significant at 3.2%. This implies that the higher the inside ownership the less aggressive an incumbent firm's capital investment decisions in market *j* around the attack event.²³ The "marginal effects" show that an increase in insider ownership of 10% would decrease the probability of expansion by 1.1% and increase the probability of retrenchment by 1.5% when all other variables are held at their mean.

The total debt:total assets ratio is negative and significant at less than 1%. This implies that the higher the debt the less aggressive an incumbent firm's capital investment decisions in market *j*. This is consistent with theoretical models of Chevalier and Scharfstein (1996) and Dasgupta and Titman (1998), which show that because of Myers' (1977) debt overhang problem, levered oligopolistic firms charge higher prices at reduced output levels.²⁴ The result is also consistent with the findings in recent empirical articles that higher debt leads to less aggressive behavior on the part of high-debt firms.²⁵ The "marginal effects" show that an increase in the debt ratio of 10% decreases the probability of expansion by 2.7% and increases the probability of retrenchment by 3.5% when all other variables are held at their mean.

²¹ All observations where firm *i* switches from public to private during year -1 to year +2 are dropped.

²² In addition to the independent variables defined above, time dummies for 2-year intervals were included, but the coefficients are not shown.

²³ Others have examined whether managerial ownership impacts firm decisions when firms face a threat. For example, see Song and Walkling (1993), Khanna and Poulsen (1995), and Berger, Ofek, and Yermack (1997). These articles, however, are not in the context of a rivalrous product market setting.

²⁴ Dasgupta and Titman (1998) also show that with heterogeneous levels of debt the relationship between leverage and investment levels may be reversed.

²⁵ See Opler and Titman (1994), Chevalier (1995a), Phillips (1995), Pulvino (1998), and Safieddine and Titman (1999) for some articles documenting this effect in different settings.

Table 4
Maximum likelihood estimates for public incumbents

Variables	All public obs. Entry by Wal-Mart	Marg.effect $dP[y = -1]/dX$	Marg.effect $dP[y = 1]/dX$
Inside Owp_i	-0.5312** (0.032)	0.1472	-0.1110
Debt _{<i>i</i>}	-1.2771*** (0.000)	0.3538	-0.2668
Focus _{<i>i</i>}	0.5100*** (0.000)	-0.1413	0.1065
Chain Sz_i	0.0002** (0.036)	0.0000	0.0000
S/Sq Ft_i	0.0151*** (0.000)	-0.0042	0.0032
Mkt Shr_{ij}	-0.4163* (0.059)	0.1153	-0.0869
Depend _{<i>ij</i>}	3.9986* (0.054)	-1.1077	0.8352
Decade	-0.5990*** (0.001)	0.1659	-0.1251
Ind. Growth	-10.2529 (0.510)	2.8402	-2.1416
Pop Chg _{<i>j</i>}	0.0004*** (0.001)	-0.0001	0.0001
Sig. Level ($H_0: \beta = 0$)	0.000		
# Obs.	1209		

There are 1209 firm i -market j observations, and 38 public firms are represented in the sample. The dependent variable is defined as follows: $Y_{ij} = -1$ if firm i 's first move in market j during years -1 to $+2$ was to retrench, $Y_{ij} = +1$ if firm i 's first move in market j during years -1 to $+2$ was to expand, $Y_{ij} = 0$ if firm i never expanded or retrenched during years -1 to $+2$. Time dummies for 2-year intervals were included but the coefficients are not shown. The specification was rerun using White's robust estimator of variance. The p -values are similar to those shown above for both specifications and are not shown. The values in parentheses are p -values.

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

The focus variable is positive and statistically significant at less than 1%. This means that the more focused a firm is on the discount business, the more likely it is to be aggressive in response to Wal-Mart's entry into a local market. Since Wal-Mart's entry is likely to hurt incumbents' future prospects in the discount segment relative to their other businesses, this result is more consistent with Stein (1997) than Meyer, Milgrom, and Roberts (1992) and Scharfstein and Stein (1997).²⁶ The "marginal effects" show that an increase in the percentage of sales coming from discount department stores of 10% increases the probability of expansion by 1.2% and decreases the probability of retrenchment by 1.4%, holding all other variables constant at their mean.

Firms with a larger number of discount stores are, on average, more aggressive in their response to Wal-Mart. Firm size is positive and significant at 3.6%. This finding is consistent with Chen and Hambrick's (1995) finding

²⁶ These findings are also consistent with Lang and Stulz (1994), who find evidence that firms diversify to seek better growth opportunities, Maksimovic and Phillips (1998), who find that the growth rates of peripheral segments are sensitive to relative productivity, and Scharfstein (1997), who finds that in high- Q industries, focused firms invest more than diversified firms. Unlike Berger and Ofek (1995), we do not find that diversified firms overinvest and support failing segments.

that large firms are more likely to respond when attacked than small firms. Firms generating higher inflation adjusted sales per square foot also appear to be more aggressive in the local market under attack. This variable is significant at less than 1%. While this is consistent with the view that availability of internally generated funds is an important determinant of the ability to invest, it is also consistent with the view that the more profitable firms are more likely to be successful in competing against Wal-Mart.

Another result is that the more dependent a firm is on a market, the more aggressive is their capital investment decision when that market is attacked. This variable is positive and significant at the 5.4% level and is consistent with the findings in Chen and MacMillan (1992). We also document that firms with a higher market share in a market are less likely to be aggressive in capital investment decisions. This is consistent with a firm not wishing to add to its already large exposure in a market.

As expected, the population change variable is positive and significant at 1%, implying that firms are more likely to expand or less likely to retrench when population is increasing in the markets under attack by Wal-Mart. Firms are also less aggressive in the 1985–1994 period, as the decade dummy is negative and significant at 1%.

3.2 Robustness tests

3.2.1 Different variables

Regional dummies

While we control for market-specific characteristics at the local market level, some characteristics may be common over regions, hence there may be unmodeled regional heterogeneity. Since this could be an important omitted variable, the relationships identified by our prior regressions may be spurious. To check for this possibility, we introduce regional dummies as proxies for regional characteristics. The regions are Northeast, Southeast, Foundry, Midwest, Rocky Mountain, and West Coast. Because Wal-Mart expanded region by region, they attacked most markets in a given region during the same years. The regional dummies are thus acting as proxies of market factors during the time that Wal-Mart was attacking a specific region of the country. The ordered probit results are shown in column A of Table 5. The results are very similar to those without the regional dummies (see Table 4).

Operating profit margin

Due to the fact that profit margins are small in the industry, inflation adjusted sales per square foot should be a fairly good measure of chain operating profitability. However, it is possible that sales per square foot is measuring an attempt to increase market share instead. To check for robustness to this possibility, the specification was rerun using total firm operating profit margin

Table 5

Maximum likelihood estimates for robustness checks—public incumbent firms only

Variables	(A) Regional dummies	(B) OPM	(C) Herfindahl	(D) Parent size	Urban/rural dummy
Inside Owp _{<i>i</i>}	−0.5501** (0.055)	−0.8096*** (0.002)	−0.5301* (0.061)	−0.5304* (0.059)	−0.5151* (0.067)
Debt _{<i>i</i>}	−1.2353*** (0.000)	−1.6701*** (0.000)	−1.2968*** (0.000)	−1.2341*** (0.000)	−1.2989*** (0.000)
Focus _{<i>i</i>}	0.6097*** (0.001)	0.6680*** (0.000)	0.4680*** (0.007)	0.3587* (0.060)	0.4834*** (0.006)
Chain Sz _{<i>i</i>}	0.0002** (0.014)	0.0003*** (0.000)	0.0001* (0.087)	0.0004*** (0.002)	0.0002** (0.017)
S/Sq Ft _{<i>i</i>}	0.0132*** (0.000)		0.0155*** (0.000)	0.0156*** (0.000)	0.0157*** (0.000)
Mkt Shr _{<i>ij</i>}	−0.5606*** (0.004)	−0.5323*** (0.003)		−0.4346** (0.018)	−0.4016** (0.027)
Depend _{<i>ij</i>}	4.3205 (0.125)	3.7558 (0.178)	3.0224 (0.281)	4.0159 (0.154)	3.7231 (0.189)
Decade	−0.6326*** (0.004)	−0.5062** (0.016)	−0.5862*** (0.004)	−0.6274*** (0.003)	−0.5969*** (0.006)
Ind. Growth	−11.6654 (0.301)	−6.9617 (0.527)	−11.3786 (0.277)	−8.8358 (0.425)	−12.0881 (0.280)
Pop Chg _{<i>j</i>}	0.0003** (0.018)	0.0004*** (0.000)	0.0003*** (0.003)	0.0004*** (0.000)	0.0004*** (0.001)
OPM _{<i>i</i>}		0.8410 (0.219)			
Herf _{<i>j</i>}			−0.0462 (0.818)		
Parent Sz _{<i>i</i>}				−0.00006** (0.045)	
Urban _{<i>j</i>}					−0.1198 (0.196)
Sig. Level (H ₀ : β = 0)	0.000	0.000	0.000	0.000	0.000
# Obs.	1209	1209	1209	1209	1209

There are 1209 firm *i*-market *j* observations, 38 public firms are represented in the sample. The dependent variable is defined as follows: $Y_{ij} = -1$ if firm *i*'s first move in market *j* during years -1 to $+2$ was to retrench, $Y_{ij} = +1$ if firm *i*'s first move in market *j* during years -1 to $+2$ was to expand, $Y_{ij} = 0$ if firm *i* never expanded or retrenched during years -1 to $+2$. Time dummies for 2-year intervals were included in all of the specifications, but the coefficients are not shown. All of the specifications use White's robust estimator of variance. Five regional dummies were included in specification A, but the coefficients are not shown. The values in parentheses are *p*-values.

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

instead of inflation adjusted discount sales per square foot as the operating profitability measure. The new variable is defined as follows:

Operating Profit Margin_{*i*}: Operating income before depreciation (Compustat item A13) divided by net sales (Compustat item A12).²⁷

The ordered probit results are shown in column B of Table 5. The operating profit margin of the firm is positive but not significant. The other coefficient magnitudes and significance levels are similar to those using inflation adjusted sales per square foot as the measure of operating profitability.

²⁷ Two firms, Hecks and S. E. Nichols could not be found on Compustat. Their operating profit margins are calculated from statements in *Moody's Industrial Manuals*.

Herfindahl

In the preceding specifications, the market share of firm i in market j is used as a control variable to measure local market rivalry. The Herfindahl of local market j can be used as an alternative measure of local market rivalry. The new variable is defined as follows:

Herfindahl Index _{j} (modified): The sum of the squares of the Market Share _{ij} 's in zip code j .

The ordered probit results are shown in column C of Table 5. The market Herfindahl is negative but not significant. The significance levels and coefficients of the other variables remain very similar to the results using market share as a measure of market rivalry.

Parent firm size

Both Demsetz and Lehn (1985) and Mikkelsen and Partch (1989) report an inverse relationship between insider holdings and parent firm size. In the earlier specifications, the number of discount department stores owned by a firm (chain size) is used as a measure of size. However, since insider ownership and debt are measured at the parent firm level, if chain size is a poor measure of parent size, the significance of the insider ownership coefficient could be spurious. As a check, inflation adjusted total assets of the parent firm are added to the specification. The variable is measured as follows:

Inflation Adjusted Total Assets of Parent _{i} : Firm i 's parent's inflation adjusted total assets (Compustat item A6) in 1974 dollars.

The ordered probit results are shown in column D of Table 5. The results are similar to those shown in Table 4 without the Parent Firm Size variable.

Urban versus rural markets

We next address whether urban markets with their higher concentration of stores are inherently different from rural markets. One obvious reason they may differ is that pricing practices may depend on store concentration. While we do not have price data, introducing a rural/urban dummy enables us to establish whether incumbent firms' investment decisions are dependent on levels of store concentration. An urban dummy is added to identify local markets containing a city with a population in excess of 100,000.

Urban Dummy _{j} : 1 if there is a city with a population in excess of 100,000; 0 otherwise.²⁸

²⁸ Populations are measured at the beginning of 1996 using the Rand McNally *Zip Code Finder*.

The ordered probit results are shown in column E of Table 5. The urban dummy is not significant and the results are similar to those shown in Table 4 without the urban/rural dummy. The results suggest that incumbent responses appear to be independent of whether the market is urban or rural.

3.2.2 Relevance of past encounters with Wal-Mart. Because most incumbent firms respond multiple times to entry by Wal-Mart, a firm's response to Wal-Mart may depend on private information gained from past encounters with Wal-Mart. To account for this, the basic specifications can be rerun conditioning on a firm's previous response to entry by Wal-Mart and on whether or not it is one of the first attacks on the firm by Wal-Mart.

First, we condition the firm expansion/retrenchment decision on whether or not an entry by Wal-Mart into an incumbent's local market is one of the first encounters of the firm with Wal-Mart. The ordered probit specification is rerun adding a dummy variable to identify if year 0 is one of the first three years that the firm competed against Wal-Mart. If a firm is already competing against Wal-Mart prior to 1975, the dummy variable is 1 the first time they are attacked by Wal-Mart after 1975. The results are shown in the "Early years dummy" column of Table 6. The coefficient is positive and significant at less than 1%, implying that firms are more aggressive against Wal-Mart in their early encounters with them. The other coefficients and significance levels remain similar to those in Table 4.

Next, we condition the incumbent firm response on the incumbent's previous response to entry by Wal-Mart in the preceeding 3-year event window in which a firm is attacked by Wal-Mart. The dummy is 1 if the firm expanded in at least 10% of its markets under attack during the most recent 3-year event window; otherwise it is 0. If there is no prior 3-year period to update with, the observation is dropped. By design, the observations for a firm's first few encounters with Wal-Mart are part of this dropped set. This leaves 1091 observations. The results are shown in the "Past response dummy" column of Table 6. The dummy is not significant, and the other results, with the exception of the inside ownership variable, remain similar.

We also control for the growth rate of the discount department store chain prior to entry by Wal-Mart into a firm's local market. It is possible that firms that have recently been growing may have a different response than those that are contracting. The past growth rate in the number of stores (arithmetic mean over the 3 years prior to year -1) can be used as a measure of past chain growth.²⁹ Because 3 years of data are needed prior to the beginning of year -1 , all observations where year 0 is prior to 1979 are dropped.

²⁹ The specifications are run using the past growth rate in the number of cities with at least one store, as exact store locations in urban areas are only known from 1980 on.

Table 6
Maximum likelihood estimates for public variables—public incumbent firms only

Variables	Early Years dummy	Past response dummy	Past growth variable
Inside Owp_i	-0.4891* (0.079)	-0.3634 (0.246)	-0.6095** (0.033)
Debt _{<i>i</i>}	-1.1891*** (0.000)	-.9027*** (0.005)	-1.3001*** (0.000)
Focus _{<i>i</i>}	0.4981*** (0.004)	0.3994** (0.049)	0.5062*** (0.004)
Chain Sz_i	0.0002** (0.013)	0.0002** (0.028)	0.0001 (0.168)
S/Sq Ft_i	0.0165*** (0.000)	0.0191*** (0.000)	0.0167*** (0.000)
Mkt Shr_{ij}	-0.3466* (0.056)	-0.3559* (0.064)	-0.4195** (0.023)
Depend _{<i>ij</i>}	1.7344 (0.563)	1.5364 (0.720)	3.3245 (0.283)
Decade	-0.5799*** (0.008)	-.7314*** (0.002)	-0.5760*** (0.008)
Ind. Growth	-6.3515 (0.570)	3.1894 (0.780)	-9.1778 (0.410)
Pop Chg _{<i>j</i>}	0.0003*** (0.001)	0.0004*** (0.000)	0.0004*** (0.001)
Early Years vs. Wal-Mart Dummy _{<i>i</i>}	.4464*** (0.007)		
Past Aggressive Response Dummy _{<i>i</i>}		0.0235 (0.856)	
Past Growth Rate of Chain _{<i>i</i>}			-1.1463** (0.028)
Sig. Level ($H_0: \beta = 0$)	0.0000	0.0000	0.0000
# Obs.	1209	1091	1194

The dependent variable is defined as follows: $Y_{ij} = -1$ if firm i 's first move in market j during years -1 to $+2$ was to retrench, $Y_{ij} = +1$ if firm i 's first move in market j during years -1 to $+2$ was to expand, $Y_{ij} = 0$ if firm i never expanded or retrenched in market j during years -1 to $+2$. Time dummies for 2-year intervals were included in the specifications, but the coefficients are not shown. The specifications all use White's robust estimator of variance. The values in parentheses are p -values.
*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

This leaves 1194 observations. The results are shown in the "Past growth variable" column of Table 6. The past chain growth rate variable is negative and significant, implying that firms that have experienced recent rapid growth are less aggressive. The coefficients on the other variables, with the exception of chain size, remain of the same sign and have similar significance levels as in Table 4.

3.2.3 Independence of observations across local markets. In the preceeding tests, decisions by the same chain in different local markets are treated as independent. If there is dependence between same-firm responses across its different markets under attack by Wal-Mart, the significance levels for firm-specific variables could get inflated. Since any dependence is most likely to manifest itself across markets attacked close in time, we rerun tests after pooling together all observations for firm i having the same year 0. We treat the pooled result as a single observation. Hence there is at most one firm i observation per year. Market-specific independent variables are averaged

across the local markets in which firm i was attacked by Wal-Mart in a given year.³⁰ Since an incumbent's response need not be uniform across all markets attacked (even close in time), a measure of aggression needs to be established for the pooled observations. If a firm has " n " markets attacked by Wal-Mart in year t :

$$\text{Pooled measure of aggression for firm } i \text{ in year } t = Y_{it} = \sum_{j=1}^n Y_{ij}/n.$$

We first use a filter of 20%, where $Y_{it} = -1$ if firm i 's pooled measure of aggression for year t is $\leq -20\%$; $Y_{it} = +1$ if firm i 's net measure of aggression for year t is $\geq 20\%$; otherwise, $Y_{it} = 0$. The tests are repeated using a 40% aggression filter. When using an ordered probit specification with a 20% filter, inside ownership remains negative and significant at 6%, debt remains negative and significant at 1%, and focus remains positive but is only significant at the 17% level. When using a 40% filter, debt remains negative and significant at less than 1%, focus is positive and significant at 4%, and inside ownership is negative and significant at the 14% level.³¹

3.2.4 Is Wal-Mart entry an important shock? To determine whether the documented incumbent responses are due to Wal-Mart's entry or would have occurred whether or not Wal-Mart entered, we expand our dataset to include local markets that Wal-Mart has not yet entered. The non-Wal-Mart markets are identified as follows: if an incumbent firm i is being attacked by Wal-Mart in a local market j during a year t , the set of non-Wal-Mart markets consists of all firm i -market j pairs in year t that Wal-Mart does not enter until after year $t + 2$.

Our earlier specification is rerun on the set of observations of firm i -market j pairs from the non-Wal-Mart markets.³² The ordered probit results are shown in the "Markets no Wal-Mart" column of Table 7. When these results are compared to those using observations for markets being attacked by Wal-Mart (column 1), some differences are striking. Some of the coefficients that are significant for explaining expansion/retranchment decisions of firms in local markets that are being attacked by Wal-Mart now have the opposite sign and are significant. In the non-Wal-Mart markets, insider ownership is

³⁰ The 20-year period is now divided into three equal time periods represented by two time dummies. The decade dummy is dropped due to high correlation between it and the two time dummies.

³¹ Although these tests control for possible dependencies between markets attacked during the same year for a given firm, there is still the issue that dependencies may not be totally eliminated due to overlapping -1 to $+2$ event windows for a firm. To control for this possibility, the pooled observations for firms were divided into three separate groups with nonoverlapping -1 to $+2$ windows. Insider ownership, debt, and focus are all significant at less than 2.5% in one group.

³² Only observations where year 0 is 1981 or later are used for this set of tests, as there are urban non-Wal-Mart markets in the group of observations prior to 1981. The exact number of stores is not available for the urban markets during the earlier years.

Table 7
Maximum likelihood estimates for Wal-Mart versus non-Wal-Mart markets—public firms only

Variables	Markets Wal-Mart entry	Markets no Wal-Mart	Wal-Mart entry dummy	Owp X Wmt	Debt X Wmt	Depend X Wmt	Size X Wmt
Wal-Mart Entry			-0.064* (0.092)	0.017 (0.702)	-0.433*** (0.007)	-0.105** (0.016)	-0.173*** (0.001)
Inside Owp _{<i>t</i>}	-0.531** (0.032)	0.329*** (0.002)	0.255*** (0.005)	0.362*** (0.000)	0.255*** (0.005)	0.253*** (0.006)	0.258*** (0.005)
Inside Owp _{<i>t</i>} X Wmt				-0.807*** (0.000)			
Debt _{<i>t</i>}	-1.277*** (0.000)	-2.233*** (0.000)	-2.093*** (0.000)	-2.092*** (0.000)	-2.186*** (0.000)	-2.093*** (0.000)	-2.074*** (0.000)
Debt _{<i>t</i>} X Wmt							
Focus _{<i>t</i>}	0.510*** (0.000)	0.633*** (0.000)	0.586*** (0.000)	0.594*** (0.000)	0.586*** (0.000)	0.586*** (0.000)	0.589*** (0.000)
Chain Sz _{<i>t</i>}	0.000** (0.036)	0.000 (0.867)	0.000 (0.383)	0.000 (0.362)	0.000 (0.292)	0.000 (0.404)	0.000 (0.789)
Sz _{<i>t</i>} X Wmt							0.0001*** (0.005)
S/Sq Ft _{<i>t</i>}	0.015*** (0.000)	0.013*** (0.000)	0.013*** (0.000)	0.013*** (0.000)	0.013*** (0.000)	0.013*** (0.000)	0.013*** (0.000)
Mkt Shr _{<i>t,j</i>}	-0.416* (0.059)	-0.649*** (0.000)	-0.617*** (0.000)	-0.617*** (0.000)	-0.617*** (0.000)	-0.615*** (0.000)	-0.621*** (0.000)
Depend _{<i>t,j</i>}	3.999* (0.054)	-6.234*** (0.000)	-5.143*** (0.000)	-5.058*** (0.000)	-5.052*** (0.000)	-5.766*** (0.000)	-5.045*** (0.000)
Depend _{<i>t,j</i>} X Wmt							
Decade	-0.599*** (0.001)	-0.025 (0.633)	-0.057 (0.266)	-0.058 (0.258)	-0.058 (0.258)	-0.058 (0.258)	-0.058 (0.259)
Ind. Growth	-10.25 (0.510)	-11.07*** (0.000)	-10.75*** (0.000)	-10.72*** (0.000)	-10.83*** (0.000)	-10.79*** (0.000)	-10.70*** (0.000)
Pop. Chg _{<i>j</i>}	0.0004** *	0.0002*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)
Sig. Level ($H_0: \beta = 0$)	(0.001)	0.000	0.000	0.000	0.000	0.000	0.000
# Obs.	1209	11,203	12,358	12,358	12,358	12,358	12,358

The first column is from Table 4 and represents 38 public firms. For all other columns, 35 public firms are represented in the sample, and only observations from 1981 on are included. The dependent variable $Y_{ij} = -1$ if firm i 's first move in market j during years -1 to $+2$ was to retrench, $Y_{ij} = +1$ if firm i 's first move in market j during years -1 to $+2$ was to expand, $Y_{ij} = 0$ if firm i never expanded or retrenched in market j during years -1 to $+2$. Time dummies for 2 year intervals were included in the specifications, but the coefficients are not shown. The values in parentheses are p -values. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

now positive and significant at less than 1%, whereas in the observations from markets being attacked by Wal-Mart, it was negative and significant at 3.2%. Thus while high ownership firms are less likely to expand in markets being attacked by Wal-Mart, in markets without Wal-Mart the opposite is true.

In the markets not being attacked by Wal-Mart, the dependence of the firm on the local market is negative and significant. However, for the observations from markets being attacked by Wal-Mart this variable was positive and significant. Thus the more dependent a firm is on a market, the more likely it is to expand (less likely to retrench) when the local market is being entered by Wal-Mart. However, for markets not yet under attack by Wal-Mart, the more dependent a firm is on a market, the less likely it is to be aggressive. Another difference between the Wal-Mart and non-Wal-Mart markets is that chain size is not significant in explaining expansion/retrenchment decisions in the markets not under attack. This implies that large firms are more likely to be aggressive in markets being entered by Wal-Mart.

As a more specific test of differences between the two markets, a specification is run with Wal-Mart and non-Wal-Mart markets pooled together. A Wal-Mart attack dummy is added as are interactions of the Wal-Mart attack dummy with various firm-specific variables of interest. The results are shown in Table 7. The interaction of insider ownership with the Wal-Mart attack dummy is negative and significant at less than 1%. The interaction term implies that firms with high managerial ownership reduce aggressiveness more in markets being attacked by Wal-Mart than firms with low managerial ownership. This result was expected given the earlier finding that the managerial ownership coefficient was significant and of the opposite sign for the non-Wal-Mart markets.

The interaction of debt with the Wal-Mart attack dummy is positive and significant at 1.9%. This implies that high-debt firms increase aggressiveness in markets being attacked by Wal-Mart by more than firms with low debt. The interactions of how dependent a firm is on the market, the market share of the firm in the market, and chain size with the Wal-Mart attack dummy are all positive and significant. However, the interaction of focus with the Wal-Mart attack dummy is negative but not significant and is not shown. The evidence suggests that entry by Wal-Mart does elicit responses from incumbent firms that differ from their responses in other markets not under attack.

Observations from the markets not yet entered by Wal-Mart can enter the database in consecutive years, leading to overlapping event windows. This could cause incorrect significance levels. To eliminate this problem, the observations were divided into three nonoverlapping time groups. The specifications were rerun on each of the three groups. The results are similar and not shown.

4. Empirical Results: Public Versus Private Firms

4.1 Public versus private incumbents with new entry

The discount department store industry contains a large number of privately held firms. Fortunately, data is available in trade journals for both privately and publicly held firms in the industry. When we combine this with publicly available information about whether the firms underwent an LBO, we can test a number of hypotheses about privately held firms. The availability of data on these firms provides us with a unique opportunity to gain insights regarding the behavior of privately held firms. The main issue we address is whether privately held firms are more or less aggressive than their publicly held counterparts.

We run our original ordered probit specification shown in Table 4 on the group of public and private firms with a few modifications. The following new variables are defined:

Public/Private Dummy_{*i*}: 1 if privately held; 0 if publicly traded. This is recorded at the beginning of year -1 .

LBO vs No LBO Dummy_{*i*}: 1 if LBO done by firm i in the 3 years prior to year -1 ; otherwise 0.

High Debt_{*i*}: 1 if privately held and an LBO firm (see definition of LBO above) or if publicly traded and the debt ratio is $\geq 70\%$; 0 otherwise.

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 and 1994. The summary statistics are shown in Table 8 and the results of the ordered probit are shown in Table 9. There are 58 incumbents and 1407 firm i -market j observations in the sample.

The private/public dummy is negative and significant at 5.8%, suggesting that public firms are more aggressive when facing a new entrant. This could

Table 8
Summary statistics: public and private incumbent firms

Variable	Mean	Minimum	Maximum	Std. Dev.
Private _{<i>i</i>}	.1407	0	1	.3479
LBO _{<i>i</i>}	.0092	0	1	.0957
High Debt _{<i>i</i>}	.2303	0	1	.4212
Focus _{<i>i</i>}	.7562	.0077	1	.3033
Chain Sz _{<i>i</i>}	666.66	4	1811	707.43
S/Sq Ft _{<i>i</i>}	61.81	15.08	204.73	20.52
Mkt Shr _{<i>ij</i>}	.2897	.0227	1	.1994
Depend _{<i>ij</i>}	.0172	.0004	.6667	.0361
Decade	.7498	0	1	.4333
Ind. Growth	.0224	.0062	.0376	.0096
Pop. Chg _{<i>j</i>}	210.60	-154	1665	330.42

Summary statistics for 1407 firm i -market j pairs where Wal-Mart was first seen competing in a three-digit zip code market j between 1976 and 1994, and in which firm i was already an incumbent. Fifty-eight firms are represented in the sample.

Table 9

Maximum likelihood estimates for public and private incumbent firms

Variables	Markets Wal-Mart entry	Marg. Eff. $dP[y = -1]/dX$	Marg. Eff. $dP[y = 1]/dX$
Private _{<i>i</i>}	-0.2233* (0.058)	0.0629	-0.0468
LBO _{<i>i</i>}	1.2351*** (0.000)	-0.3478	0.2591
High Debt _{<i>i</i>}	-0.4484*** (0.000)	0.1263	-0.0940
Focus _{<i>i</i>}	0.2909** (0.012)	-0.0819	0.0610
Chain Sz _{<i>i</i>}	0.0002** (0.017)	0.0000	0.0000
S/Sq Ft _{<i>i</i>}	0.0122*** (0.000)	-0.0034	0.0026
Mkt Shr _{<i>ij</i>}	-0.4623** (0.017)	0.1302	-0.0970
Depend _{<i>ij</i>}	1.5315 (0.213)	-0.4312	0.3212
Decade	-0.5990*** (0.000)	0.1687	-0.1256
Ind. Growth	-6.8529 (0.616)	1.9297	-1.4375
Pop. Chg _{<i>j</i>}	0.0004*** (0.000)	-0.0001	0.0001
Sig. Level ($H_0: \beta = 0$)	0.000		
# Obs.	1407		

There are 1407 firm *i*-market *j* observations. Fifty-eight firms are represented in the sample. The dependent variable is defined as follows: $Y_{ij} = -1$ if firm *i*'s first move in market *j* during years -1 to +2 was to retrench, $Y_{ij} = +1$ if firm *i*'s first move in market *j* during years -1 to +2 was to expand, $Y_{ij} = 0$ if firm *i* never expanded or retrenched in market *j* during years -1 to +2. Time dummies for 2-year intervals were included in the specifications, but the coefficients are not shown. The specification was rerun using White's robust estimator of variance. The *p*-values are similar to those shown above for both specifications and are not shown. The values in parentheses are *p*-values.

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

be due to differences in managerial ownership, differences in organizational form, or differences in accessibility to capital between public and private firms. As documented earlier, high ownership public firms are less aggressive than low ownership public firms. Since public firms are relatively homogeneous with respect to access to capital and organizational form, this suggests that it may be differences in managerial ownership that is driving the results.³³

The results also show that firms that undergo LBOs in the period prior to year -1 are more aggressive when they are attacked. The LBO dummy is positive and significant at less than 1%. This is consistent with the models of Brander and Lewis (1986), Maksimovic (1988) and Rotemberg and Scharfstein (1990), who hypothesize that higher financial leverage leads to more aggressive product market behavior. However, there is a potential endo-

³³ 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.

geneity problem as the more aggressive firms could also be more likely to undertake an LBO. Our results contradict Chevalier (1995a), which documents that LBOs make the product market softer. This may be due to the fact that Chevalier's tests control for only one firm-specific factor: firm size.³⁴ Also, our results need to be interpreted with caution, as there are only 20 observations over three instances of LBOs. All of the other results are very similar to those for the subset of public firms shown in Table 4.

4.2 Wal-Mart versus non-Wal-Mart markets

We need to determine if the responses we document are due to Wal-Mart's entry or would have occurred whether or not Wal-Mart had entered. We expand our dataset in the same manner in which we expand it for the subset of public firms. We run tests on the expanded dataset to identify whether incumbents behave differently in markets being attacked by Wal-Mart than in markets not under attack.

We first run the ordered probit specification on the non-Wal-Mart markets alone. The results are shown in the "Markets no Wal-Mart" column of Table 10. Other columns show various interactions of variables with the Wal-Mart attack dummy. When these results are compared to those using observations for markets being attacked by Wal-Mart (column 1), there are once again some differences. Private firms are less aggressive than public firms in the markets being entered by Wal-Mart. Once again, chain size and the dependence of a firm on the market also differ between Wal-Mart and non-Wal-Mart markets. The larger firms are more aggressive in markets being attacked by Wal-Mart, but less aggressive in the non-Wal-Mart markets. Also, firms that are dependent on a market are more aggressive in markets being attacked than in the non-Wal-Mart markets. The evidence suggests that entry by Wal-Mart does elicit responses from incumbent firms that differ from their responses in other markets not under attack. It also suggests that private firms act similar to high ownership public firms in markets with a new entrant as well as markets without a new entrant.

4.3 Exogeneity of firm-specific characteristics

As mentioned earlier, the empirical methodology used (measuring firm characteristics prior to a shock) implicitly assumes that firm-specific characteristics are not altered in anticipation of Wal-Mart's entry. We check for evidence that this is indeed the case. We concentrate on the earlier years that these firms faced Wal-Mart, as firms are more likely to change characteristics (to signal their intent) during the earlier encounters. Managerial ownership, debt, and focus are measured 1 year prior ("beg.") and 2 years after ("end") the

³⁴ For example, it is likely that many firms that undergo LBOs are converting from public to private ownership.

Table 10

Maximum likelihood estimates for Wal-Mart versus non-Mart markets—public and private

Variables	Markets Wal-Mart entry	Markets no Wal-Mart	Owp X Wmt	Depend X Wmt	Size X Wmt
Wal-Mart Entry			-0.0587 (0.118)	-0.1401*** (0.000)	-0.1911 (0.000)
Private _{<i>i</i>}	-0.2233* (0.058)	-0.0037 (0.941)	-0.0217 (0.650)	-0.0489 (0.281)	-0.0433 (0.341)
Private _{<i>i</i>} X Wmt			-0.1865* (0.061)		
LBO _{<i>i</i>}	1.2351*** (0.000)	1.0582*** (0.000)	1.1379*** (0.000)	1.1123*** (0.000)	1.1260*** (0.000)
High Debt _{<i>i</i>}	-0.4484*** (0.000)	-0.6202*** (0.000)	-0.6007*** (0.000)	-0.5973*** (0.000)	-0.5916*** (0.000)
Focus _{<i>i</i>}	0.2909** (0.012)	0.4898*** (0.000)	0.4504*** (0.000)	0.4420*** (0.000)	0.4528*** (0.000)
Chain Sz _{<i>i</i>}	0.0002* (0.017)	-0.0001*** (0.000)	-0.00007*** (0.000)	-0.0001*** (0.000)	-0.0001*** (0.000)
Chain Sz _{<i>i</i>} X Wmt					0.0001*** (0.001)
S/Sq Ft _{<i>i</i>}	0.0122*** (0.000)	0.0123*** (0.000)	0.0120*** (0.000)	0.0120*** (0.000)	0.0121*** (0.000)
Mkt Shr _{<i>ij</i>}	-0.4623** (0.017)	-0.6443*** (0.000)	-0.6210*** (0.000)	-0.6107*** (0.000)	-0.6239*** (0.000)
Depend _{<i>ij</i>}	1.5315 (0.213)	-5.5536*** (0.000)	-3.6281*** (0.000)	-4.9749*** (0.000)	-3.6380*** (0.000)
Depend _{<i>ij</i>} X Wmt				3.8449*** (0.000)	
Decade	-0.5990*** (0.000)	-0.0614 (0.222)	-0.0953** (0.048)	-0.0967** (0.045)	-0.0957** (0.047)
Ind. Growth	-6.8529 (0.616)	-11.680*** (0.000)	-11.147*** (0.000)	-11.337*** (0.000)	-11.098*** (0.000)
Pop. Chg _{<i>j</i>}	0.0004*** (0.000)	0.0002*** (0.000)	0.0003*** (0.000)	0.0002*** (0.000)	0.0003*** (0.000)
Sig Level ($H_0: \beta = 0$)	0.000	0.000	0.000	0.000	0.000
# Obs.	1407	12, 076	13, 427	13, 427	13, 427

The first column is from Table 9 and represents 58 firms. For all other columns 56 firms are represented in the sample, and only observations from 1981 on are included. The dependent variable is defined as follows: $Y_{ij} = -1$ if firm i 's first move during years -1 to $+2$ was to retrench, $Y_{ij} = +1$ if firm i 's first move during years -1 to $+2$ was to expand, $Y_{ij} = 0$ if firm i never expanded or retrenched during years -1 to $+2$. Time dummies for 2-year intervals were included in the specifications, but the coefficients are not shown. The values in parentheses are p -values.

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

firm competes with Wal-Mart.³⁵ Tables 11 and 12 show whether incumbents change firm-level characteristics when they first compete with Wal-Mart.³⁶ Table 11 uses t -tests to test each null hypothesis that the mean difference between the beginning and ending firm-specific characteristics is zero. The null hypothesis cannot be rejected for ownership, debt, or focus.

³⁵ If data was available for 1 year prior to Wal-Mart attacking, but unavailable for 2 years after Wal-Mart attacked a firm, then 3 years after, 4 years after, or 1 year after Wal-Mart attacked is used as the ending value instead. If data was unavailable for 1 year prior to Wal-Mart attacking, then either 2 years prior to Wal-Mart attacking was used as the starting level, or a 3-year event window was started as soon as data became available. Some firms had to be dropped due to lack of data.

³⁶ The only exception is for the ownership tests. Two firms converted from private to public resulting in a huge change in ownership. These were treated as outliers and left out of the ownership tests.

Table 11
Difference in means tests: public and private firms

Variable	Inside Ow _{<i>i</i>}	Debt _{<i>i</i>}	Focus _{<i>i</i>}
Beginning mean	.5189	.5955	.7065
Ending mean	.5085	.6302	.7066
No. of firms	46	30	48
<i>t</i> -statistic	1.347	−1.340	−0.003

H_0 : Mean difference = 0

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

To test whether the above test is misspecified because of possible mean reversion in firm-specific characteristics, the observations are segmented into those that are above and below the median at the beginning of the event window for each of the three characteristics. *t*-Tests were run on each of the six groups separately to test the null hypothesis. The results are shown in Table 12. The null hypothesis can only be rejected for the case of below average debt firms. It appears that firms that have below average debt increase their debt during the first few years that they compete against Wal-Mart.

The results seem to imply that firms by and large do not change their firm-specific characteristics in the early years of competition with Wal-Mart. This may be because markets are competitive even before Wal-Mart's entry. Thus it is unlikely that incumbents are in a position to make significant changes to their firm characteristics. Also, since many incumbents have a presence in multiple markets, they may be reluctant to change firmwide characteristics in response to Wal-Mart's entry into a few of their markets.

5. Conclusion

We study how firm-specific characteristics such as insider ownership, private versus public ownership, capital structure, focus, size, and profitability affect incumbent firms' responses to Wal-Mart's entry into their local markets. Since Wal-Mart entered a large number of markets in a surprisingly

Table 12
Difference in means tests: public and private firm observations above and below median at beginning

Variable	Above median inside Ow _{<i>i</i>}	Below median inside Ow _{<i>i</i>}	Above median Debt _{<i>i</i>}	Below median Debt _{<i>i</i>}	Above median Focus _{<i>i</i>}	Below median Focus _{<i>i</i>}
Beginning mean	.8988	.1391	.6819	.5091	.9951	.4180
Ending mean	.8852	.1317	.6774	.5830	.9519	.4613
No. of firms	23	23	15	15	24	24
<i>t</i> -statistic	1.083	0.779	0.136	−1.960*	1.651	−1.444

H_0 : Mean difference = 0

*, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

short period of time, we are able to study incumbent responses while keeping industry, product, and the nature of the shock relatively constant. On average, firms with high inside ownership (or privately owned) respond less aggressively to Wal-Mart's entry. The same appears to hold for firms with higher levels of debt. However, firms that undergo LBOs appear to respond more aggressively, suggesting that LBO decisions are different from leverage decisions. While larger and more profitable incumbents respond more aggressively, firms with a larger presence in markets under attack are less aggressive. In addition, level of firm focus on discount business and relative importance of a market under attack appear to make firms more aggressive, consistent with firms/managers fighting harder with more at stake.

We run a number of tests to check the robustness of our results. With additional data on non-Wal-Mart markets, we establish while some variables result in similar incumbent responses in both Wal-Mart and non-Wal-Mart markets, others appear to lead to significantly different (even opposite) responses. This suggests that some documented responses are specific to Wal-Mart's entry. We also check whether it is appropriate for us to treat Wal-Mart's entry into different markets as independent observations. When we rerun our tests after pooling together markets attacked close in time, the results are not affected. Another potential source of dependence is a firm's previous experience against Wal-Mart. Given that most incumbents respond to Wal-Mart's entry in multiple markets, their responses in later markets may depend on their experiences in the markets attacked earlier. First, we condition on whether it is an early attack by Wal-Mart. While incumbents appear to be more aggressive in their earlier encounters with Wal-Mart, other results are unaffected. Second, we condition on incumbent response in the preceding three years to each new attack by Wal-Mart. The updating dummy is not significant. A possible explanation may lie in the surprising amount of heterogeneity across local markets. Since even proximate markets can differ on who the incumbents are, their market shares, or level of market concentration, an incumbent's experience in one market may not be transferable to another.

An important issue remains. While we document which characteristics increase the probability of an aggressive response by incumbents, we have not identified whether being aggressive is good or bad. This problem suffers from some of the same endogeneity problems as articles that try to establish causation between two separate decisions of the firm and will pose similar difficulties in testing. This and other issues are left to future research.

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