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Essays on Corporate Finance and Product Market Competition

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Essays on Corporate Finance and Product Market Competition

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To my parents and husband for their unconditional love, support, and prayer.

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Essays on Corporate Finance and Product Market Competition

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This dissertation contains two essays on the aggressive behavior of corporations in product market competition. In the first essay, I investigate how market structure can impact a firm's risk of facing predation by rivals, and hence, its financial policy decisions. Using a simple model, I demonstrate that a firm faces a greater predation threat when it meets the same competitor in many markets, as this competitor is able to internalize more of the benefit, degrading the firm's ability to compete in the future through aggressive actions today.

I then test the predictions of the model using 2003-2011 panel data on store location across retail store chains in the US. I find that firms tend to expand more aggressively in markets shared with a competitor experiencing a substantial increase in leverage, or a decline in a credit rating, when they face that competitor in more of the other markets. The expansion relationship was found to be stronger in data from the 2008-2009 financial crisis, a period when difficulty in rolling over or obtaining new debt made it especially hard for weak firms to absorb losses. I also show that a firm facing the same competitors in many markets choose lower levels of leverage and that it decreases that leverage when a merger in the industry increases the amount

of competitive overlap it has with other firms. These results suggest that firms are aware of the predation risk due to a competitive overlap and select financial policies to minimize this risk.

In the second essay, I study the impact of internally generated funds on product market competition. More specifically, I investigate the idea that firms compete aggressively when their competitors face cash flow shortfalls. Testing this idea is challenging because competitor's cash flow changes are potentially endogenous with respect to firm's behavior. I address this problem in three ways. First, I investigate firm's reaction in a given market when its competitors face cash flow shortfalls outside of that market; this analysis is conducted using store location data on retail store chains. Second, I focus on the 2008-2009 financial crisis period in which retail store chains were hit by a negative demand shock which was hardly expected ex ante. Finally, I use a shock to local economic conditions which varies across markets and the different distributions of store locations across firms as instruments for the changes in competitors' cash flows.

I find that a firm expands more in a given market in which it competes with rivals which face a more negative cash flow shortfall in the other markets. This relation is stronger when the competitors were highly leveraged before the crisis. Finally, I illustrate evidence that a firm responds more aggressively to competitor's cash flow shortfalls if it competes with that competitor in many of the same markets; this result is consistent with the prediction of the model in Chapter 1. These essays contribute to the literature by adding new evidence on the predatory behavior of corporations in product market competition.

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Chapter 1

Competitive Overlap and Predatory Behavior

1.1 Introduction

Researchers have investigated the tendency of firms to "predate upon" financially weak competitors; these studies began with the work of Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990). A firm facing a vulnerable competitor has an incentive to behave aggressively to deny the competitor the cash flow that it needs to compete effectively in the future and possibly to drive it out of business completely. Examples of such aggressive behavior include starting price wars, expanding into locations that are in close proximity to competitors' existing locations, and ramping up advertising.

The evidence suggests that firms prey on financially vulnerable peers. For instance, Chevalier (1995a,b) finds that; when a grocery store chain experiences a large increase in debt due to a leveraged buyout (LBO), its competitors enter or expand into the chain's local markets. In addition, prices fall in markets where low-leveraged rivals are competing with an LBO chain; these results are consistent with rival chains lowering prices in an effort to induce the LBO chain to exit the market.

However, it is unlikely that all highly-leveraged firms face predation. Previ-

ous studies offer little guidance on the conditions under which the threat of predation is high and the threat should therefore be a first order concern in the choice of financial policy. This chapter attempts to fill the gap in two steps. First, I show, in a two-period Cournot model with financial distress, that a firm should behave more aggressively in the short-run in markets in which it faces a highly-leveraged rival if it also faces that rival in many other markets. Intuitively, such a firm can capture more of the future monopoly rents from driving its peers into financial distress. Therefore, a firm meeting the same competitors in many markets faces a greater risk of predation.

I then test the model's predictions using 2003-2011 panel data on store location and local advertising in five retail industries. Consistent with the model's predictions, I find that when a firm experiences a substantial increase in leverage, competitors expand more into each of its markets if they meet the firm in more markets. I address concerns that some omitted variables may drive this relationship in several ways. I also find that firms choose a lower leverage when they face the same competitors in many markets, suggesting that firms take predation risk into account in setting the financial policies. My results contribute to the literature on capital structure and product market competition by identifying circumstances under which the interaction of the two can have a big impact on firm behavior.

I begin by collecting data on the location of stores in the grocery store, discount store, department store, pharmacy, and wholesale club industries. I focus on these industries for two reasons. First, firms in these industries typically operate across many local markets, with substantial variation in the competitive overlap

between firms. Second, they sell relatively undifferentiated products with low margins. This makes the profitability vulnerable to aggressive behavior that increases the competitive pressure in the short-run.

Using store-level location and sales data, I construct pairwise "multimarket contact" measures that capture the degree of competitive overlap between two firms across all of the markets in which the firms compete. These measures of multimarket contact are adopted from the industrial organization literature (e.g., Feinberg (1985), Singal (1996), Chen (1996), and Gimeno and Jeong (2001)). I then identify the firm in each market experiencing the largest increase in leverage during the past year. I classify that firm as financially weak if its increase in leverage is in the top quartile in its industry. I then test whether competitors in a market with a weak firm are more likely to expand (i.e., add new stores) in that market if they have more contact with the weak firm in other markets. I include industry-market-year fixed effects in my regressions. Thus, I rely solely on variation in competitive overlap within an industry-market-year in conducting this test. This allows me to rule out the possibility that the estimates from the test are contaminated by the effects of variation in competition across markets and industries or in the aggregate over time, as well as the effects of variation within a market and industry *over time*.[1]

I find that firms having more multimarket contact with a financially weak competitor in a market are more likely to expand into that market than those with less multimarket contact. A one-standard deviation increase in multimarket contact

[1] For example, firms expanding business may open stores in many of the growing markets; this may affect both the competitive overlap among these firms and the financial structure.

with a weak firm leads to an economically meaningful rise in the probability of expansion by 2.52% in the following year. The relationship also holds when I define a financially weak firm as one experiencing a drop in a credit rating from investment to non-investment grade. This is consistent with the predictions of my model.

One natural concern with these results is that leverage and multimarket contact are both choice variables, and therefore, potentially endogenous with respect to expansion decisions, even after accounting for industry-market-year fixed effects. For example, a weak firm may raise leverage ex ante to show its pre-commitment to competitors that it has a high degree of multimarket contact with, if it expects the competitors to expand aggressively.[2]

I address this concern in three ways. First, I test whether the relationship between multimarket contact and expansion holds when the firm with the largest increase in leverage in a market is not financially weak. If my results are driven by omitted factors affecting both multimarket contact and expansion, but not affecting leverage, then I should find a similar relationship even when there is no financially weak firm in the market. I do not find that this is the case.

Second, I perform a placebo test using artificially constructed markets of firms not competing directly with each other. More specifically, I examine the relationship between a firm's expansion in a market and its multimarket contact with a financially weak competitor in that market, but from another industry. If multimarket contact with a financially weak firm causes expansion, then I should

[2]Brander and Lewis (1986) argue that a manager has limited liability, debt effectively commits the firm to more aggressive behavior.

not find such a relationship in these artificial markets. I find no such relationship.

Third, I use the recent financial crisis as a plausibly exogenous shock to a financially weak firm's ability to withstand predatory behavior by its rivals. During the crisis, firms faced difficulty rolling over existing debt and obtaining additional financing. This made it difficult for an already highly-leveraged firm to endure losses without failing. Thus, incentives to predate upon weak rivals were likely to be especially strong during this time period. Providing further evidence that multimarket contact drives predatory behavior, I find that firms having high multimarket contact with a financially weak competitor expanded in the weak firm's local markets more aggressively during the crisis than in other periods.

While I focus on expansion as an aggressive action, firms may also compete aggressively in other ways, for example by dropping price or increasing advertising. I also use market-level advertising data from Ad Spender to examine whether a firm increase advertising in a market with a financially weak competitor when it faces that competitor in many markets. Here the results are less clear. Multimarket contact with a weak firm in a market is positively related to advertising in that market. However, I cannot reject the hypothesis that this relation and the relation in cases where the firm experiencing the largest leverage increase is not financially weak are different.

This might reflect an inherent limitation of local advertising data, as it does not capture any effects on a firm's regional or national advertising, which might be a more cost effective means of damaging a weak competitor with which the firm competes in a lot of markets. However, it might also reflect a disadvantage

of advertising as a means of predation. Unlike expansion decisions, an increase in a firm's advertising budget is an easy decision to later reverse. Thus, advertising represents less of a commitment to aggressive competition. Moreover, expanding while the weak firm is still present may be more useful, because it preempts the entry of other competitors if the weak firm is later eliminated from the market.

Finally, I examine the relationship between capital structure decisions and the degree of multimarket contact a firm has with competitors across all markets in which it competes. My model and the results, thus far, suggest that a firm faces a greater risk of predation when it faces the same competitors in many markets (as opposed to mostly different competitors in different markets). If the threat of being predated upon is a meaningful cost of taking on leverage, then firms should adopt more conservative financial policies when they have more multimarket contact with the competitors.

Consistent with firms considering the threat of predation in choosing leverage, I find that a firm's leverage is lower when the average level of multimarket contact that it has with all of its competitors is higher. To further identify the effect of the threat of predation on leverage, I examine the effects of changes in multimarket contact due to mergers. A merger between two firms increases the average amount of multimarket contact that its competitors face. However, this effect can be either small or large, depending on how much an overlap a firm had with each of the two firms separately before the merger. I find that the change in a firm's leverage is negatively related to the magnitude of the multimarket contact changes caused by the mergers of its rival. This result further supports the argument that

firms do adjust the financial leverage to take into account the threat of predation.

This chapter builds on the literature investigating the relationship between firms' financial condition and product market competition in retail industries. Chevalier (1995a,b) shows that, when a grocery store chain becomes highly-leveraged as a result of an LBO, its competitors are more likely to enter or expand into the LBO firm's local markets, and prices fall in markets in which low-leveraged rivals compete with an LBO firm, suggesting that the rival lowers prices to induce the LBO firms to exit. Similarly, Khanna and Tice (2005) document that high-debt firms are more likely to exit cities with lower prices during recessions. However, there is an alternative explanation for the results in these papers that is difficult to rule out. More specifically, being highly leveraged may force a firm to scale back. As a result, its competitors may expand to fill the resulting vacuum. In addition, a highly-leveraged firm might cut prices to steal market share and increase short-run cash flow.[3]

The primary innovation of this chapter is to consider how often a highly-leveraged firm meets the same rival in different markets rather than treat the same firm operating in different markets as different firms, as previous papers have. This allows me to more cleanly identify the effects of incentives to predate on the aggressiveness of the firm with respect to its competitors. More importantly, it enables me to study which types of firms engage in predation, and which financially weak firms are most subject to predation. This chapter also contributes to the literature

[3]Many have argued the opposite, as a highly-leveraged firm might sacrifice the future market share for higher prices today to increase the short-run cash flow.

by illustrating that the threat of predation feeds back into a firm's capital structure decisions.

This chapter contributes to the literature considering how financial policy and product market competition interact to affect firms' behavior. Previous studies have documented that the investment, sales, or equity values of highly-leveraged firms decline more in more concentrated industries. However, it is not clear what drives these differences; they may be driven by consumers' reluctance to buy products from a firm with a higher bankruptcy probability (Opler and Titman (1994)) or by a higher level of managerial discipline (Kovenock and Phillips (1997)). I show that a firm's competitive environment can interact with its financial condition to influence both its own and competitors' behavior due to its impact on incentives to engage in predation.

Finally, my study adds to the industrial organization literature on multimarket contact. Previous studies have focused on the tendency of multimarket contact to promote "mutual forbearance," a form of implicit collusion. A firm competing with the same firms in multiple markets avoids competing aggressively in one market, for example by lowering prices, because of the threat of retaliation in the other markets in which it competes with the same firms (Edwards (1955); Scott (1982); Bernheim and Whinston (1990); Phillips and Mason (1992)). In contrast, this chapter illustrates that multimarket contact can lead to *more* aggressive behavior, as a firm internalizes more of the benefits of eliminating a competitor when it shares more markets in common with that competitor.

The organization of the rest of this chapter is as follows. Section II describes

the model, Section III introduces the data and the measures of competitive overlap, Section IV presents the empirical evidence, and Section V concludes.

1.2 Model

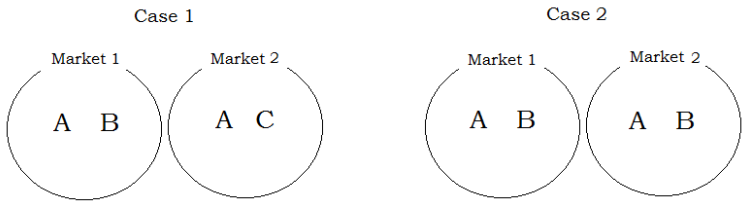


Figure 1.1: Competitive overlap

Consider a two-period Cournot model of duopoly competition with firms selling a homogeneous good in each of two separate markets, Market 1 and Market 2. I consider two separate cases. In Case 1, there are three firms, A, B and C. Firms A and B compete against each other in Market 1, while Firms A and C compete against each other in Market 2. In Case 2, there are only two firms, A and B, and they compete against each other in both markets. The firms in the model may participate in other markets outside the model, but Firm A does not compete with either Firm B or Firm C in any other market. In each period, the inverse demand function for market $j = 1, 2$ is $p_j = a - Q_j$, where Q_j is the total quantity produced by the two firms competing in market j. Note that demand in the model is deterministic. For simplicity, production is costless.

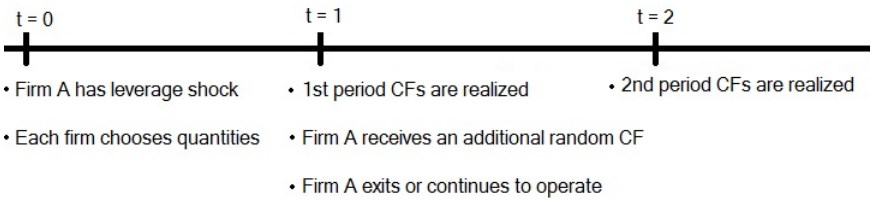
Firm A begins the game with a level of debt $D \geq 0$, which is due at the end of period 1. At the beginning of the first period, firms simultaneously choose quantities

to sell in the period in each market in which they compete. A firm competing in more than one market can choose different quantities in each market. Let q_{ij} denote firm i's first period quantity choice in market j. Then the quantity choices in Case 1 are $\{q_{A1}, q_{A2}, q_{B1}, q_{C2}\}$ and in Case 2 are $\{q_{A1}, q_{A2}, q_{B1}, q_{B2}\}$. Thus, $Q_1 = q_{A1} + q_{B1}$ in both cases, while $Q_2 = q_{A2} + q_{C2}$ in Case 1 and $Q_2 = q_{A2} + q_{B2}$ in Case 2.

At the end of the first period, firms compete and realize their cash flows. In addition, Firm A receives a random cash flow z, which is uniformly distributed over $[0, \overline{z}]$, from an outside source. This source might be other markets in which it sells but does not compete with other firms in the model, or it might be from some other line of business entirely. This is a simple way of introducing uncertainty into Firm A's first period cash flow. Firm A then repays its debt, D, if it has sufficient cash flow to do so. If it does, then Firm A continues to operate in the second period. If not, creditors receive all of Firm A's cash, and Firm A ceases to operate completely (i.e., in both markets).

In the second period, all firms remaining in the model simultaneously choose quantities to sell in each market in which they compete and realize the second period cash flows. If Firm A was able to repay its debt at the end of the first period, there is duopoly competition in both markets in the second period. It can easily be shown that the equilibrium duopoly profit in the second period for each firm in each market in this case is $\frac{a^2}{9}$. If Firm A was not able to repay its debt at the end of the first period, then the other firm competing in each of the markets has a monopoly in that market in the second period. It can easily be shown that the equilibrium monopoly profit in the second period for each market is $\frac{a^2}{4}$. Note that I do not allow Firm B

Figure 1.2: Time line



to enter Market 2 or Firm C to enter Market 1 in the second period. This holds fixed the number of competitors in each market in the second period when Firm A exists. It captures the idea that expanding into a new market at a minimum requires time and planning, and some firms may be poorly-positioned to compete in certain markets.

I can now consider the equilibrium choice of quantities in period 1. Firms A, B, and C solve the following maximization problems:

(Case 1)

$$\begin{cases} max_{q_{A1},q_{A2}} & \pi_A = (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{C2})q_{A2} + E[z] \\ & +Prob[z + (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{C2})q_{A2} \geq D]\frac{2a^2}{9} \\ max_{q_{B1}} & \pi_B = (a - q_{A1} - q_{B1})q_{B1} + Prob[z + (a - q_{A1} - q_{B1})q_{A1} \\ & +(a - q_{A2} - q_{C2})q_{A2} < D]\frac{a^2}{4} + Prob[z + (a - q_{A1} - q_{B1})q_{A1} \\ & +(a - q_{A2} - q_{C2})q_{A2} \geq D]\frac{a^2}{9} \\ max_{q_{C2}} & \pi_C = (a - q_{A2} - q_{C2})q_{C2} + Prob[z + (a - q_{A1} - q_{B1})q_{A1} \\ & +(a - q_{A2} - q_{C2})q_{A2} < D]\frac{a^2}{4} + Prob[z + (a - q_{A1} - q_{B1})q_{A1} \\ & +(a - q_{A2} - q_{C2})q_{A2} \geq D]\frac{a^2}{9} \end{cases}$$

(Case 2)

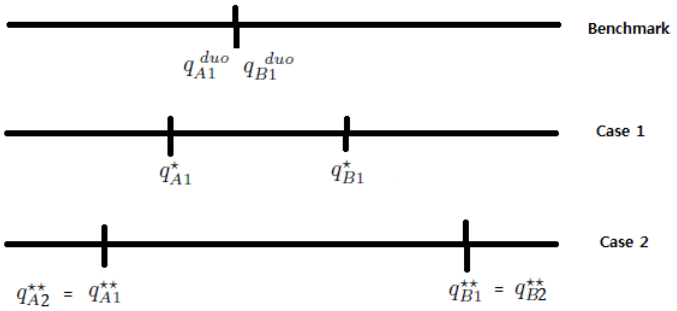
$$\begin{cases} max_{q_{A1},q_{A2}} & \pi_A = (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{B2})q_{A2} + E[z] \\ & +Prob[z + (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{B2})q_{A2} \geq D]\frac{2a^2}{9} \\ max_{q_{B1},q_{B2}} & \pi_B = (a - q_{A1} - q_{B1})q_{B1} + (a - q_{A2} - q_{B2})q_{B2} \\ & +Prob[z + (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{B2})q_{A2} < D]\frac{a^2}{2} \\ & +Prob[z + (a - q_{A1} - q_{B1})q_{A1} + (a - q_{A2} - q_{B2})q_{A2} \geq D]\frac{2a^2}{9} \end{cases}$$

Any firm competing with firm A has an incentive to produce a large quantity in the first period in order to increase the likelihood that Firm A generates cash flow less than D, allowing its competitors to earn monopoly profits in the second period. The key insight from examining the payoff functions is that, in Case 1, Firms B and C each enjoy the monopoly profits in only a single market. Thus, each only internalizes the benefits of eliminating Firm A from the one market in which it competes. In Case 2, on the other hand, Firm B receives the monopoly profits in both markets, and thus, internalizes all of the benefits of eliminating Firm A. Thus, Firm B has a stronger incentive to predate upon Firm A by choosing higher quantities in the first period in the second case, than either Firm B or C has individually in the first case. This can be seen in the equilibrium first period quantity choices, which are:

$$\begin{cases} (q^{\star}_{A1},\, q^{\star}_{A2},\, q^{\star}_{B1},\, q^{\star}_{C2}) = \left(\frac{36a\overline{z}}{5a^2+108\overline{z}},\, \frac{36a\overline{z}}{5a^2+108\overline{z}},\, a - \frac{72a\overline{z}}{5a^2+108\overline{z}},\, a - \frac{72a\overline{z}}{5a^2+108\overline{z}}\right) & (Case1) \\ (q^{\star\star}_{A1},\, q^{\star\star}_{A2},\, q^{\star\star}_{B1},\, q^{\star\star}_{B2}) = \left(\frac{18a\overline{z}}{5a^2+54\overline{z}},\, \frac{18a\overline{z}}{5a^2+54\overline{z}},\, a - \frac{36a\overline{z}}{5a^2+54\overline{z}},\, a - \frac{36a\overline{z}}{5a^2+54\overline{z}}\right) & (Case2) \end{cases}$$

Figure 1.3 illustrates the equilibrium in Cases 1 and Case 2. When Firm B competes with Firm A in two markets, it sells more in each than when it meets Firm A in one market, implying that Firm B's aggressiveness against its weak rival, Firm A, increases in their competitive overlap. It is also worth noting that Firm A

Figure 1.3: Production choices depending on competitive overlap



sells less when it has a high degree of competitive overlap with Firm B. However, the prediction of the model on which I focus in the rest of this chapter is that a competitor with more multimarket contact with a financially weak rival is more likely to be aggressive than a competitor with less multimarket contact with the rival.

1.3 Data and Measures

1.3.1 Data Sources and Sample Construction

To test the predictions of the model, I focus on five retail industries: grocery stores, wholesale clubs, department stores, discount stores, and pharmacies.[4] These industries offer several advantages for studying competition among firms. In these industries, firms are less likely to compete by differentiating products than other retail industries, as they sell many of the same products and face fairly similar de-

[4]SIC codes for grocery stores, wholesale clubs, department stores, discount stores, and pharmacies are 541105, 531110, 531102, 591205, and 573117, respectively.

mand changes over time.[5] Rather, they tend to compete with the rivals by reducing prices, opening more stores near the competitors' stores, or advertising more.

The data in this chapter comes primarily from two sources: Reference USA and Ad Spender. Reference USA is a database that contains detailed information on almost every retailer in the US at the establishment level. It consists of snapshots of detailed store information, such as store name, address, phone number, sales volume, the number of employees, parent company information, industry classification, and the population in which the store is located (at the 5 digit zip code level). I obtain snapshots of this information at the end of the 2003, 2005, 2007, 2009 and 2011 for all stores in each industry with at least 100 employees.[6]

I cleaned the data, making store names and parent firm names consistent; then I eliminated multiple store observations for the same parent firm at a given address in the same year. I manually matched parent firms to stores using the Corporate Affiliations database when information was missing from the Reference USA data, or if stores with the same name showed different parent firm names in the same year.[7] If the records of a store were dropped from the database in certain years and then reappeared in later years, I filled in the missing records. Overall,

[5]To some extent, there is product differentiation in these industries. For example, many grocery stores sell private label products (those manufactured or provided by a manufacturer for offer under a retailer's brand), and some department stores may sell products from more luxurious brands than others.

[6]My sample is biased towards large stores; the number of observations is unbalanced across the different industries. For example, I have fewer observations in the pharmacy industry than in the other four industries because individual pharmacies tend to have fewer employees.

[7]In some cases, stores with the same name are owned by different parent firms in different regions due to store-level buyouts.

there were 87,542 distinct store-level records for 1,551 firms.[8] Table 1.1 illustrates that public firms tend to own more stores than private firms. The relatively large change in the number of private company-owned stores in the discount department store industry after 2003 is due to Kmart, which was privately owned in 2003 and went public in the subsequent year. The number of all stores increased the most in 2007, while it decreased in 2009 and 2011, following the onset of the financial crisis.

Ad Spender provides dollar amounts of firms' advertisement spending at the firm-designated market area-product category-advertising medium level. The designated market area (DMA) is the region in which a population generally receives the same media offerings. In urban areas, the size of one DMA is similar to the size of a metropolitan statistical area (MSA).[9] It covers various media, such as television (cable television, network television, spot television, and syndication), print (consumer magazines, national newspapers, local newspapers, and Sunday magazines), radio (national spot radio and network radio) and outdoor advertising, such as billboards. I obtain monthly advertisement spending data for the years of 2003, 2005, 2007, 2009 and 2011, for all five retail industries in my sample.

I construct advertising spending variables at the firm-DMA-year level by summing up monthly spending in advertisement across the different product categories and across the different advertising media. I merge store location data with advertisement spending data by assigning a DMA code to each 5-digit zip code, re-

[8]These missing records may be partly due to the screening rule of 100 employees. That is, a store may be dropped from the sample because its employee headcount falls below 100, but it will reappear if its headcount exceeds 100 in the future.

[9]DMA was invented by Nielsen Media Research. It basically identifies TV stations that best reach an area; there are 210 Nielsen DMAs in the US.

sulting in 75,106 store-level records and 15,285 distinct firm-DMA level records from 1,177 firms. Table 1.2 presents the summary statistics of advertisement spending by media types in each industry. Department stores and discount stores tend to spend more on advertisement, when compared to the others, and department stores advertise more in the local media, while discount stores advertise more nationwide. Grocery stores and pharmacies tend to spend less on advertising, but more firms in the grocery store industry engage in advertisements. This is partly because grocery store chains are more likely to operate within specific regions, and therefore, choose cheaper forms of advertisement covering only the local areas.

My store location and advertising data covers both public and private firms. To measure the financial characteristics of firms in my sample, I merge this data with Compustat's Fundamental and Standard & Poor's Credit Ratings. Note that this data is only available for public firms. Table 1.3 reports the summary statistics of these variables. *Book Leverage* is measured as book debt over total assets, *Market Leverage* is book debt over market value, *Sales* is sales in logs, *Profitability* is operating income before depreciation divided by total assets, *Market to Book* is the market-to-book ratio defined as the market value over total assets, *Tangibility* is property, plant and equipment (PPE) divided by total assets, and *Average Stock Return* is defined as the firm's annual stock return over the past three years.

1.3.2 Definition of Local Markets and Aggressiveness Measures

In order to measure the degree of competitive overlap, measured as the geographic market overlap in this chapter, I need to define a local market. Ideally,

the local market should be small enough for stores in the market to be in direct competition with each other and targeting the same consumers. At the same time, it needs to be large enough for consumers not to shop in adjacent local markets.

I define a local market at the level of the first three digits of the five-digit zip codes following Khanna and Tice (2005). They suggest that the area covered by a three-digit zip code appears to be a population center and retail stores tend to be clustered around such centers. The size of this area is smaller than the size of the metropolitan statistical area (MSA).[10] In my sample, there are 833, 835, 841, 830, and 829 different local markets from 2003 to 2011, biennially, and four stores that compete with each other in a market-industry, on average.

I measure firms' aggressive behavior in a given market in two ways: expansion (store opening) and the amount of advertisement spending in that market. Price competition is not explored in this chapter because it is difficult to collect firms' market-level pricing data.[11] Nevertheless, we may not lose much of the aspect of competition because advertisements in such industries as grocery stores, discount stores, and department stores, are often about discounts or sales. Moreover, firms in these industries may prefer expansion over price competition, because expansion may preempt the entry of other competitors after the weak firm is eliminated from

[10]Some studies define a local market at the metropolitan statistical area (MSA) level. This may coincide better with identifiable physical features, such as population, rather than ZIP Codes, but is too big to ensure that stores in this area compete directly with each other.

[11]While some previous studies have investigated price competition using city-level price index or scanner data, they are very limited. A city-level price index hardly provides us with enough information on which firm triggers the price changes; scanner data is only available for a few firms in a few specific markets, although it offers very detailed pricing information, when compared to a city-level price index.

the market.

Expansion is defined if a new store appears in Reference USA that was not present in the previous year.[12] Advertisement spending is the dollar amount of annual spending on advertisements. Note that firm's aggressive behavior is measured at the firm level, not at the subsidiary level, meaning that I do not distinguish between the different subsidiaries owned by the same parent firm if they are in the same industry. For example, the stores of Marshalls and T. J. Maxx are treated as belonging to a single firm, as both are owned by the TJX Companies, Inc.

1.3.3 Competitive Overlap Measure

To measure competitive overlap, I employ the measure of multimarket contact from the industrial organization literature. Although various measures of multimarket contact have been used in the literature, multimarket contact measures primarily capture whether firms are competing in the same markets and the degree of the market overlap. I construct two multimarket contact measures at the pairwise level.[13] They are very similar to the measure of Chen (1996), who captured the overall degree of multimarket contact between two firms across all the markets in which both firms were competing.[14]

[12] Although the data obtained from Reference USA is biennial (2003, 2005, 2007, 2009 and 2011), it provides the date records are added, which makes it possible to pin down the year of the new entry.

[13] Other studies have also used firm-in-market level or market-level measures. See Gimeno and Jeong (2001) for more details.

[14] The only difference is that I use the dollar amount of sales or the number of stores in each market to calculate market shares, while Chen (1996) uses the number of customers to calculate market shares. My measures are also similar to the measure used by Baum and Korn (1999).

In constructing multimarket contact measures, I account for the size of the competing firms, because competing with a firm in one additional market would be less significant for a firm that operates across ten markets than a firm that operates in only one market. Similarly, I account for the total number of competing firms in a given market, because the impact of one competitor in a market with ten other competitors would be less important than its impact in a market with only two competitors.

I construct two measures: a count-based measure and a sales-based measure. The count-based measure provides the same weight to the contact of a pair of firms across different markets, while the sales-based measure gives more weight to the contact in a market in which the firms have higher sales. The count-based measure is defined as:

$$MMCC_{ij} = \sum_{m} \left(\frac{I_{im}}{N_i}\right)\left(\frac{I_{jm}}{N_m}\right)$$

where: I_{im} (I_{jm}) is an indicator function with a value of 1 if firm i (firm j) operates in market m, N_i is the total number of markets where firm i is operating, and N_m is the total number of competing firms in market m (i.e., $N_i = \sum_m I_{im}$ and $N_m = \sum_{k \epsilon K_m} I_{km}$ where K_m is the set of all firms competing in market m). In the example in Figure 1, $MMCC_{AB} = MMCC_{BA} = \frac{1}{4}$ in Case 1 and $MMCC_{AB} = MMCC_{BA} = \frac{1}{2}$ in Case 2, meaning Firm A and Firm B have a higher degree of competitive overlap in Case 2.

The sales-based measure is defined as:

$$MMCS_{ij} = \sum_{m} \left(\frac{s_{im}}{S_i}\right)\left(\frac{s_{jm}}{S_m}\right)$$

where: s_{im} (s_{jm}) is sales of firm i (firm j) in market m, S_i is firm i's total sales across all markets, and S_m is the sum of the sales of all firms in market m (i.e., $S_i = \sum_m s_{im}$ and $S_m = \sum_{k \epsilon K_m} S_{km}$ where K_m is the set of all firms competing in market m). This measure consists of two components: the importance for firm i of each market shared with its competitor firm j, and the competitor j's market position in these markets. Because it takes into account the size of the competitor positions in a market, this measure may better reflect the degree of competition between them than the count-based measure.

One feature of these measures is that they are normalized by firm i's total sales or the total number of markets in which a firm operates. Thus, it captures the relative competitive market overlap with other firms from the perspective of firm i. This ensures that my estimation results are not contaminated by a big firm effect. That is, without the normalization, the degree of multimarket contact is higher for large firms, and they tend to expand more and spend more in advertisements, which could result in a positive relationship between multimarket contact and expansion or advertisement spending.

Table 1.5 reports an example of the calculated multimarket contact measures for similar sized firms in the grocery store industry. Both A&P and Giant Foods operate primarily in the northeast, while Safeway has stores in a few of the same markets as A&P and Giant Foods, but primarily operates in the western US. Thus,

the competitive overlap between Giant Foods and A&P should be larger than the overlap between Safeway and A&P. The multimarket measure between Giant Foods and A&P is about ten times bigger than the measure for Safeway and A&P

Table 1.4 reports the summary statistics of my multimarket contact measures. The multimarket contact measures are calculated for a pair of firms within an industry and within a year. Firms in the discount store industry and the grocery store industry tend to have a higher degree of multimarket contact, when compared to other industries, which indicates that firms in these industries tend to operate in many of the same markets with each other. The low level of multimarket contact for firms in the pharmacy industry is due to the exclusion of stores with fewer than 100 employees. Note that in my analysis, I rely only on variation in multimarket contact within the industry and not across industries.

1.4 Empirical Evidence

In this section, I test whether a firm is more likely to compete aggressively in a market which it shares with a financially weak competitor if it meets that competitor in more markets. I focus on aggression through expansion decisions, but I also consider aggressive advertising. I then examine whether a firm facing a greater threat of predation because it overlaps with the same competitors in many markets chooses a more conservative capital structure, in response.

1.4.1 Effect of Competitive Overlap on the Predation of Financially Weak Rivals

1.4.1.1 Expansion Following a Rival's Leverage Changes

I test the hypothesis that a firm facing a financially weak competitor in a market behaves more aggressively with respect to that competitor if it also faces the competitor in many other markets. I begin by identifying the firm in each market experiencing the largest increase in leverage in the past year. I classify this firm as financially weak if its leverage increase is in the top quartile of its industry. I then estimate probit models in which the dependent variable is an indicator equal to one if a firm expands in a local market in a given year and zero otherwise. The primary explanatory variable of interest is the firm's multimarket contact with respect to the competitor experiencing the largest increase in leverage. Table 1.6 shows the results.

In all of these regressions, I control for industry-market-year fixed effects.[15] Thus, I am effectively studying whether, among the firms competing in a market during a year, those with more multimarket contact with the firm experiencing the largest leverage increase expand more, or less, than those with less multimarket contact. Because I am relying on variation only within industry-market-year, my estimates are not contaminated by the effects of unobserved cross-industry or cross-

[15] I apply the Mundlak approach to avoid the incidental parameters problem that can arise in non-linear models with fixed effects when the number of observations is fixed within a group (see Wooldridge (2002) and Mundlak (1978) for more details). This approach effectively assumes that the unobserved heterogeneity at the market-industry-year level is correlated with the market-industry-year group means of the regressors. My results are similar if I instead use a linear probability model with fixed effects (See Table 1.13) or a conditional logit model.

market factors that might drive expansion independently of multimarket contact, even if these unobserved factors are time varying. In my regressions, I also control for the market share (*Market Share)*, market dependence (*Market Dependence*), and size (*Total Sales*) of the firm whose expansion decisions I am estimating. *Market Share* is the fraction of the firm's sales divided by the sum of sales of all firms operating in a given market. *Market Dependence* is the firm's sales in a given market divided by its sum of sales across all markets. *Total sales* is the natural log of the firm's total sales.[16]

Panel A of Table 1.6 reports the average partial effects from the probit model estimation using the sales-based multimarket contact measure. The capacity to predate is strongest when the potential prey is in a financially weak state. I therefore run my regressions separately for cases where the firm experiencing the largest increase in leverage is financially weak (the first two columns) and where it isn't (the last two columns). For each of these two cases, I estimate the model separately for the expansion decisions of all firms in the group (first and third columns) and for those of publicly-traded firms only (second and fourth columns). In the latter case, I also control for a one year-lagged book leverage (i.e., book debt over total assets) of the firm whose expansion decisions I am estimating.

The first column illustrates that a one-standard deviation increase in a firm's multimarket contact with a financially weak competitor is associated with a 2.52%

[16]The explanatory variables constructed are one-year lagged when the dependent variable is measured in the even-numbered years (year 2004, 2006, 2008, and 2010) and two-year lagged when the dependent variable is measured in the odd-numbered years (year 2005, 2007, 2009, and 2011). This is because, while store opening information is available every year, store-level sales information is only available in odd-numbered years.

rise in the probability that the firm expands in the market in the subsequent year. The second column shows that this relationship is slightly larger (2.79%) if I estimate the model examining only the expansion decisions of publicly-traded firms. These estimates support the hypothesis that firms behave more aggressively in a market in which they face a financially weak competitor when they face that competitor in more markets.

The third and fourth columns illustrate that this relationship does not hold when the firm with the largest increase in leverage does not experience a leverage increase in the top quartile within its industry (i.e., is not financially weak). This provides comfort that the relationship, where there is a financially weak firm, is not driven by unobserved factors correlated with both a firm's multimarket contact with other firms in a market and its expansion decisions in that market. If it were, and if the effects of this unobserved factor did not vary with the presence of a financially weak firm, then the relationship should hold, regardless of whether the market has a financially weak firm or not. Consistent with the existing literature, a firm's own leverage level has a negative relationship with the probability of its expansion regardless of whether the firm experiencing the largest leverage increase in a given market is financially weak or not.[17]

Panel B shows the results of the same set of regressions in Panel A, using the count-based multimarket contact measure, instead of the sales-based measure. A

[17] All of the results for publicly-traded firms are similar when I control for other financial variables, including total assets (the natural log of the firm's total book assets), Tobin's Q (total assets plus the market value of equity minus the book value of equity divided by total assets), market-to-book ratios (market value over total assets), and the amount of cash holdings. I do not include these variables to keep the model parsimonious.

one-standard deviation increase in a firm's multimarket contact with a competitor whose leverage increase is in the top quartile of its industry is associated with a 3.85% rise in the probability that the firm expands in the market in the subsequent year. The relationship is again slightly stronger when I examine the expansion decisions of only publicly-traded firms. When the firm with the largest increase in leverage does experience a leverage increase in the top quartile in its industry, the relationship between multimarket contact and expansion is positive for the full sample, but is relatively weak and is statistically significant at only the 10% level. When I examine only the expansion decisions of publicly-traded firms, this relationship disappears completely.

1.4.1.2 Falsification Exercise: Placebo Test

I perform a placebo test to further alleviate the concerns that leverage and multimarket contact are potentially endogenous with respect to expansion decisions. More specifically, I examine the relationship between a firm's expansion in a market and its multimarket contact with a financially weak firm in the same market, but from another industry. That is, I construct artificial industry-markets by substituting in a financially weak firm competing in another industry in the same market. If the positive relationship between firms' tendency to expand and the degree of the multimarket contact with a financially weak competitor is caused by the potential benefits from predation, then I should not find such a relationship in these artificial markets, because firms are less likely to have benefits from making a firm from another industry weaker.

I start by identifying the financially weak firms (i.e., firms with a leverage increase are in the top quartile of the industry) and the markets in which these firms are located. Then, I calculate multimarket contact between the financially weak firm and other firms in that market from another industry. If there are firms from more than one industry in that market, I randomly assign one industry and examine the expansion of firms in that industry. For example, if Firm A in the grocery store industry operating in Market 1 becomes financially weak, I calculate the multimarket contact between Firm A and other firms which are in the same market, but from another industry (e.g., department stores). Then, I examine the association of this multimarket contact on the expansion of those firms in that market in the subsequent year. I use a probit model with the same specification used in Section 1.4.1.

Table 1.7 reports the average partial effect from a probit model using these artificial markets. The degree of multimarket contact with a financially weak firm from another industry is not related to the expansion of other firms in the market in which the financially weak firm is operating. Moreover, the magnitude and the significance are similar to that of Table 1.6 in the case of competing with a non-highly-leveraged competitor. That is, the effect of multimarket contact if a firm is competing with a non-highly-leveraged competitor is about the same as in the case of competing with a firm from another industry with respect to expansion. This implies that multimarket contact matters only when predation is likely to be effective *and* when firms are direct beneficiaries from predation. These results then help to address alternative explanations for my results relating to endogenously determine

leverage, multimarket contact, and expansion in a given market.

1.4.1.3 Expansion Following a Rival's Credit Rating Changes

In the previous two sections, I define a firm as financially weak if its increase in leverage is large compared to other firms in the same industry. The intuition is that leverage makes a firm a potential target for predation by increasing its vulnerability to the adverse effects of temporarily low cash flows. However, as leverage is a choice variable, it could be endogenously determined with other firms' expansion decisions. For example, a firm's investing resources to keep up with competitors that are expanding in a given market might issue more debt in order to finance that investment. In this section, I define a firm as financially weak if it experiences a deterioration in its credit rating. While a firm's credit rating is determined, in part, by its endogenous capital structure decisions, it is also determined, in part, by its ability to generate a cash flow, as well as its future prospects, which are both partly beyond a firm's control.

A negative credit rating shock reflects increased expected difficulty in generating sufficient cash flow to service a firm's debt, much less finance investment in operations and advertising in order to compete effectively in the future. In addition, a firm facing a negative credit shock may have more difficulty obtaining additional external capital in the future. In particular, the existing literature identifies the boundary between investment grade and non-investment grade as a critical point in credit rating distributions, as many contracts have clauses directly written on

this cutoff.[18] Analogous to my approach with leverage changes, I identify the firm experiencing the largest decline in credit rating in a given market during the past year, and classify that firm as financially weak if its credit rating drops from investment grade (Standard & Poor's rating from AAA to BBB-) to non-investment grade (Standard & Poor's rating from $BB+$ to D). The other details of the estimation are similar to those in Section 1.4.1.1.

Table 1.8 reports the results. Consistent with the results in Section 1.4.1.1, firms having a higher degree of multimarket contact with a financially weak competitor tend to expand in a market in which they compete. More specifically, a one standard deviation increase in the sales-based multimarket contact measure with respect to a financially weak competitor is associated with an 11% increase in the probability of expansion (14.6% when I only include publicly-traded firms in the sample). I also examine cases where the firm with the largest credit rating drop experiences a decrease within the investment grade or non-investment grade categories rather than from the investment grade to non-investment grade. I find that multimarket contact has a slightly positive relationship with expansion if the decline is within the non-investment grade, and no effect if the decline is within the investment grade. While such declines may alter predatory incentives within a market some, these effects should be weaker than when a competitor moves from investment to non-investment grade. Thus, the results overall when I use credit rating changes to identify financially weak firms are similar to those where I use leverage changes.

[18] See Beaver *et al.* (2006)

1.4.1.4 Advertisement Spending Following a Rival's Leverage Changes

While most of my analyses focus on aggressive behavior through expansion, I also measure a firm's aggressive behavior using advertising expenditures. Firms may advertise heavily in order to steal market share in a rival's markets, and possibly eliminate a weak rival. This can be a more prompt way of being aggressive than expansion because store openings take time. However, because an increase in advertising can easily be reversed in the future, it may not commit a firm to aggressive behavior as effectively as expanding does. Moreover, expanding while a weak firm is still present may preempt the entry of other competitors after the weak firm is eliminated from the market. Advertising may be less effective at such preemption.

The advertisement expenditure data are provided at the level of a DMA. A DMA identifies TV stations that best reach an area, and classifies the region in which a population receives the same media offerings. There are 210 DMAs in the US, and each DMA covers one or more local markets defined at the first three digits of the five-digit zip code level. When multiple local markets are associated with the same DMA, I only examine the local market in which the firm experiencing the largest increase in leverage compared to the other firms in that DMA is operating. That is, I assume that a firm advertises aggressively in a given DMA in order to steal market share from the firm with the most leverage increase in a specific local market which is covered by that DMA.[19]

The estimation procedure is similar to that in Section 1.4.1.1. In a given

[19] I also conduct a test re-defining a local market at the DMA level and constructing multimarket measures at the DMA level. I find that the results still hold.

DMA, I identify the firm experiencing the largest increase in leverage during the past year and the market in which that firm is operating. If the firm with the largest leverage increase is located in more than one market in a given DMA, I include all observations from these markets in the estimation. I then calculate the multimarket contact between the firm experiencing the largest increase in leverage and the other firms in that market using the sales amount during the past year. Finally, I investigate the advertisement spending of other firms in that DMA. The advertisement spending is defined as the natural log of the firm's local media advertisement spending plus nationwide media advertisement expenditures divided by the total number of DMAs in which a firm is operating.

I estimate a linear regression model with market-industry-year fixed effects. The dependent variable is firm's advertisement spending at the DMA level, and the independent variables are the firm's multimarket contact with the firm experiencing the largest leverage increase, its own leverage level, its total sales, and its market shares and market dependence averaged within a DMA if it operates in more than one market in a given DMA.

Table 1.9 presents the results. These results are less clear than the results using the expansion decisions to identify aggressive behavior. Although multimarket contact with a weak firm is positively related to advertisement expenditures in the market, the differences between the case where the firm experiencing the largest increase in leverage is weak and the case where the firm is not weak are small. A one-standard deviation increase in multimarket contact with the firm experiencing the largest increase in leverage is associated with a rise in advertisement spending

of $1.86 million if the firm with the leverage increase is financially weak, and a rise of about $1.8 million if the firm is not financially weak.

This could indicate that firms in the industries I study do not rely on advertising to predate on weak rivals, because this mechanism does not provide sufficient commitment to aggressive behavior. On the other hand, it could reflect an inherent limit of examining local advertising. Many of the firms in the industries I study operate regionally or even nationally. If a firm seeks to predate upon a weak rival with which it competes across an entire region through advertising, it would probably find regional, rather than local, advertising the most cost effective way of doing so. My measure of advertising would omit such expenditures, and may therefore be missing an important piece of how firms compete with the rivals through advertising.

1.4.2 During the Financial Crisis: Expansion Against a Financially Constrained Rival

In the previous sections, I identify financially weak firms using either the increase in leverage or a negative shock to the credit ratings. However, it is possible that these changes are expected ex ante, which in turn, endogenously determines expansion or advertisement information. For example, a weak firm may raise leverage ex ante to illustrate its pre-commitment to its competitors that have high multimarket contact with it, if it expects those competitors to expand aggressively.[20] The placebo test in Section 1.4.1.2 provides some comfort that this endogeneity problem does not drive my results. Nevertheless, to further address this endogeneity concern,

[20]Brander and Lewis (1986) argued that when a manager has limited liability, debt effectively commits the firm to more aggressive behavior.

I use the recent financial crisis as a quasi-natural experiment in which to study the effect of an unanticipated change in the vulnerability of a highly-leveraged firm to predation.

During the financial crisis, firms had difficulty in rolling over existing debt and obtaining additional financing, and therefore, faced tighter financing constraints. This made it especially difficult for an already highly-leveraged firm to endure losses without failing. Thus, incentives to predate upon weak rivals were likely to be especially strong during this period. I define firms that were already highly leveraged before the crisis as firms which are potentially more vulnerable to predation during the crisis. The identifying assumption is that the multimarket contact level a firm has with a highly-leveraged competitor before the financial crisis is not positively correlated with any unobserved within-firm changes making that firm aggressive against the highly-leveraged competitor during the crisis.

The estimation procedure is similar to the procedure in Section 1.4.1.1. In a given market, I identify the firm with the highest level of leverage in the past year, and whether that firm's leverage is in the top quartile in its industry.[21] Then, I investigate whether those firms expand more during the year if they had higher multimarket contact with the highly-leveraged firm. Since I expect a highly-leveraged firm to face *more* predatory behavior by its competitors *during the crisis*, I use a difference-in-difference estimation approach by including the interaction term of the

[21]The increase in *book leverage* is used when I identify firms experiencing the largest leveraged increase. The results are consistent when *market leverage* is used, but with less power. In addition, the results are consistent when the absolute change in leverage is used instead of the percentage change.

firm's lagged multimarket contact with a highly-leveraged firm and a dummy variable indicating the period of the crisis. The period of the crisis is assumed to be the years 2008 and 2009.

Table 1.10 reports the results from a linear probability model with market-industry fixed effects. During the crisis, firms tended not to expand, on average, but firms having a one standard deviation higher degree of multimarket contact with a highly-leveraged firm were 3.23% more likely to expand during the crisis. Multimarket contact with a highly-leveraged firm outside of the crisis does not appear to be associated with expansion. The relationship is stronger for public firms, with the probability of expansion increasing by 10.27% with a one-standard deviation increase in multimarket contact with a highly-leveraged firm. These findings suggest that the tighter financial constraint during the crisis makes a highly-leveraged firm more susceptible to predation, and lend further support to the results in the previous sections.

1.4.3 Impact of Competitive Overlap on Leverage Decisions

1.4.3.1 Average Multimarket Contact Level and Leverage

In Section 1.4.1, I find evidence that firms competing with the same competitors in many markets (i.e., having a higher degree of competitive overlap) are more likely to be aggressive if the competitors become financially weak. If this threat of being predated upon is a meaningful cost of taking on leverage, firms should adopt more conservative financial policies when the threat of such predation is high. Thus, in this section, I investigate how the threat of predation due to the

competitive overlap affects firms' financial structure decisions.

To accomplish this goal, I first estimate the effect of a firm's overall degree of multimarket contact on the leverage level by estimating $Leverage_{i,t} = \alpha + \beta MMCfirm_{i,t-1} + \gamma X_{i,t-1} + YearDummy_t$. $MMCfirm_{i,t}$ is a firm-level multimarket contact variable. Book, market, net book, and net market leverage are considered dependent variables; the control variables in $X_{i,t}$ are *Sales, Profitability, Market to Book, Tangibility, Dividend,* and *Average Stock Return.*

Since the multimarket measures (i.e., $MMCC$ and $MMCS$) are normalized by the firm's total number of markets or the total number of sales, the cross sectional variation in these measures disappears if I take the average of those measures across different competitors. Instead, I construct a Herfindahl index-style measure by taking the average of the product of the multimarket contact measures. More specifically, $MMCCfirm_i$ ($MMCSfirm_i$) is defined as $\sum_j MMCC_{ij} \cdot MMCC_{ji}$ ($\sum_j MMCS_{ij} \cdot MMCS_{ji}$). Conceptually, it is the sum of the significance of each competitor j for firm i across different competitors, giving weight to how significant firm i is to each firm j.[22]

Table 1.11 presents the estimation results. It shows that if a firm has a higher degree of multimarket contact, it is more likely to maintain a low leverage. A one-standard deviation increase in a firm's average multimarket contact is associated with a decline in its book leverage by 2.89% in the subsequent year. The result is weaker with market leverage, partly because movements in stock prices make market

[22] Alternative firm level multimarket measures are constructed as $\sum_j (MMCC_{ij})^2$. The signs of coefficients are consistent with coefficients in Table 1.11 with less power.

leverage a noisier measure of the impact of the capital structure decisions.

1.4.3.2 Impact of Multimarket Contact Changes on Leverage Decisions Following Mergers Events

To further identify the effect of the threat of predation on leverage, I examine the effects of changes in multimarket contact due to mergers. A merger between two firms can result in either a large or small change in the amount of multimarket contact between those firms and other firms. Since the merger decision is made by those two firms, the changes in the amount of multimarket contact for other firms due to the merger is plausibly exogenous with respect to those other firms' capital structure decisions.

The estimation procedure is as follows. First, firms going through mergers (including the purchase of stores from other firms) are identified in each year. Then, the change in other firms' multimarket contact with those firms before and after the merger event is calculated. Also, all other independent variables are constructed at the change level, before and after the merger event (i.e., if a merger occurs between t and $t-1$, $\triangle X$ is defined as $X_t - X_{t-1}$). A dependent variable is calculated in the following year after the merger event (i.e., $\triangle Y = Y_{t+1} - Y_t$).

Table 1.12 reports the results. It illustrates that firms' leverage change has a negative relationship with the multimarket contact changes due to the competitors' mergers. A one-standard deviation increase in multimarket contact in a given year, due to the competitors' merger leads to a leverage decrease in the subsequent year by 2.11%. Both of the results in Section 1.11 and Section 1.12 support the

argument that firms do adjust the financial leverage to take into account the threat of predation.

1.5 Conclusion

This chapter provides evidence that firms competing with the same competitors in more markets face a higher risk of predation, and that this risk feeds back into the capital structure decisions. More specifically, I test the idea that more competitive overlap with a financially weak competitor leads to its competitor have a more aggressive behavior, because these competitors internalize more benefits from impairing or eliminating the financially weak firm. Using store-level location data and advertisement expenditure data for retail stores, I find that firms having a higher degree of competitive overlap with a firm with a drastic leverage increase or a negative credit rating shock are more likely to expand and increase advertisements in the markets in which they compete. The relationship was stronger during the recent financial crisis, which arguably is a period of severe financing constraints. Finally, I present evidence that firms choose more conservative capital structures when they face a higher risk of predation as a result of having more competitive overlap with the same competitors. This chapter sheds light on the cross-sectional variation in financially weak firms' product market behavior by introducing different levels of predation risk. In particular, this chapter provides clearer evidence of firm's predatory behavior by looking at the competitive decisions of highly-leveraged firm's rivals, which vary with the predation incentives captured by the degree of multimarket contact.

Table 1.1: Summary Statistics of the Number of Stores

	Grocery store				Discount store				Department store			
	Public		Private		Public		Private		Public		Private	
year	Firms	Stores	Firms	Stores	Firms	Stores	Firms	Stores	Firms	Stores	Firms	Stores
2003	24	5604	209	2415	7	3459	11	1080	19	2231	10	68
2005	22	5951	217	2532	7	4575	12	267	17	2241	14	208
2007	21	6400	225	2965	7	5482	12	381	19	3214	14	207
2009	19	6065	221	2968	9	4720	8	338	18	3165	12	67
2011	19	5247	207	2926	8	4682	10	324	17	2568	10	51

	Pharmacy				Wholesale club			
	Public		Private		Public		Private	
year	Firms	Stores	Firms	Stores	Firms	Stores	Firms	Stores
2003	13	67	10	17	3	720	0	0
2005	11	105	11	21	3	815	0	0
2007	8	87	14	44	3	1030	2	3
2009	8	80	11	32	3	1030	3	82
2011	9	53	8	16	3	933	3	6

Table 1.2: Summary Statistics of Advertisement Spending

(unit: million dollars)

	Grocery store			Discount store			Department store		
	Firms	Mean	StD	Firms	Mean	StD	Firms	Mean	StD
Network TV	838	0	0.002	69	31.364	68.202	184	11.361	36.153
Cable TV	838	0.001	0.012	69	14.436	36.897	184	4.554	15.43
Syndication	838	0	0.003	69	6.941	19.343	184	1.653	6.77
Spot TV	838	1.438	4.27	69	11.116	21.16	184	5.082	11.562
Magazine	838	0.031	0.234	69	10.786	28.163	184	6.263	13.683
Sunday magazine	838	0.003	0.039	69	2.946	12.939	184	0.514	2.535
Natl newspaper	838	0.004	0.049	69	0.731	2.357	184	2.118	5.641
Newspaper	838	1.394	3.211	69	19.331	37.145	184	33.644	74.61
Network radio	838	0.001	0.027	69	1.228	4.361	184	1.222	4.026
Spot radio	838	0.446	2.954	69	1.96	4.824	184	1.241	3.444
Outdoor	838	0.014	0.06	69	0.088	0.239	184	0.02	0.058
Total	838	3.459	9.133	69	101.715	204.103	184	67.852	143.208
	Pharmacy			Wholesale club					
	Firms	Mean	StD	Firms	Mean	StD			
Network TV	70	2.45	8.223	16	0.407	0.745			
Cable TV	70	2.867	8.609	16	0.502	0.94			
Syndication	70	1.377	4.466	16	0.106	0.305			
Spot TV	70	1.326	3.014	16	0.629	1.168			
Magazine	70	1.284	3.393	16	0.96	2.088			
Sunday magazine	70	0.289	0.965	16	0.666	2.045			
Natl newspaper	70	0.026	0.128	16	0.044	0.056			
Newspaper	70	13.199	23.392	16	1.633	1.804			
Network radio	70	0.965	3.155	16	1.671	3.522			
Spot radio	70	0.654	2.394	16	0.531	0.686			
Outdoor	70	0.024	0.067	16	0.001	0.012			
Total	70	24.678	49.389	16	7.25	9.192			

Table 1.3: Summary Statistics of Financial Variables

Book Leverage is measured as book debt over total assets, *Market Leverage* is book debt over market value, *Sales* is book sales in logs, *Profitability* is operating income before depreciation divided by total assets, *Market to Book* is the market-to-book ratio defined as the market value over total assets, *Tangibility* is property, plant and equipment (PPE) divided by total assets, and *Avg Stock Return* is defined as the firm's annual stock return over the past three years. *Market* is defined as at the first 3-digit-zip-code level. *Market Dependence* is firm's sales in each market m divided by its total sales over all markets, and *Market Share* is the fraction of firm's sales divided by the sum of all firms' sales operating in each market.

		Firm-year level variable								Market-firm-year level variable	
		Book Leverage	Market Leverage	Sales	Profitability	Market to Book	Tangibility	Total Assets	Avg Stock Return	Market Share	Market Dependence
Grocery stores	Mean	0.609	0.477	8.47	0.092	1.703	0.447	7.4	4.994	0.287	0.073
	25th	0.48	0.203	7.621	0.058	1.072	0.33	0.021	6.319	0.093	0.001
	Med	0.659	0.527	8.288	0.093	1.303	0.44	0.054	7.217	0.212	0.006
	75th	0.745	0.643	9.88	0.111	1.528	0.561	0.128	8.706	0.416	0.038
	StDev	0.23	0.259	1.612	0.075	1.589	0.148	1.636	23.658	0.247	0.178
	Obs	177	164	177	177	164	177	177	158	0.578	0.015
Discount store	Mean	0.582	0.379	10.046	0.128	1.785	0.413	9.226	3.179	0.295	0.001
	25th	0.545	0.234	8.66	0.081	1.242	0.313	0.037	7.769	0.559	0.002
	Med	0.586	0.334	10.025	0.114	1.567	0.372	0.055	9.128	0.964	0.006
	75th	0.645	0.53	11.069	0.167	2.491	0.557	0.125	10.341	0.324	0.072
	StDev	0.118	0.173	1.601	0.067	0.716	0.149	1.656	14.424	0.328	0.017
	Obs	68	67	68	68	67	68	68	65	0.159	0.002
Department store	Mean	0.515	0.437	8.53	0.092	1.448	0.362	8.031	4.119	0.268	0.004
	25th	0.4	0.231	7.803	0.054	0.976	0.301	0.035	7.3	0.417	0.008
	Med	0.504	0.41	8.461	0.093	1.249	0.378	0.079	7.87	0.239	0.078
	75th	0.606	0.608	9.503	0.14	1.825	0.432	0.203	8.984	0.871	0.246
	StDev	0.144	0.228	1.189	0.076	0.672	0.121	1.321	19.003	1	0.058
	Obs	155	148	155	155	148	155	155	140	1	0.105
Pharmacy	Mean	0.601	0.448	9.945	0.088	1.541	0.201	9.044	3.269	1	0.291
	25th	0.466	0.314	8.736	0.06	1.155	0.046	0.022	8.722	0.251	0.307
	Med	0.554	0.456	10.384	0.08	1.334	0.129	0.054	9.349	200	200
	75th	0.704	0.567	10.999	0.115	1.738	0.311	0.081	9.791	0.779	0.007
	StDev	0.21	0.194	1.28	0.042	0.673	0.169	1.116	26.981	0.53	0.002
	Obs	83	82	83	83	82	83	83	75	1	0.003
Wholesale Club	Mean	0.526	0.311	10.9	0.106	1.746	0.507	9.728	0.024	1	0.005
	25th	0.485	0.275	9.213	0.092	1.531	0.452	0.043	7.624	0.292	0.039
	Med	0.523	0.318	11.005	0.102	1.689	0.49	0.05	9.77	2145	2145
	75th	0.57	0.345	12.564	0.121	1.881	0.57	0.188	11.697		
	StDev	0.045	0.05	1.549	0.018	0.389	0.06	1.79	0.097		
	Obs	27	27	27	27	27	27	27	27	2177	2177

Table 1.4: Multimarket Contact (MMC) Measures

This table shows the summary statistics of multimarket contact measures, $MMCS$ (sales-based multimarket contact measure) and $MMCC$ (count-based multimarket contact measure) within the same industry and the same year. $MMCS_{ij} = \sum_m \left(\frac{s_{im}}{S_i}\right)\left(\frac{s_{jm}}{S_m}\right)$ where s_{im} (s_{jm}) is sales of firm i (firm j) in market m, and S_i is firm i's total sales across all markets and $S_m$is the sum of sales of all firms in market m (i.e., $S_i = \sum_m s_{im}$ and $S_m = \sum_{\tilde{i}} S_{\tilde{i}m}$). $MMCC_{ij} = \sum_m \left(\frac{I_{im}}{N_i}\right)\left(\frac{I_{jm}}{N_m}\right)$ where I_{im} (I_{jm}) is an indicator function with the value of 1 if firm i (firm j) operates in market m, N_i is the total number of markets where firm i is operating, and N_m is the total number of competing firms in market m (i.e., $N_i = \sum_m I_{im}$ and $N_m = \sum_{\tilde{i}} I_{\tilde{i}m}$).

year		Sales-based Multimarket Contact measures (MMCS)					Count-based Multimarket Contact measure (MMCC)				
		Grocer	Discnt	Deparmt	Pharm	Wholesl	Grocer	Discnt	Deparmt	Pharm	Wholesl
2003	Mean	0.353	0.447	0.194	0.110	0.211	0.180	0.246	0.182	0.095	0.197
	Std Dev	0.170	0.190	0.043	0.217	0.083	0.087	0.095	0.053	0.140	0.083
	Num of firms	235	17	20	25	3	235	17	20	25	3
2005	Mean	0.364	0.492	0.203	0.124	0.228	0.187	0.286	0.172	0.093	0.191
	Std Dev	0.167	0.183	0.052	0.233	0.096	0.090	0.101	0.042	0.163	0.079
	Num of firms	242	17	19	24	3	242	17	19	24	3
2007	Mean	0.395	0.543	0.229	0.152	0.026	0.189	0.320	0.176	0.118	0.250
	Std Dev	0.180	0.200	0.067	0.230	0.070	0.094	0.115	0.061	0.160	0.066
	Num of firms	251	18	21	25	5	251	18	21	25	5
2009	Mean	0.391	0.471	0.232	0.142	0.304	0.190	0.311	0.180	0.090	0.252
	Std Dev	0.175	0.210	0.057	0.241	0.120	0.093	0.118	0.050	0.121	0.069
	Num of firms	242	16	18	21	6	242	16	18	21	6
2011	Mean	0.391	0.505	0.230	0.175	0.336	0.196	0.298	0.197	0.161	0.254
	Std Dev	0.178	0.190	0.064	0.246	0.209	0.097	0.089	0.063	0.174	0.095
	Num of firms	228	17	17	19	6	228	17	17	19	6
Total	Mean	0.379	0.492	0.217	0.139	0.284	0.188	0.292	0.181	0.110	0.237
	Std Dev	0.175	0.193	0.058	0.229	0.133	0.092	0.105	0.054	0.152	0.076
	Num of firms	1198	85	95	114	23	1198	85	95	114	23

Table 1.5: Example of multimarket contact (MMC) measures

This table shows an example of multimarket contact measures in the department store industry. $MMCS_{ij} = \sum_m \left(\frac{s_{im}}{S_i}\right)\left(\frac{s_{jm}}{S_m}\right)$ where s_{im} (s_{jm}) is sales of firm i (firm j) in market m, and S_i is firm i's total sales across all markets and $S_m$is the sum of sales of all firms in market m (i.e., $S_i = \sum_m s_{im}$ and $S_m = \sum_{\tilde{i}} S_{\tilde{i}m}$). $MMCC_{ij} = \sum_m \left(\frac{I_{im}}{N_i}\right)\left(\frac{I_{jm}}{N_m}\right)$ where I_{im} (I_{jm}) is an indicator function with the value of 1 if firm i (firm j) operates in market m, N_i is the total number of markets where firm i is operating, and $N_m$is the total number of competing firms in market m (i.e., $N_i = \sum_m I_{im}$ and $N_m = \sum_{\tilde{i}} I_{\tilde{i}m}$).

Firm i	Firm j	Year	$MMCS_{ij}$	$MMCC_{ij}$	$Sales_i$	$Sales_j$
SAFEWAY	A&P	2003	0.004	0.014	10.38589	9.28678
SAFEWAY	A&P	2005	0.003	0.013	10.48634	9.292373
SAFEWAY	A&P	2007	0.003	0.012	10.60125	8.832043
SAFEWAY	A&P	2009	0.007	0.015	10.69431	9.160749
SAFEWAY	A&P	2011	0.005	0.014	10.62255	8.996956
GIANT FOOD	A&P	2003	0.050	0.070	11.09321	9.28678
GIANT FOOD	A&P	2005	0.043	0.060	11.16191	9.292373
GIANT FOOD	A&P	2007	0.047	0.062	10.98897	8.832043
GIANT FOOD	A&P	2009	0.081	0.083	10.48577	9.160749
GIANT FOOD	A&P	2011	0.071	0.076	10.57601	8.996956

Table 1.6: Effect of Multimarket Contact (*MMC*) on Expansion Interacting with a Rival's Leverage Changes

This table reports the average partial effect from a conditional probit model where the value of a dependent variable is e*xpansion (=1)* or *no change (=0)*. See Table 1.4 for the definitions of *MMCS* and *MMCC*, and Table 1.3 for the other independent variables. *Leverage* is lagged one year, *MMCS, MMCC*, *Market Share,* and *Market Dependence* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years because of data limitations (See Section 1.4.1 for more details). ***Significant at 1%; **significant at 5%; *significant at 10%.

A: Sales-based multimarket contact measure (MMCS)

	Rival's leverage changes			
	Top quartile		Below top quartile	
MMCS	0.0252***	0.0279***	0.00724	-0.00683
	(3.70)	(2.70)	(0.95)	(-0.50)
Leverage		-0.0989**		-0.133**
		(-2.47)		(-2.45)
Market Share	-0.0145	-0.00878	0.0238***	0.0297***
	(-1.60)	(-0.74)	(3.86)	(3.70)
Market Dependence	0.00777	-0.198	-0.00292	-0.0180
	(1.36)	(-1.60)	(-0.41)	(-0.73)
Total Sales	0.107***	0.00748	0.0643***	0.0423***
	(14.38)	(0.41)	(9.87)	(2.89)
Private firm included	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes
Observation	9096	6194	8934	4950

B: Count-based multimarket contact measure (MMCC)

	Rival's leverage changes			
	Top quartile		Below top quartile	
MMCC	0.0385***	0.0441***	0.0164*	-0.000373
	(4.56)	(3.50)	(1.88)	(-0.02)
Leverage		-0.0944**		-0.158***
		(-2.35)		(-2.83)
Market Share	-0.0164*	-0.0113	0.0245***	0.0305***
	(-1.81)	(-0.95)	(3.92)	(3.77)
Market Dependence	0.00739	-0.175	-0.00348	-0.0130
	(1.30)	(-1.46)	(-0.48)	(-0.57)
Total Sales	0.107***	0.00925	0.0685***	0.0489***
	(14.35)	(0.51)	(10.30)	(3.34)
Private firm included	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes
Observation	9096	6194	8934	4950

Table 1.7: Falsification Exercise on the Relationship between Multimarket Contact (*MMC*) and Expansion

The table reports the average partial effect from a conditional probit model in placebo tests. *MMCS* and *MMCC* are artificially calculated between a financially weak firm in a given industry and other firms located in the same market but from another industry. See Table 1.4 for the definitions of *MMCS* and *MMCC*. A dependent variable is e*xpansion (=1)* or *no change (=0)*, and see Table 1.3 for the other independent variables. *Leverage* is lagged one year, *MMCS, MMCC*, *Market Share,* and *Market Dependence* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years because of data limitations (See Section 1.4.1 for more details). ***Significant at 1%; **significant at 5%; *significant at 10%.

A: Sales-based multimarket contact measure (MMCS)

	Rival's leverage changes in top quartile	
MMCS	0.00603	0.00737
	(0.98)	(0.94)
Leverage		-0.121***
		(-3.27)
Market Share	0.0264**	0.0259**
	(2.51)	(2.42)
Market Dependence	-0.00517	-0.00435
	(-0.77)	(-0.18)
Total Sales	0.0782***	0.0808***
	(10.68)	(9.16)
Private firm included	Yes	No
Market-industry-year FE	Yes	Yes
Observation	7963	6274

B: Count-based multimarket contact measure (MMCC)

	Rival's leverage changes in top quartile	
MMCC	0.00954	0.0139
	(1.27)	(1.51)
Leverage		-0.121***
		(-3.26)
Market Share	0.0276***	0.0269**
	(2.62)	(2.50)
Market Dependence	-0.00550	-0.00367
	(-0.82)	(-0.15)
Total Sales	0.0769***	0.0806***
	(10.55)	(9.17)
Private firm included	Yes	No
Market-industry-year FE	Yes	Yes
Observation	7963	6274

Table 1.8: Effect of Multimarket Contact (*MMC*) on Expansion Interacting with a Rival's Credit Rating Changes

This table reports the average partial effect from a conditional probit model where the value of a dependent variable is e*xpansion (=1),* or *no change (=0).* In each market, a firm with the largest credit rating drop is identified using the Standard & Poor's long term debt credit rating at $t-1$. Local markets are grouped by the extent of a credit rating drop of the largest-credit-rating-drop firm in each market; they are classified as the high-to-low group if the credit rating changes are from investment grade to non-investment grade, the low-to-low group if the rating drops are within non-investment grade, and the high-to-high group if the rating drops are within investment grade. See Table 1.4 for the definitions of *MMCS* and *MMCC*, and Table 1.3 for the other independent variables. *Leverage* and *Total Asset* are lagged one year. *MMCS, MMC*C, *Market Share, Market Dependence* are one-year lagged when the dependent variable is measured in the even-number years, and two-year lagged if the dependent variable is measured in the odd-number years because of data limitation (See Section 1.4.1 for more details). ***Significant at 1%; **significant at 5%; *significant at 10%.

A: Sales-based multimarket contact measure (MMCS)

	Rival's credit rating changes					
	High to Low		Low to Low		High to High	
MMCS	0.110***	0.146***	0.0349*	0.0172	0.00346	-0.00792
	(4.92)	(4.73)	(1.87)	(0.51)	(0.25)	(-0.37)
Leverage		0.0190		0.0301		-0.127**
		(0.37)		(0.46)		(-2.34)
Market Share	0.0568*	0.0902*	-0.0695**	-0.0651*	0.0181	0.0222
	(1.84)	(1.84)	(-2.52)	(-1.81)	(1.61)	(1.51)
Market Dependence	-0.00190	-1.114***	-0.00833	-0.139	-0.0705**	-0.0556
	(-0.22)	(-2.92)	(-0.61)	(-0.84)	(-2.01)	(-0.80)
Total Sales	0.0739***	-0.0182	0.0689***	0.0432	0.0163	0.0252
	(5.59)	(-0.57)	(4.28)	(1.47)	(1.35)	(1.49)
Private firm included	Yes	No	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	3377	2251	2119	1570	3355	2496

B: Count-based multimarket contact measure (MMCC)

	Rival's credit rating changes					
	High to Low		Low to Low		High to High	
MMCC	0.0730***	0.103***	0.0264	0.00586	0.000637	-0.000213
	(4.55)	(4.98)	(1.59)	(0.23)	(0.02)	(-0.07)
Leverage		0.0301		0.0281		-0.132**
		(0.58)		(0.43)		(-2.46)
Market Share	0.0551*	0.0846*	-0.0694**	-0.0655*	0.0188*	0.0247*
	(1.77)	(1.72)	(-2.52)	(-1.82)	(1.69)	(1.71)
Market Dependence	-0.00332	-1.006***	-0.00541	-0.132	-0.0854**	-0.0625
	(-0.39)	(-2.69)	(-0.42)	(-0.73)	(-2.31)	(-1.00)
Total Sales	0.0758***	-0.00230	0.0701***	0.0432	0.0176	0.0241
	(5.70)	(-0.07)	(4.35)	(1.45)	(1.45)	(1.47)
Private firm included	Yes	No	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	3377	2251	2119	1570	3355	2496

Table 1.9: Effect of Multimarket Contact (*MMC*) on Ads Spending Interacting with a Rival's Leverage Changes

This table reports the results of a linear regression model with a dependent variable defined as the natural log of a firm's local media advertisement spending plus nationwide media advertisement expenditures divided by the total number of designated market areas (DMA). A firm with the most-leverage-increase is identified by comparing the percentage changes of the leverage. Local markets are grouped by the percentage leverage increase of the highest-leverage-increase firm in each market; they are classified as the top quartile group if the leverage increase is in the top quartile of the leverage change distribution, and as the below top quartile group, otherwise. Then, among several markets in each DMA, one market with the highest multimarket contact level is chosen. *Leverage* and *Total Asset* are lagged one year, and *MMCS, MMC*C, *Market Share,* and *Market Dependence* are two-year lagged. See Table 1.4 for the definitions of *MMCS* and *MMCC*, and Table 1.3 for the other independent variables. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: Sales-based multimarket contact measure (MMCS)

	Rival's leverage changes			
	Top quartile		Below top quartile	
MMCS	4.336***	3.531**	4.135***	2.422**
	(3.71)	(2.25)	(4.20)	(2.65)
Leverage		-1.706*		0.244
		(-1.73)		(0.16)
Market Share	-2.710***	-2.156**	-1.049**	-0.795**
	(-2.88)	(-2.48)	(-2.15)	(-2.09)
Market Dependence	3.262***	6.303**	0.242	-0.503
	(4.01)	(2.20)	(0.24)	(-0.08)
Total Sales	0.785***	0.792***	0.882***	0.982***
	(6.93)	(6.55)	(6.30)	(4.63)
Private firm included	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes
Observation	2177	1742	1506	1207

B: Count-based multimarket contact measure (MMCC)

	Rival's leverage changes			
	Top quartile		Below top quartile	
MMCS	8.816***	5.598**	7.150***	6.359***
	(4.74)	(2.11)	(4.11)	(2.84)
Leverage		-1.476		0.319
		(-1.38)		(0.25)
Market Share	-3.037***	-2.452***	-1.327**	-0.391
	(-3.05)	(-2.82)	(-2.56)	(-0.80)
Market Dependence	3.135***	5.922**	0.0386	-5.470
	(3.89)	(2.02)	(0.04)	(-0.65)
Total Sales	0.745***	0.753***	0.854***	0.893***
	(6.59)	(6.33)	(6.20)	(5.39)
Private firm included	Yes	No	Yes	No
Market-industry-year FE	Yes	Yes	Yes	Yes
Observation	2177	1742	1506	1207

Table 1.10: Expansion Against a Highly-Leveraged Rival During the 2008-2009 Financial Crisis

This table reports the average partial effect from a conditional probit model where the value of a dependent variable is e*xpansion (=1),* or *no change (=0).* In each market (within the same industry and the same year), a firm with the highest leverage level is identified at $t-1$. *Crisis* is a dummy variable which equals to 1 if the dependent variable is measured in 2008 or 2009 (i.e., t=2008 or t=2009). See Table 1.4 for the definitions of *MMCS* and *MMCC*, and Table 1.3 for the other independent variables. *Leverage* and *Total Asset* are lagged one year. *MMCS, MMCC*, *Market Share,* and *Market Dependence* are one-year lagged when the dependent variable is measured in the even-number years, and two-year lagged if the dependent variable is measured in the odd-number years because of data limitation (See Section 1.4.1 for more details). ***Significant at 1%; **significant at 5%; *significant at 10%.

A: Sales-based multimarket contact measure (MMCS)

	Rival's leverage level			
	Top quartile		Below top quartile	
MMCS x Crisis	0.250***	0.793***	0.0992	-0.278
	(2.64)	(4.75)	(1.17)	(-1.43)
MMCS	-0.191	-0.114	-0.114	0.478
	(-1.22)	(-0.85)	(-0.85)	(1.38)
Crisis	-0.0228*	-0.0653***	-0.0898***	-0.0430*
	(-1.65)	(-3.40)	(-6.04)	(-1.79)
Leverage		-0.110**		-0.340***
		(-2.05)		(-3.22)
Market Share	0.0773	0.0692	0.127**	0.214***
	(1.13)	(0.83)	(2.14)	(2.95)
Market Dependence	0.0989**	0.281	-0.0224	0.0587
	(2.05)	(1.32)	(-0.50)	(0.33)
Total Sales	0.0488***	0.0539***	0.0376***	0.0493***
	(10.94)	(8.39)	(7.43)	(6.59)
Private firm included	Yes	No	Yes	No
Market-industry FE	Yes	Yes	Yes	Yes
Observation	8255	5460	7779	4420

B: Count-based multimarket contact measure (MMCC)

	Rival's leverage level			
	Top quartile		Below top quartile	
MMCC x Crisis	0.637***	0.876***	-0.512	-1.326*
	(5.73)	(6.56)	(-1.06)	(-1.75)
MMCC	-0.345	-0.642	0.582*	0.853**
	(-1.14)	(-1.50)	(1.96)	(2.03)
Crisis	-0.0670***	-0.0861***	-0.0203	0.0704
	(-4.36)	(-4.81)	(-0.39)	(0.83)
Leverage		-0.110**		-0.343***
		(-2.04)		(-3.36)
Market Share	0.0863	0.0745	0.0930	0.181**
	(1.26)	(0.90)	(1.56)	(2.52)
Market Dependence	0.0969**	0.320	-0.0197	0.0316
	(2.02)	(1.51)	(-0.44)	(0.18)
Total Sales	0.0494***	0.0583***	0.0359***	0.0469***
	(11.21)	(9.43)	(7.14)	(6.44)
Private firm included	Yes	No	Yes	No
Market-industry FE	Yes	Yes	Yes	Yes
Observation	8255	5460	7779	4420

Table 1.11: Multimarket Contact (MMC) and Leverage Decisions

This table reports the results of a linear regression model with a dependent variable, leverage level. Firm-level multimarket measures ($MMCS\_firm$ and MMC_firm) are defined as $\sum_j MMCS_{ij} \cdot MMCS_{ji}$ and $\sum_j MMCC_{ij} \cdot MMCC_{ji}$. (See Table 1.4 for the definitions of *MMCS* and *MMCC). Book Leverage* is measured as the book debt over the book value of the total assets, *Market Leverage* is book debt over market value, *Net Book Leverage* is book debt minus cash and marketable securities over total assets, and *Net Market Leverage* is book debt minus cash and marketable securities over market value. See Table 1.3 for the definitions of the other independent variables. All independent variables are one year lagged and standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

	Dependent variable							
	Book Leverage		Market Leverage		Net Book Leverage		Net Market Leverage	
MMCS_firm	-0.851*		-0.365		-1.197**		-0.723	
	(-1.90)		(-0.81)		(-2.33)		(-1.47)	
MMCC_firm		-1.058**		-0.626		-1.576***		-1.053**
		(-2.42)		(-1.42)		(-3.15)		(-2.19)
Sales	0.0610***	0.0585***	0.0268***	0.0233**	0.0766***	0.0720***	0.0363***	0.0320***
	(6.07)	(5.67)	(2.66)	(2.25)	(6.68)	(6.07)	(3.29)	(2.81)
Sales Growth	0.0831	0.0832	0.218***	0.218***	0.168**	0.168**	0.248***	0.248***
	(1.43)	(1.42)	(3.71)	(3.70)	(2.52)	(2.50)	(3.85)	(3.83)
Profitability	-0.588***	-0.571***	-1.187***	-1.172***	-0.978***	-0.951***	-1.268***	-1.247***
	(-2.98)	(-2.89)	(-5.94)	(-5.86)	(-4.34)	(-4.18)	(-5.80)	(-5.68)
Market to Book	-0.0326**	-0.0309**	-0.0707***	-0.0700***	-0.0380**	-0.0357**	-0.0667***	-0.0652***
	(-2.52)	(-2.37)	(-5.40)	(-5.32)	(-2.57)	(-2.38)	(-4.65)	(-4.52)
Tangibility	0.0748	0.0644	0.154*	0.144*	0.191**	0.173*	0.223**	0.209**
	(0.95)	(0.82)	(1.94)	(1.82)	(2.13)	(1.92)	(2.57)	(2.40)
Avg Stock Return	-0.0545	-0.0570	0.00254	-0.000645	-0.0449	-0.0496	-0.00829	-0.0123
	(-0.95)	(-0.99)	(0.04)	(-0.01)	(-0.69)	(-0.75)	(-0.13)	(-0.19)
Observation	232		231		232		231	

Table 1.12: Leverage Changes Depending on the Multimarket Contact (MMC) Changes Caused by Rival's M&A

This table reports the results of a linear regression model with a dependent variable, leverage changes. Multimarket contact changes (i.e., $\triangle MMCS$, $\triangle MMCC$) are calculated in two steps: 1) firms acquiring other firms (including the purchase of stores from other firms) are identified in each industry in each year, 2) the changes of multimarket contact of those firms with the other firms before and after the M&A event are calculated (i.e., $\triangle MMCS = MMCS_{after\ rival's\ M\&A} - MMCS_{before\ rival's\ M\&A}$ and $\triangle MMCC = MMCC_{after\ rival's\ M\&A} - MMCC_{before\ rival's\ M\&A}$, and see Table 1.4 for the definitions of $MMCS$ and $MMCC$). All other independent variables are constructed at the change level before and after the M&A event (i.e., $\triangle X = X_{after\ rival's\ M\&A} - X_{befire\ rival's\ M\&A}$, and see Table 1.3 for the definitions of the independent variables. All dependent variables are calculated in the following year after the M&A event (i.e., $\triangle Y = Y_{t+1} - Y_t$ where t is the year of the M&A event). Standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

	Dependent variable							
	△Book Leverage		△Market Leverage		△Net Book Leverage		△Net Market Leverage	
△MMCS	-0.143**		-0.0415		-0.170*		-0.0337	
	(-2.21)		(-0.34)		(-1.92)		(-0.27)	
△MMCC		-0.302		-0.162		-0.313		-0.126
		(-1.11)		(-0.50)		(-1.00)		(-0.38)
△Sales	0.126	0.123	0.0891	0.0885	0.0775	0.0735	0.0657	0.0651
	(1.18)	(1.18)	(0.91)	(0.91)	(0.68)	(0.67)	(0.69)	(0.69)
△Profitability	-0.448	-0.448	-0.0598	-0.0529	-0.456	-0.461	0.0316	0.0367
	(-0.83)	(-0.87)	(-0.10)	(-0.09)	(-0.83)	(-0.88)	(0.05)	(0.06)
△Market to Book	-0.00881	-0.00745	-0.00530	-0.00472	-0.0103*	-0.00881	-0.00642	-0.00596
	(-1.59)	(-1.25)	(-0.79)	(-0.68)	(-1.68)	(-1.33)	(-0.97)	(-0.86)
△Tangibility	0.299	0.285	0.195	0.184	0.130	0.117	0.0537	0.0449
	(1.09)	(1.13)	(0.49)	(0.48)	(0.41)	(0.39)	(0.14)	(0.13)
△Avg Stock Return	-0.0102	-0.00979	0.0323	0.0321	0.0200	0.0206	0.0486	0.0485
	(-0.68)	(-0.63)	(0.85)	(0.86)	(0.78)	(0.81)	(1.18)	(1.19)
Observation	126	126	125	125	126	126	125	125

Table 1.13: Robustness Check: Effect of Multimarket Contact (*MMC*) on Expansion Interacting with a Rival's Leverage Changes

This table reports the results of a linear probability model estimation where the value of a dependent variable is e*xpansion (=1)* or *no change (=0)*. See Table 1.4 for the definitions of *MMCS* and *MMCC*, and Table 1.3 for the other independent variables. *Leverage* and *Total Asset* are lagged one year. *MMCS, MMCC*, *Market Share,* and *Market Dependence* are one-year lagged when the dependent variable is measured in the even-numbered years, and two-year lagged if the dependent variable is measured in the odd-numbered years because of data limitations (See Section 1.4.1 for more details). ***Significant at 1%; **significant at 5%; *significant at 10%.

	Rival's leverage changes Top quartile				Rival's leverage changes Below top quartile			
MMCS	0.0354***	0.0161	0.0101*	0.0236**	0.0125	0.00103	0.0161	0.00528
	(4.63)	(1.06)	(1.79)	(2.43)	(1.37)	(0.19)	(1.06)	(0.70)
Leverage		-0.0919**		-0.203**			-0.0919**	0.0669
		(-2.23)		(-2.32)			(-2.23)	(0.79)
Market Share	0.00193	0.0112	0.0347***	0.0406***	0.0108	0.00686	0.0112	0.00142
	(0.22)	(0.98)	(3.92)	(3.92)	(1.58)	(1.10)	(0.98)	(0.20)
Market Dependence	0.00741	-0.0168	-0.00360	-0.0228	0.00948	-0.0222	-0.0168	0.0276
	(1.31)	(-0.85)	(-0.32)	(-0.64)	(1.44)	(-1.57)	(-0.85)	(0.63)
Total Sales	0.104***	0.0723***	0.0758**	0.166***	0.0952***	-0.342***	0.0723***	-0.0825***
	(11.88)	(11.11)	(2.17)	(5.38)	(11.45)	(-9.44)	(11.11)	(-2.66)
Private firm included	Yes	Yes	No	No	Yes	Yes	No	No
Fixed effect	Market-year-industry		Market-industry , Year, and Firm		Market-year-industry		Market-industry , Year, and Firm	
Observation	9096	6194	9096	6194	8934	4950	8934	4950

Chapter 2

Cash Flow Shocks and Predatory Behavior

2.1 Introduction

Researchers have studied the aggressive behavior of corporations in an attempt to take advantage of financially weak competitors. More specifically, Chevalier (1995a,b); Campello (2003, 2006) conduct investigations of firms investing aggressively when their competitors are highly leveraged, while Opler and Titman (1994) focus their research on financially constrained firms losing their large market share to their peers. The basic premise is that financial constraints can restrict firms' ability to compete. This financial strain gives their competitors the incentives to compete aggressively to obtain a better competitive position in the future.

In this chapter, I investigate how internally generated funds affect product market competition. While many studies have focused on how product market decisions are affected by external financing conditions (e.g., leverage), few papers have investigated the impact of the internal financing condition. For instance, Bolton and Scharfstein (1990) illustrate how internal capital availability affects firms' ability to predate on peers and deter their own predation. In line with this literature, I explore the idea that a firm's limited amount of internal funds, particularly arising from cash flow shortfalls, induces aggressive behavior in competitors by leading the firm to become a target of predation.

One of the many challenges in examining the impact of competitor's cash flow shortfalls on product market competition is that competitors' cash flow changes are potentially endogenous with respect to a firm's behavior. I address this endogeneity problem in several ways. First, I focus on retail store chains operating across many geographical markets and investigate a firm's reaction in a given market when its competitors face cash flow shortfalls *outside* of that market. Since the shock reducing competitors' cash flows occurs outside of the focal market, it is less likely that the firm responds to the shock, except through its competition with its peers in that market.

Second, I focus on the 2008-2009 financial crisis period, in which retail store chains were hit by a negative demand shock which was hardly expected ex ante. More importantly, the magnitude of the decline in demand varied across the local markets. This variation in the local economic condition provides enough cross-sectional differences in cash flow shortfalls across firms depending on their store location distribution. In addition, since firms faced difficulty in obtaining additional external financing, the impact of internal funds on deterring or engaging in predation was large.

I begin my investigation by collecting store location and store-level sale data for grocery stores, discount stores, department stores, wholesale clubs, and pharmacies. I focus on these industries, because they sell relatively undifferentiated products at low margins, which makes their profitability vulnerable to aggressive behavior that increases competitive pressure in the short-run. In addition, firms in these industries typically operate across many local markets, which enables me to

compare firm's decisions in different markets with different economic and competitive environments.

I then collect data on local economic conditions, such as population, unemployment, income, house ownership cost, house value, and rent. These variables will be used to estimate the demand on retail products in each local market, and ultimately to measure firms' cash flow changes in each market.

To analyze my data, I adopt an instrumental variable approach. I first define local markets at the level of the first three digits of the five-digit zip codes. I then measure a firm's market dependence, which captures how much of a percentage of the firm's sales is generated from each market in each year using store-level sales data. The changes in cash flows generated by each firm in each market are instrumented by interacting a lagged-market dependence measure with the measures capturing the local economic conditions. This serves as a useful instrument because both the lagged-market dependence and the local market conditions are rarely affected by the firm's decisions in the current year.

I find that a firm expands more in a given market when it competes with peers that are losing more of their cash flows in the other markets. A 10% decrease in competitors' cash flows on average leads to an economically significant increase in the probability of expansion by 1.9%. This result calls for further investigation, as a local market may not be completely independent from another market.

The economic condition in a market can be correlated with that of its neighboring markets. Thus, I conduct a further test to try to address this concern. I measure competitors' cash flows generated outside of a given market, excluding the

sales from the markets located in the same states with the focal market. The negative relationship between expansion and the peer's cash flow changes still holds but the magnitude is smaller. Since many retail store chains tend to be clustered in a few states, excluding any cash flow changes from the same state minimizes the effect of a cash flow shock that a firm faces during a crisis.

The next step is to extend the baseline analysis to an external financing dimension. During the crisis, firms faced tighter external financing constraints. In Chapter 1, I illustrate that an already highly-leveraged firm before the crisis is more likely to be a victim of predation during the crisis. Thus, if an already highly-leveraged firm was hit by a negative cash flow shock, it is especially more vulnerable to predation when compared to a firm hit by the same shock, but maintaining a conservative capital structure. I find that the impact of the leverage-weighted cash flow of rivals decrease on expansion is much more significant than that of the baseline analysis (i.e., the effect of the non-leverage-weighted cash flow changes of rivals).

Finally, I examine the impact of the competitive overlap on firms' aggressive behavior in relation to their cash flow changes. As I illustrate in the model in Section 1.2, a firm should behave more aggressively against a financially weak competitor if it faces that competitor in many other markets. The intuition is that a firm with a more competitive overlap can possibly capture more of the future monopoly rents from driving the competitor into financial distress. This prediction should hold, regardless of what the source of the competitor's weakness is if it increases the likelihood of being pushed towards financial distress. Thus, I expect a greater impact of the competitor's cash flow shortfalls on the firm's expansion decision if

they have a higher degree of competitive overlap. Consistent with the prediction, the result is stronger when the decrease in the competitors' cash flows is measured by giving more weight to the decline in the cash flow of rivals, if the rival has a greater degree of competitive overlap with a reacting firm.

This chapter adds new evidence to the literature which finds that financially vulnerable firms experience more aggressive behavior from their competitors. For example, Chevalier (1995a,b) shows that when a grocery store chain becomes highly-leveraged as a result of a leveraged buyout (LBO), its competitors are more likely to enter or expand into the LBO firm's local markets, and prices fall in the markets in which low-leveraged rivals compete with an LBO firm, suggesting that the rival lowers prices to induce the LBO firm's exit. Similarly, Campello (2003, 2006) finds the sales growth of a highly-leveraged firm to be lower than its peers in the industries in which the peers are relatively unleveraged during recessions. While these papers find evidence on how a firm's external financing condition (i.e., leverage) affects the behavior of its peers, I find evidence on how the internal financing condition has an impact on it.

This chapter has a similar spirit to a strand of literature which finds that internal funds enhance a firm's competitive strength in product market competition. Bolton and Scharfstein (1990) argue that a firm's internal capital availability is an important determinant of its survival , because it enables the firm to mitigate the risk of predation. Similarly, Froot *et al.* (1993) suggest that a negative shock to cash flows can make a firm reduce its investment when external financing is costly, while a firm with internal funds attempts to gain market share by

increasing investment. Weinstein and Yafeh (1995) support this idea, illustrating that group-affiliated firms compete more aggressively than stand-alone firms against competitors' entry. Khanna and Tice (2000, 2001) also find that multi-segment incumbents respond more efficiently than stand-alone incumbents to Wal-Mart's entry into the discount department store industry.

These studies focus on the role of internal capital markets on product market competition by comparing firms affiliated with corporate groups or multi-segment firms to stand-alone peers. However, it can be problematic because a group-affiliated firm is systematically different from stand-alone entities. Rather, this chapter compares a firm to its peers in the case where both the firm and its peers are operating across many local markets, but have different amounts of internal funds. Thus, I focus more on the impact of the internal funds, than on the internal capital markets. This approach is similar to the approach in Boutin *et al.* (2013), who investigate the impact of group cash holdings on firm's entry decision into the French manufacturing industries. They find that entry into the manufacturing industries is negatively related to the group cash holdings of the incumbent firms; this effect is smaller when the entrant is affiliated with cash-rich groups.

The organization of the rest of this chapter is as follows. Section II introduces the data, Section III explains the empirical specification, Section IV presents the empirical evidence, and Section V concludes and provides recommendations for future research.

2.2 Data

2.2.1 Data Sources and Sample Construction

To test the predictions, I focus on five retail industries: grocery stores, wholesale clubs, department stores, discount stores, and pharmacies.[1] These industries offer several advantages for studying competition among firms. In these industries, firms are less likely to compete by differentiating products than other retail industries, as they sell many of the same products and face fairly similar demand changes over time.[2] Rather, they tend to compete with the rivals by reducing prices, opening more stores near the competitors' stores, or advertising more.

The data comes primarily from two sources: Reference USA and Census American Community Survey. Reference USA is a database that contains detailed information on almost every retailer in the US at the establishment level. It consists of snapshots of detailed store information, such as store name, address, phone number, sales volume, the number of employee, parent company information, industry classification, and the population in which the store is located (at the 5 digit zip code level). I use snapshots of this information at the end of the 2007, 2009, and 2011 for all stores in each industry with at least 100 employees.[3]

I cleaned the data, making store names and parent firm names consistent;

[1] SIC codes for grocery stores , wholesale clubs , department stores, discount stores, and pharmacies are 541105, 531110, 531102, 591205, and 573117, respectively.

[2] To some extent, there is product differentiation in these industries. For example, many grocery stores sell private label products (those manufactured or provided by a manufacturer for offer under a retailer's brand), and some department stores may sell products from more luxurious brands than others.

[3] My sample is biased towards large stores and the number of observations is unbalanced across different industries. For example, I have fewer observations in the pharmacy industry than in the other four industries because individual pharmacies tend to have fewer employee.

then I eliminated multiple store observations for the same parent firm at a given address in the same year. I manually matched parent firms to stores using the Corporate Affiliations database when information was missing from the Reference USA data, or if stores with the same name showed different parent firm names in the same year.[4] If the records of a store were dropped from the database in certain years and then reappeared in later years, I filled in the missing records. [5] Table 1.1 in Chapter 1 illustrates that public firms tend to own more stores than private firms. The number of stores increased the most in 2007, while it decreased in 2009 and 2011, following the onset of the financial crisis.

I obtain US county-level data which is closely related to the local economic conditions, from the Census American Community Survey (ACS). The data is based on a annual survey of 3 million US residents from 2007 to 2011.[6] I use the information on total population, the unemployment rate for the population for 16 years old, and inflation adjusted per capital income. I expect demand in a local market to be positively related to its population and to income, while I expect it to be negatively associated with unemployment.

I use real estate related information in identifying the local economic conditions because there was a significant drop in real estate prices during the 2008-2009

[4]In some cases, stores with the same name are owned by different parent firms in different regions due to store-level buyouts.

[5]These missing records may be partly due to the screening rule of 100 employee.That is, a store may be dropped from the data because its employee headcount falls below 100, but it will reappear later if its headcount later exceeds 100 again.

[6]The disadvantage of ACS data is that it is based on survey data which can be inaccurate. Regardless, ACS county-level income data illustrates similar patterns with IRS income tax data over time.

financial crisis; this could affect consumer's purchasing power. More specifically, I include the information on median house values for all owner-occupied housing units, the median gross rent, and the median monthly owner expenses as a percentage of household income. The monthly owner expenses as a percentage of household income provide information on the cost of monthly housing expenses, which includes the sum of payments for mortgages, deeds of trust, contracts to purchase, real estate taxes, utilities, and fuel.[7] I expect that house values and rent have a positive effect on local demand and house owner expenses are negatively associated with the demand.

I construct variables which capture the *changes* in demand in the local markets; percentage changes are calculated for population, income, house value, rents, the unemployment rate, and house owner expenses over a year. Table 2.2 presents the summary statistics of these variables. In 2009, the unemployment rate significantly increased, and the decline in income and house values were substantial. The decreasing trend continued in 2010 for income and house values. In 2011, the economic condition recovers with an increasing income and decreasing unemployment, while the house values continued to drop, on average.

Firm's financial data was obtained from the Compustat annual database from 2007 to 2011. Table 2.1 reports the summary statistics of these variables. *Leverage* is measured as the book debt over the book vale of the total assets, *Sales* is sales in logs, *Cash Holdings* is measured as the ratio of cash and marketable securities to net assets, and *Tobin's Q* is defined as the sum of the book value of

[7]See https://www.census.gov/acs/www/Downloads/QbyQfact/monthly_cost.pdf for details.

assets plus the difference between the market value and book value of equity minus the deferred taxes over the book value of assets.

2.2.2 Definitions of Local Markets and Aggressiveness

I define a local market at the level of the first three digits of the five-digit zip codes following Khanna and Tice (2005). They suggest that the area covered by a three-digit zip code appears to be a population center and retail stores tend to be clustered around such centers. The size of this area is smaller than the size of the metropolitan statistical area (MSA).[8] In my sample, there are 841, 830, and 829 different local markets in 2005, 2007, and 2011, respectively, and four stores that compete with each other in a market-industry on average.

I measure firms' aggressive behavior in a given market using expansion (i.e., store opening). Price competition is not explored in this chapter because it is difficult to collect firms' market-level pricing data.[9] However, firms in these industries may prefer expansion over price competition; expansion tends to preempt the entry of other competitors after the weak firm is eliminated from the market. Expansion is defined if a new store appears in Reference USA that was not present in the previous year.[10]

[8]Some studies define a local market at the metropolitan statistical area (MSA). It may more coincide with identifiable physical features such as population than ZIP Codes but is too big to ensure that stores in this area compete directly with each other.

[9]While some previous studies have investigated price competition using city-level price index or scanner data, they are very limited. A city-level price index hardly provides us with enough information on which firm triggers the price changes; scanner data is only available for a few firms in a few specific markets, although it offers very detailed pricing information, when compared to a city-level price index.

[10]Although the data obtained from Reference USA is biennial (2003, 2005, 2007, 2009 and 2011)

2.3 Hypotheses and Empirical Specifications

I test whether a firm is more likely to compete aggressively in a market which it shares with competitors, when its competitors have a limited amount of internal funds. I focus on the changes in internal funds through the cash flow changes; these are measured using sales information at the store level. I also identify aggressive behavior as an expansion decision.

Examining a firm's behavior responding to a competitor's cash flow shortfall is challenging, because firms' decisions are affected by many unobserved market characteristics, and they are correlated with each other. For instance, if a firm loses customers due to its poor product quality, we may observe both a firm's low cash flows and a competitor's expansion responding to the increase in demand for its product.

To deal with the potential endogeneity problem, I use a similar approach to that of Lamont (1997), who examines the investment of the non-oil subsidiaries of oil companies during the 1986 oil shock, which allows him to isolate the effect of internal funds on investments from that of business profitability. I investigate the firm's reaction in a given market, when its competitors face cash flow shortfalls *outside* of that market. Since the shock reducing competitors' cash flows occurs outside of the focal market, it is less likely that the firm responds to the shock, except through its competition with its peers in that market.

I focus on the 2008-2009 financial crisis period. During this period, retail

it provides the date when records are added, which makes it possible to pin down the year of new entry.

store chains experienced a negative demand shock, which was hardly expected in advance. Campello *et al.* (2010), Campello *et al.* (2011), and Almeida *et al.* (2011) suggest that the 2008-2009 financial crisis offers a good setting for studying the effects of financial condition on investments because while the shock significantly affected firms' decisions the original shock was less likely to be related to corporate financing environment. Moreover, the magnitude of the demand shock varied across local markets, which provided enough cross-sectional differences in cash flow shortfalls across firms, depending on the distribution of the store locations.

The basic specification is as follows:

$$\begin{aligned} Expansion_{i,m,t} &= \beta_1 \Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t} \\ &+\beta_2 \Delta Own\,Cash\,Flow\,from\,Other\,Markets_{i,m,t} \\ &+\Delta Market\,Condition_{m,t}\lambda + X_{i,m,t-1}\delta_1 + +Z_{i,t-1}\delta_2 \\ &+\alpha + \epsilon_{i,m,t} \end{aligned} \tag{2.3.1}$$

where $Expansion_{i,m,t}$ is firm i's expansion decision in market m in year t, and $\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$ is the average cash flow changes generated in outside market m across all competitors operating in market m (i.e., $\frac{1}{\sum_{j\neq i} \mathbf{1}_{j\in J_m}} \left(\sum_{j\neq i} \mathbf{1}_{j\in J_m} \cdot \sum_{n\neq m} \Delta Cash\,Flow_{j,n,t}\right)$, where $\mathbf{1}_{j\in J_m}$ is an indication function which equals to 1 if firm j is operating in market m, and $\sum_{n\neq m} \Delta Cash\,Flow_{j,n,t}$ is firm j's percentage change in cash flows from all of the other markets in year t). $\Delta Own\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$ is firm i's percentage change in cash flows from all of the other markets in which it is operating in year t (i.e., $\sum_{n\neq m} \Delta Cash\,Flow_{i,n,t}$). $\Delta Market\,Condition_{m,t}$ is the change in economic condi-

tions, such as population, unemployment, house value, gross rent, and house owner expenses in market m in year t. $X_{i,m,t-1}$ controls for lagged firm-market level characteristics (e.g., market share and market dependence), and $Z_{i,t-1}$ for lagged firm level characteristics (e.g., total sales, leverage, cash holdings, and Tobin's Q).

Since the firm's investment decision and its peer cash flow changes are simultaneously observed, it is possible that a firm's investment decision in a given market affects its peer's business decisions, and thus, changes their cash flow distribution across markets. Thus, I conduct a two-stage least squares (2SLS) estimation of Eq. (2.3.1), in which the change in competitor j's cash flows generated in market n is instrumented by the interaction of firm j's lagged-market dependence on market m and the changes in the local economic conditions in market n, i.e.,

$$\begin{aligned}&\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t} = \\ &\frac{1}{\sum_{j\neq i}\mathbf{1}_{j\in J_m}}\left(\sum_{j\neq i}\mathbf{1}_{j\in J_m}\cdot\sum_{n\neq m}Market\,Dependence_{j,n,t-1}\cdot\Delta Market\,Condition_{n,t}\right)\Gamma \\ &+\kappa+\eta_{i,m,t}\end{aligned} \tag{2.3.2}$$

where $\mathbf{1}_{j\in J_m}$ is an indication function which equals to 1 if the store of firm j is located in market m, $Market\,Dependence_{j,n,t-1}$ is firm j's sales in market n divided by its total sales over all markets, and $\Delta Market\,Condition_{n,t}$ is the change in economic conditions in market n. The instrument is capturing the *expected* cash flows generated from market n using information from the previous year on how much of a percentage of firm j's sales is generated from market n and the current

economic conditions in market n. This serves as a useful instrument because both the lagged-market dependence and the local market conditions are less likely to be affected by the firm's decisions in the current year.

I extend the baseline analysis to the external financing dimension. During the crisis, firms faced tighter external financing constraints because they had a difficult time rolling over the existing debt and raising additional capital. In Section 1.4.2, I illustrate the evidence that an already highly-leveraged firm before the crisis is more likely to be a victim of predation during the crisis. Thus, I expect that if an already highly-leveraged firm was hit by a negative cash flow shock, it is significantly more vulnerable to predation, when compared to a peer hit by the same shock, but maintaining a conservative capital structure.

I newly define $\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$ as:

$$\sum_{j \neq i} Weight_{j,before\,crisis} \cdot \mathbf{1}_{j \in J_m} \cdot \sum_{n \neq m} \Delta Cash\,Flow_{j,n,t} \tag{2.3.3}$$

where $Weight_{j,before\,crisis}$ equals to $leverage_{j,before\,crisis}$ if $\sum_{n \neq m} \Delta Cash\,Flow_{j,n,t} \leq 0$, and $1 - leverage_{j,before\,crisis}$ if $\sum_{n \neq m} \Delta Cash\,Flow_{j,n,t} > 0$. These weights are constructed in a way that provide more (less) weight to firm j's cash flow decrease (increase) if it is more leveraged. Then, $\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$ is instrumented by $\sum_{j \neq i} Weight_{j,before\,crisis} \cdot \mathbf{1}_{j \in J_m} \cdot \sum_{n \neq m} Market\,Dependence_{j,n,t-1} \cdot \Delta Market\,Condition_{n,t}$, and Eq. (2.3.1) is estimated.

Finally, I examine the impact of competitive overlap between firms on their aggressive behavior in relation to their cash flow changes. As I illustrate in the model in Section 1.2, a firm should behave more aggressively against a financially

weak competitor if it faces that competitor in many other markets. The intuition is that a firm with more competitive overlap can possibly capture more of the future monopoly rents from driving the competitor into financial distress. This prediction should hold, regardless of what the source of the competitor's weakness is if it increases the likelihood of being pushed towards financial distress. Thus, I expect a greater impact from the competitor's cash flow shortfalls on a firm's expansion decision if they have a higher degree of competitive overlap.

Now, $\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$changes to:

$$\sum_{j \neq i} MMCS_{i,j,t-1} \cdot \mathbf{1}_{j \in J_m} \cdot \sum_{n \neq m} \Delta Cash\,Flow_{j,n,t} \tag{2.3.4}$$

where $MMCS_{i,j,t-1}$ is the sales-based multimarket contact measure, which captures the competitive overlap between firm i and firm j in year $t-1$. $MMCS_{i,j,t-1}$ is measured in year $t-1$ as $\sum_m \left(\frac{s_{im}}{S_i}\right)\left(\frac{s_{jm}}{S_m}\right)$, where s_{im} (s_{jm}) is the sales of firm i (firm j) in market m, S_i is firm i's total sales across all markets, and S_m is the sum of sales of all firms in market m.[11] Then, $\Delta Competitor\,Cash\,Flow\,from\,Other\,Markets_{i,m,t}$ is instruments by $\sum_{j \neq i} MMCS_{i,j,t-1} \cdot \mathbf{1}_{j \in J_m} \cdot \sum_{n \neq m} Market\,Dependence_{j,n,t-1} \cdot \Delta Market\,Condition_{n,t}$.

[11] See Section 1.3.3 for more details.

2.4 Results

2.4.1 Effect of Competitors' Cash Flow Changes on a Firm's Expansion Decisions

2.4.1.1 Ordinary Least Squares (OLS) Regressions

The first three columns in Table 2.4 present the results from estimating the specification in Eq. (2.3.1) using the expansion decision of a firm in a given market when it is faced with a decline in competitors' cash flows generated from the other markets during the financial crisis. I estimate the model separately for the expansion decisions of for all firms in the group (first and fourth columns), for those of private firms (second and fifth columns), and for those of only publicly-traded firms (third and sixth columns). In the last case, I also control for one year-lagged firm-level financial characteristics which may affect the firm's expansion decisions (e.g., leverage, cash holdings, and Tobin's Q).

The first column shows that a 10% decrease in the average competitors' cash flows generated from outside of a given market is associated with a 1.9% rise in the probability that the firm expands in that market. The third column illustrates that this relationship is slightly smaller (1.5%), if I estimate the model by only examining the expansion decisions of the publicly-traded firms. These results occur because more of the financial characteristics of firms are controlled for publicly-traded firms. These estimates support the hypothesis that firms behave more aggressively in a market in which they compete with cash flow constrained competitors.

A private firm's expansion is not significantly related to competitors' cash flow changes while positively related to its own cash flow changes at the 1% signif-

icance level; a 10% increase in own cash flows generated in other markets gives a rise to the probability of expansion by 20%. These results occurs, because private firms have limited access to external financing, which makes them less aggressive in predatory behavior, and makes their investments more sensitive to internal funds.

The fourth through sixth columns present the results from the regressions with the same specification in the first three columns for the period after the crisis.[12] The positive effect of the competitor's cash flow decrease on the firm's expansion does not hold. This confirms that the financial crisis is a nice laboratory for examining the effect of competitor's cash flow changes on the firm's predatory behavior by providing unexpected shock to peers' cash flows. It is also noteworthy to point out that the effect of the firm's own cash flow changes on expansion is greater and more economically significant after the crisis period, indicating that a firm's expansion decision is more sensitive to its own cash flows, than that of its competitor.

Consistent with the existing literature, firms' investment is positively related to demand changes in a market. Firms tend to expand more in a market with an increasing population, decreasing unemployment, increasing average income, and decreasing expenses for house owners, all of which capture an increase in demand. The effect of real estate values on expansion is mixed. The increase in house prices is negatively related to the expansion while it is positively related to rent changes. This may be because the real estate prices affect the firm's business through both

[12]The estimation before the crisis can not be conducted due to the data limitation. The ACS 3-year data from the Census are only available from the year of 2007; this is used to calculate the changes in economic condition during the year of 2008. However, when I conduct the same test using ACS 1-year data, which is available from the year of 2006, for the expansion decision in the year of 2007, this relationship does not hold.

the demand and supply side. The decline in the real estate price may have either a positive or negative effect on a firms' operating cost, depending on whether the firm are owns or leases the stores.

2.4.1.2 Two Stage Least Squares (2SLS) Regressions

Table 2.5 illustrates the results from an instrumental variable approach using the two stage regressions with the specification presented in Equations (2.3.2) and in (2.3.1). Panels A and B represent the first-stage and second-stage regression results, respectively. As in the OLS regressions in Section 2.4.1.1, I run regressions using the same specification for the period during the crisis (first through third columns) and after the financial crisis (fourth through sixth columns), and estimate the model separately for all firms in the group (first and fourth columns), for those of private firms (second and fifth columns), and for those of only publicly-traded firms (third and sixth columns). In the estimation for publicly-traded firms, I also control for one year-lagged firm-level financial characteristics, which may affect the firm's expansion decision (e.g., leverage, cash holdings, and Tobin's Q).

The results are similar to the OLS regressions in Table 2.4. The first column illustrates that a 10% decline in the average competitors' cash flows generated from outside of a given market leads to an economically significant increase in the probability of a firm's expansion by 1.9%. This relationship is not economically significant if I only estimate the model for publicly-traded firms (second column), implying that private firms tend to react more sensitively to competitor's cash flow changes. For the period after the crisis period, the competitor's cash flow changes

do not have a significant effect on expansion.

Panel B reports the estimates from the first-stage of the 2SLS estimations. The excluded instruments are the average changes in population, unemployment, income, house value, rent, and house owner expenses across all the *other* markets in which a competitor is operating. These instruments are relevant to competitor's cash flow changes in the *other* markets with significant first-stage F-statistics, 12.34, at the 5% level. The first column shows that the decrease in house owner expenses and the increase in house values, which indicate a higher demand outside of a focal market, are associated with a rise in competitor's cash flows generated in those markets. However, the changes in unemployment in those markets are positively related to their cash flow changes. This may be due to the potential correlation between the unemployment changes in the focal markets and that of the other markets. Indeed, Hansen's J-tests fail to reject the null hypothesis that the instruments are uncorrelated with the error term in the second stage regression.

2.4.1.3 Market Interdependency

The results in Table 2.5 calls for further investigation of the interdependency across the local markets. For example, the economical condition in a market can be correlated with that of neighboring markets. In attempt to address this concern, I conduct a further tests by measuring competitors' outside cash flows (i.e., $\triangle$*Competitor Cash Flow from Other Markets* in Table 2.5) in a different way. For each competitor operating in a given market, I measure its average cash flow changes generated from outside of that market by excluding the sales information from the

markets located in the same state with the focal market. Then, I take an average of those cash flow changes across all competitors in that market.

Table 2.6 reports the results from the OLS (first through third columns) and 2SLS (fourth through sixth columns). The negative relationship between the expansion and peer's cash flow changes holds in the OLS by a smaller magnitude (-0.154), and the relationship is not economically significant in the 2SLS. These results occur because many retail store chains tend to be clustered in a few states; excluding any cash flow changes from the same state minimizes the effect of a cash flow shock that a firm faces during a crisis.

Another potential source of market interdependency is the market overlap among firms. If a pair of firms are operating in the same markets, they are more likely to make decisions that take into account each other's actions in all the markets in which they are competing. Thus, if firms are operating in many of the same markets, their expansion decision in a market can be endogenous with respect to competitors' cash flow changes in other markets. This issue is further discussed in Section 2.8.

2.4.2 Effect of Competitors' Cash Flow Changes and Leverage on a Firm's Expansion Decisions

Table 2.7 presents the estimation results for Eq. (2.3.1) with newly defined $\triangle$*Competitor Cash Flow from Other Markets* following Eq. (2.3.3). The first column reports the estimates from the OLS regression and the second column presents the estimates of the 2SLS regression; the results of both the OLS and 2SLS are only for

publicly-traded firms. The results of the OLS and 2SLS are comparable to that of the third column in 2.4 and the third column in Table 2.5, respectively.

The coefficient on the leverage-weighted cash flow changes of competitors is more significant than that of non-leverage-weighted cash flow changes of competitors in both the OLS and 2SLS regressions.[13] In particular, the significance increase is large in the 2SLS regressions; the impact of a competitor's cash flow changes on expansion is significant at the 5% level in 2.7, while it is not economically significant in 2.5. These results support my prediction that the cash flow decrease of an already highly-leveraged is more likely to be a victim of predation. This implies that firms strategically respond to their competitors' financial constraints, both in the external financing condition and the internal capital availability.

2.4.3 Effect of Competitors' Cash Flow Changes and the Competitive Overlap on a Firm's Expansion Decisions

Table 2.8 reports the estimation results for Eq. (2.3.1). Now, $\triangle$*Competitor Cash Flow from Other Markets* is defined as in Eq. (2.3.4). The first three columns report estimates from the OLS regression and the last three columns present that of the 2SLS regression. I estimate the model separately for all firms in the group (first and fourth columns), for those of private firms (second and fifth columns), and for those of only publicly-traded firms (third and sixth columns). The first three columns of Table 2.8 are comparable to the first three columns in 2.4; the last three

[13]Note that the magnitude of the coefficient cannot be compared between the regression with leverage-weighted cash flows and that of non-leverage-weighted cash flows because the variable units are different.

columns can be compared to the first three columns in Table 2.5.

The coefficient on the *MMCS*-weighted cash flow changes of competitors is more significant than that of the non-*MMCS*-weighted cash flow changes of competitors in all four cases: (1) OLS with all firms, (2) OLS with private firms, (3) OLS with publicly-traded firms, (4) 2SLS with all firms, (5) 2SLS with private firms, and (6) 2SLS with publicly-traded firms.[14] The coefficient on the *MMCS*-weighted cash flow changes of competitors in the 2SLS regression with publicly-traded firms is strongly significant, when compared to the baseline 2SLS regression result in Table 2.5. The formal is significant at the 1% level, while the latter is not economically significant. These results support the prediction that a firm should behave more aggressively against a competitor with a negative cash flow shock if it faces that competitor in many other markets. These findings support my results in Chapter 1 by providing additional evidence that a firm's predatory behavior against a financially constrained competitor is positively related to their competitive overlap.

In addition, these findings alleviate the concern of market interdependency, discussed in Section 2.4.1.3, which may arise from market overlaps among firms. That is, if firms are operating in many of the same markets, their expansion decision in a market can be endogenous with respect to the competitors' cash flow changes in other markets. The approach allows us to directly take into account the effect of competitive overlap, which is omitted in the baseline specification, on expansion in association with competitor's cash flow changes. The stronger effect

[14]Note that the magnitude of the coefficient cannot be compared between the regression with *MMCS*-weighted cash flows and that of non-*MMCS*-weighted cash flows because of the variable unit differences.

of the competitors' cash flow shortfalls on the expansion when we consider the competitive overlap, gives us some comfort in that, at least the potential endogeneity problem does work against us in the tests in the previous sections.

2.4.4 Effect of Competitors' Cash Flow Changes on a Firm's Retrenchment Decisions

In this section, I explore the idea that a positive shock to competitors' cash flows induces a firm's retrenchment in a market in which they compete. The intuition is that a firm may close stores or exit from a market in order to avoid competition with a financially-strengthened rival. The retrenchment can be either a reaction to competitors' aggressive behavior or a decision in anticipation of competitors' aggressive behavior.

The empirical specification is similar to Eq. (2.3.1) except that a dependent variable is $Retrenchment_{i,m,t}$ which equals to 1 if firm i closes stores in market m in year t. Table 2.9 illustrates the results from estimating this specification. I estimate the model separately for the expansion decisions of for all firms in the group (first and fourth columns), for those of only publicly-traded firms (second and fifth columns), and for those of only publicly-traded firms (third and sixth columns). In the last case, I also control for one year-lagged firm-level financial characteristics which may affect the firm's expansion decisions (e.g., leverage, cash holdings, and Tobin's Q).

The fourth column shows that a 10% increase in the average competitors' cash flows generated from outside of a given market is associated with a 1.6% rise in

the probability that the firm retrench from that market. This relationship is slightly smaller (1.1%), if I estimate the model by only examining the expansion decisions of the publicly-traded firms (third column), and the relationship is not significant for those of private firms. These results confirm that firms strategically respond to the changes in financial constraints of their competitors.

2.5 Conclusion

In this chapter, I investigate how internally generated funds impact product market competition. More specifically, I investigate the idea that firms compete aggressively when their competitors face cash flow shortfalls. Testing this idea is challenging because competitor's cash flow changes are potentially endogenous with respect to firm's behavior. To address this problem, 1) using store location data on retail store chains operating across many local markets, I investigate firm's reaction in a given market when its competitors face cash flow shortfalls *outside* of that market, 2) I focus on the 2008-2009 financial crisis period in which retail store chains were hit by a negative demand shock which was hardly expected in advance, and 3) I use a shock to local economic conditions which varies across markets and the different distributions of store location across firms as instruments for the changes in competitors' cash flows.

I find that a firm expands more in a given market in which it competes with rivals facing a more negative cash flow shock in other markets. In addition, I find that a firm facing tighter external financing constraints during the crisis, due to its high leverage, is more likely to be a victim of predation. Finally, I illustrate

the evidence that the impact of a rival's cash flow shortfalls on a firm's expansion decision is stronger when they have a higher degree of competitive overlap; these results are consistent with the perdition of my model in Chapter 1. To my best knowledge, this chapter is the first study to provide the evidence that a firm's cash flow shortfalls induce an aggressive behavior in rival firms. It contributes to the literature which find that financially vulnerable firms experience more aggressive behavior from their competitors by adding new evidence from internal financing vulnerability.

Nevertheless, it is important to be aware of the limitations that may follow from the empirical context of this study. Since local markets are interdependent, the economic condition in the other markets may not be an ideal instrument to capture the competitor's cash flow shock in those markets although I attempt to alleviate this problem in several ways. Research that uses instruments less subject to the market interdependency can offer cleaner evidence.

Table 2.1: Summary Statistics of Financial Variables and Multimarket Contact Measure

Leverage is measured as book debt over the book value of total assets, *Sales* is sales in logs, *Cash Holdings* is measured as the ratio of cash and marketable securities to net assets, and *Tobin's Q* is defined as the sum of book value of assets plus the difference between market value and book value of equity minus deferred taxes over the book value of assets. *Market* is defined as at the 3-digit-zip-code level. *Market Dependence* is a firm's sales in each market m divided by its total sales over all markets, and *Market Share* is the fraction of a firm's sales in a given market divided by the sum of all firms' sales in that market. $MMCS$ (sales-based multimarket contact measure) is defined as $\left(\frac{s_{im}}{S_i}\right)\left(\frac{s_{jm}}{S_m}\right)$ where s_{im} (s_{jm}) is sales of firm i (firm j) in market m, and S_i is firm i's total sales across all markets and $S_m$is the sum of sales of all firms in market m (i.e., $S_i = \sum_m s_{im}$ and $S_m = \sum_{\tilde{i}} S_{\tilde{i}m}$).

		Firm-year level variable				Market-firm-year level variable		Pair-year level variable
		Total Sales	Leverage	Cash Holding	Tobin's Q	Market Share	Market Dependence	MMCS
Grocery stores	Mean	8.572	0.607	0.114	2.038	0.288	0.073	0.351
	25th	7.815	0.487	0.017	1.181	0.091	0.001	0.238
	Med	8.404	0.636	0.051	1.381	0.212	0.006	0.331
	75th	10.09	0.743	0.143	1.579	0.417	0.039	0.446
	StDev	1.593	0.25	0.162	2.159	0.248	0.179	0.183
	Obs	90	90	90	77	8322	8322	441
Discount store	Mean	10.149	0.57	0.095	1.677	0.589	0.013	0.215
	25th	8.88	0.547	0.041	1.191	0.297	0.001	0.133
	Med	10.677	0.583	0.055	1.507	0.571	0.002	0.179
	75th	11.118	0.637	0.125	2.052	1	0.006	0.271
	StDev	1.653	0.131	0.094	0.632	0.327	0.065	0.173
	Obs	39	39	39	36	2853	2853	25
Department store	Mean	8.568	0.542	0.141	1.379	0.32	0.016	0.197
	25th	8.016	0.424	0.038	0.943	0.155	0.002	0.15
	Med	8.447	0.527	0.081	1.185	0.26	0.003	0.199
	75th	9.651	0.612	0.209	1.765	0.403	0.007	0.262
	StDev	1.168	0.148	0.141	0.601	0.236	0.077	0.1
	Obs	82	82	82	72	4932	4932	50
Pharmacy	Mean	10.19	0.616	0.055	1.453	0.877	0.227	0.037
	25th	8.75	0.44	0.019	1.087	1	0.05	0
	Med	10.868	0.542	0.045	1.394	1	0.094	0
	75th	11.264	0.731	0.077	1.738	1	0.233	0.043
	StDev	1.38	0.236	0.043	0.556	0.245	0.306	0.103
	Obs	38	38	38	33	160	160	26
Wholesale Club	Mean	11.064	0.536	0.096	1.617	0.769	0.008	0.209
	25th	9.229	0.513	0.035	1.478	0.519	0.002	0.126
	Med	11.177	0.532	0.049	1.564	1	0.003	0.195
	75th	12.836	0.568	0.193	1.713	1	0.005	0.278
	StDev	1.564	0.037	0.083	0.196	0.297	0.043	0.09
	Obs	15	15	15	13	1666	1666	6

Table 2.2: Summary Statistics of Local Economic Condition Variables and Cash Flow Change Measure

This table illustrates the summary statistics of the changes in the local economic conditions in each local market, in each year. $\triangle Population$ is calculated as the percentage change in total population, $\triangle Unemployment$ is measured as the percentage change in the unemployment rate for population 16 years old, $\triangle Income$ is defined as the percentage change in the inflation-adjusted per capital income, $\triangle House\ Owner\ Expenses$ is measured as the percentage change in median monthly owner expenses over household income, $\triangle House\ Value$ is calculated as the percentage change in house values for all owner-occupied housing units, and $\triangle Rent$ is the percentage change in median gross rent. $\triangle Competitor\ Cash\ Flow$ is calculated in two steps: 1) for each competitor operating in a given market, the percentage change in its cash flows from all of the other markets is calculated, and 2) these cash flow changes are averaged across those competitors. $\triangle Own\ Cash\ Flow$ is defined in a given market as the percentage change in a firm's cash flows generated from all of the other markets.

		Market-year level variable						Market-firm-year level variable	
year		△Population	△Unemployment	△Income	△House Owner Expenses	△House Value	△Rent	△Competitor Cash Flow	△Own Cash Flow
2008	Mean	0.01	0.046	0.036	0.006	0.023	0.046	0.039	0.035
	25th	0.001	-0.137	0.004	-0.027	-0.013	0.01	-0.005	-0.005
	Med	0.007	0.018	0.034	0.004	0.025	0.043	0.02	0.011
	75th	0.015	0.195	0.068	0.037	0.062	0.079	0.058	0.048
	StDev	0.017	0.289	0.055	0.061	0.078	0.065	0.117	0.162
	Obs	841	840	841	841	841	841	5219	5219
2009	Mean	0.011	0.581	-0.041	0.001	-0.037	0.023	-0.072	-0.066
	25th	0.002	0.343	-0.076	-0.034	-0.073	-0.014	-0.135	-0.145
	Med	0.009	0.538	-0.04	-0.004	-0.029	0.02	-0.07	-0.062
	75th	0.017	0.761	-0.009	0.026	0.006	0.058	-0.029	0.01
	StDev	0.014	0.384	0.054	0.063	0.071	0.063	0.132	0.18
	Obs	843	833	843	843	843	843	5141	5141
2010	Mean	0.01	0.092	-0.003	0.006	-0.014	0.016	0.037	0.015
	25th	-0.003	-0.043	-0.039	-0.031	-0.048	-0.02	-0.054	-0.066
	Med	0.01	0.082	-0.007	0.003	-0.013	0.013	-0.016	-0.031
	75th	0.025	0.201	0.027	0.04	0.019	0.05	0.03	0.079
	StDev	0.029	0.212	0.056	0.061	0.062	0.062	0.677	0.677
	Obs	844	833	844	844	844	844	4546	4546
2011	Mean	0.013	-0.125	0.046	-0.056	-0.032	0.04	0.061	0.056
	25th	0.001	-0.259	0.013	-0.092	-0.079	0.002	0.012	0.012
	Med	0.011	-0.146	0.044	-0.061	-0.035	0.036	0.041	0.017
	75th	0.023	-0.014	0.079	-0.026	0.012	0.073	0.08	0.06
	StDev	0.017	0.199	0.058	0.057	0.074	0.068	0.135	0.192
	Obs	850	841	850	850	850	850	4775	4775

Table 2.3: Correlations of Local Economic Condition Variables

This table illustrates the correlations among the variables representing the changes in the local economic conditions. $\triangle$*Population* is calculated as the percentage change in total population, $\triangle$*Unemployment* is measured as the percentage change in the unemployment rate for population 16 years old, $\triangle$*Income* is defined as the percentage change in the inflation-adjusted per capital income, $\triangle$*House Owner Expenses* is measured as the percentage change in median monthly owner expenses over household income, $\triangle$*House Value* is calculated as the percentage change in house values for all owner-occupied housing units, and $\triangle$*Rent* is the percentage change in median gross rent.

			During the crisis (2008-2009)			
	△Population	△Unemployment	△Income	△House Owner Expenses	△House Value	△Rent
△Population	1					
△Unemployment	0.0669	1				
△Income	-0.0598	-0.4713	1			
△House Owner Expenses	-0.036	0.0453	-0.2401	1		
△House Value	0.0591	-0.2911	0.3455	0.1392	1	
△Rent	0.0088	-0.1051	0.1343	-0.0127	0.075	1
			After the crisis (2010-2011)			
	△Population	△Unemployment	△Income	△House Owner Expenses	△House Value	△Rent
△Population	1					
△Unemployment	-0.0372	1				
△Income	0.0257	-0.2697	1			
△House Owner Expenses	-0.0655	0.3281	-0.4609	1		
△House Value	0.0095	0.0776	0.1186	0.1667	1	
△Rent	0.0433	-0.1249	0.1528	-0.112	0.0654	1

Table 2.4: Effect of Competitors' Cash Flow Changes on a Firm's Expansion: OLS Regressions

This table reports the linear regression estimates from Eq. (2.3.1) with a binary dependent variable, where e*xpansion (=1)* or *no change (=0)*. See Table 2.2 for the definitions of $\triangle$*Competitor Cash Flow from Other Markets,* $\triangle$*Own Cash Flow from Other Markets,* and the variables representing the changes in market conditions, and see Table 2.1 for the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

	During Crisis Period (2008-2009)			After Crisis Period (2010-2011)		
△Competitor Cash Flow from Other Markets	-0.193**	-0.00830	-0.146*	0.0433	0.0188	0.0656
	(-2.54)	(0.04)	(-1.84)	(0.89)	(0.45)	(1.16)
△Own Cash Flow from Other Markets	0.185*	2.086***	0.209**	0.256***	2.207***	0.262***
	(1.74)	(2.94)	(2.19)	(4.18)	(6.65)	(3.93)
△Population	0.302**	0.742**	0.250	-0.213*	-0.333	-0.0453
	(2.00)	(2.16)	(1.25)	(-1.83)	(-1.58)	(-0.34)
△Unemployment	-0.133***	-0.140*	-0.133***	-0.232***	-0.193***	-0.234***
	(-3.44)	(-1.71)	(-2.96)	(-4.48)	(-2.64)	(-3.81)
△Income	0.490***	0.992***	0.332	0.817***	1.061***	0.548***
	(3.69)	(2.66)	(1.51)	(4.26)	(3.51)	(2.71)
△House Owner Expenses	-0.0273***	-0.0237	-0.0276***	-0.0192**	-0.0315**	-0.0172**
	(-3.76)	(-1.39)	(-3.52)	(-2.56)	(-1.99)	(-2.32)
△House Value	-0.506***	-0.724***	-0.417***	-0.461***	-0.254	-0.497***
	(-4.49)	(-3.33)	(-3.46)	(-3.79)	(-1.45)	(-3.28)
△Rent	0.386**	0.371	0.371**	0.209	0.350	0.231
	(2.43)	(1.09)	(2.24)	(1.20)	(1.08)	(1.13)
Market Share	0.0240	0.0546	0.00941	0.0443	0.00615	0.0122
	(1.07)	(1.20)	(0.29)	(1.51)	(0.13)	(0.37)
Market Dependence	0.228***	0.212***	0.519***	0.386***	0.313***	1.378***
	(3.04)	(4.13)	(3.00)	(5.06)	(6.33)	(2.94)
Total Sales	0.0191**	0.0348***	0.0366***	0.0434***	0.0695***	0.0626***
	(2.12)	(4.03)	(3.31)	(4.58)	(7.88)	(4.33)
Leverage			-0.00264			-0.00152
			(-0.04)			(-0.02)
Cash Holdings			0.0609			-0.0374
			(0.40)			(-0.26)
Tobin's Q			0.0211			0.00686
			(1.51)			(1.23)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	10535	2180	7103	9891	2095	7191

Table 2.5: Effect of Competitors' Cash Flow Changes on a Firm's Expansion : 2SLS Regressions

This table reports the two stage least squares regression results for Eq. (2.3.1) with a binary dependent variable, where e*xpansion (=1)* or *no change (=0).* See Table 2.2 for the definitions of △*Competitor Cash Flow from Other Markets,* △*Own Cash Flow from Other Markets,* and the variables representing the changes in market conditions, and see Table 2.1 for the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: 1st Stage Regression

Instrumented variable: △Competitor Cash Flow from Other Markets						
	During Crisis Period (2008-2009)			After Crisis Period (2010-2011)		
Excluded variables						
△Other Market Population	-0.572	-0.563	-1.437	0.595	0.824	0.793
	(-0.87)	(-1.05)	(-1.23)	(0.40)	(0.68)	(0.71)
△Other Market Unemployment	0.192**	0.205*	0.164	-0.574*	-0.615	-0.597**
	(2.18)	(1.81)	(1.25)	(-1.63)	(-1.26)	(-2.05)
△Other Market Income	0.0520	0.643	0.279	3.123***	5.985***	2.409
	(0.12)	(1.06)	(0.49)	(2.66)	(5.20)	(1.53)
△Other Market House Owner Expenses	-0.0610*	-0.0400	-0.0632	-0.186***	-0.102*	-0.214***
	(-1.94)	(-1.61)	(-1.31)	(-2.68)	(-1.74)	(-4.02)
△Other Market House Value	0.485***	0.439**	0.449**	-0.947	-3.912***	0.0942
	(3.94)	(2.40)	(2.66)	(-1.30)	(-4.43)	(0.11)
△Other Market Rent	0.346	-0.00536	0.169	2.050**	1.423	1.448
	(1.24)	(-0.02)	(0.45)	(2.25)	(1.18)	(1.38)
Included variables						
△Population	-0.0484	-0.189*	-0.0122	-0.114	-0.162	-0.0928
	(-1.17)	(-1.94)	(-0.28)	(-1.33)	(-0.99)	(-1.59)
△Unemployment	0.0212**	0.0543**	0.00443	0.0733*	0.0713	0.0779*
	(2.15)	(2.37)	(0.36)	(1.80)	(0.98)	(1.85)
△Income	-0.00151	0.0411	0.0247	0.0865	-0.328	0.273
	(-0.04)	(0.50)	(0.52)	(0.67)	(-1.20)	(1.59)
△House Owner Expenses	-0.00202	0.00272	-0.00299	0.00721*	0.000457	0.00527
	(-1.16)	(0.62)	(-1.18)	(1.67)	(0.04)	(1.19)
△House Value	-0.0549	-0.0767	-0.0268	-0.184	0.349	-0.265
	(-1.63)	(-1.26)	(-0.69)	(-1.50)	(1.35)	(-1.55)
△Rent	0.0872**	0.0693	0.0655	0.167	-0.0753	0.162
	(2.41)	(1.22)	(1.11)	(1.28)	(-0.22)	(1.22)
△Own Cash Flow from Other Markets	-0.0889**	0.0263	-0.116**	-0.125*	0.558	-0.145
	(-2.48)	(0.18)	(-2.04)	(-1.81)	(1.49)	(-1.45)
Market Share	-0.00928	-0.0216**	-0.00375	0.107**	0.118	0.111
	(-0.86)	(-2.41)	(-0.19)	(2.54)	(1.49)	(1.55)
Market Dependence	-0.0546**	0.0173	-0.175*	-0.216**	-0.0523	-0.529
	(-2.34)	(1.51)	(-1.99)	(-2.48)	(-0.86)	(-0.77)
Total Sales	-0.00337**	0.000308	-0.0109**	-0.0149*	-0.00322	-0.0327
	(-2.49)	(0.14)	(-2.11)	(-1.81)	(-0.36)	(-1.29)
Leverage			-0.00169			0.00443
			(-0.05)			(0.06)
Cash Holdings			0.113**			-0.0189
			(2.70)			(-0.09)
Tobin's Q			-0.00234			-0.0151
			(-1.42)			(-1.43)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	10535	2180	7103	9891	2095	7191

(continued)

Table 2.5 *(continued)*

B: 2nd Stage Regression

	During Crisis Period (2008-2009)			After Crisis Period (2010-2011)		
△Competitor Cash Flow from Other Markets	-0.191***	-0.141	-0.099	0.082	0.029	0.086
	(-2.99)	(-1.43)	(-1.45)	(1.01)	(0.55)	(1.55)
△Own Cash Flow from Other Markets	0.0366	2.108***	0.117	0.305***	1.805***	0.343***
	(0.30)	(2.83)	(0.75)	(3.65)	(3.59)	(3.31)
△Population	0.195	0.433	0.226	0.0239	-0.272	0.180
	(1.22)	(1.13)	(1.13)	(0.19)	(-1.25)	(1.45)
△Unemployment	-0.0888**	-0.0508	-0.128**	-0.111**	-0.152**	-0.118*
	(-2.30)	(-0.49)	(-2.39)	(-2.18)	(-2.14)	(-1.70)
△Income	0.523***	1.103***	0.378*	0.291	0.855***	-0.0412
	(3.24)	(2.66)	(1.76)	(1.35)	(2.85)	(-0.17)
△House Owner Expenses	-0.0326***	-0.0226	-0.0312***	0.00340	-0.0215	0.00650
	(-4.31)	(-1.23)	(-3.82)	(0.47)	(-1.32)	(1.08)
△House Value	-0.535***	-0.730***	-0.415***	-0.0103	-0.0405	-0.0889
	(-4.61)	(-3.15)	(-3.46)	(-0.06)	(-0.21)	(-0.39)
△Rent	0.489**	0.442	0.411***	-0.200	0.232	-0.127
	(2.54)	(1.23)	(2.92)	(-0.92)	(0.63)	(-0.70)
Market Share	0.00610	0.0197	-0.00405	-0.0243	-0.0370	-0.0656
	(0.20)	(0.42)	(-0.09)	(-0.61)	(-0.65)	(-1.26)
Market Dependence	0.197**	0.282***	0.845**	0.595***	0.366***	2.104***
	(2.32)	(4.60)	(2.46)	(6.19)	(5.95)	(2.66)
Total Sales	0.0148	0.0377***	0.0316***	0.0524***	0.0710***	0.0870***
	(1.60)	(3.99)	(3.22)	(5.82)	(7.28)	(4.11)
Leverage			-0.00593			-0.00262
			(-0.07)			(-0.02)
Cash Holdings			0.153			-0.000167
			(0.91)			(-0.00)
Tobin's Q			0.0174***			0.0200**
			(3.94)			(2.30)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	10535	2180	7103	9891	2095	7191

Table 2.6: Effect of Competitors' Cash Flow Changes on a Firm's Expansion Decisions Excluding Neighboring Markets' Effect During the Crisis

This table reports the OLS estimates and the 2SLS estimates from Eq. (2.3.1) with a binary dependent variable, where e*xpansion (=1)* or *no change (=0).* △*Competitor Cash Flow from Other Markets* is calculated in two steps: 1) for each competitor operating in a given market, its average cash flow changes generated from outside of that market are calculated by *excluding* the sales information from the markets located in the same state with the focal market, and then 2) it is averaged across all competitors in that market. △*Own Cash Flow from Other Markets* is defined in a given market as the percentage change in a firm's cash flows generated from all of the other markets excluding the markets which are in the same states with the focal market. See Table 2.2 for the definitions of the variables representing the changes in market conditions and Table 2.1 for the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: OLS and 2SLS in the second stage regression

		OLS			2SLS (2nd Stage)	
△Competitor Cash Flow from Other Markets	-0.154**	0.0253	-0.102	-0.139	-0.359**	-0.143
	(-2.34)	(0.16)	(-1.35)	(-1.07)	(-2.26)	(-0.98)
△Own Cash Flow from Other Markets	0.169	1.322*	0.203**	0.0478	1.598*	0.0271
	(1.60)	(1.73)	(2.15)	(0.33)	(1.68)	(0.12)
△Population	0.300**	0.782**	0.244	0.137	-0.107	0.156
	(1.98)	(2.24)	(1.22)	(0.82)	(-0.23)	(0.68)
△Unemployment	-0.133***	-0.137	-0.132***	-0.115***	0.0704	-0.138**
	(-3.39)	(-1.65)	(-2.94)	(-3.16)	(0.50)	(-2.37)
△Income	0.487***	0.996***	0.333	0.450***	1.274**	0.399*
	(3.64)	(2.66)	(1.51)	(3.08)	(2.29)	(1.93)
△House Owner Expenses	-0.0275***	-0.0251	-0.0280***	-0.0297***	-0.0108	-0.0331***
	(-3.83)	(-1.42)	(-3.57)	(-4.19)	(-0.38)	(-3.90)
△House Value	-0.507***	-0.762***	-0.421***	-0.518***	-0.856**	-0.400***
	(-4.46)	(-3.12)	(-3.49)	(-4.31)	(-2.33)	(-3.27)
△Rent	0.384**	0.384	0.377**	0.451**	0.320	0.415**
	(2.43)	(1.13)	(2.27)	(2.34)	(0.69)	(2.53)
Market Share	0.0252	0.0511	0.00972	0.0113	-0.0331	-0.00870
	(1.13)	(1.09)	(0.30)	(0.44)	(-0.52)	(-0.19)
Market Dependence	0.227***	0.217***	0.518***	0.276**	0.421***	1.018**
	(2.99)	(4.21)	(3.00)	(2.34)	(3.45)	(2.26)
Total Sales	0.0186**	0.0358***	0.0365***	0.0170*	0.0491***	0.0263***
	(2.05)	(3.96)	(3.30)	(1.77)	(2.90)	(2.97)
Leverage			0.00192			-0.0122
			(0.03)			(-0.12)
Cash Holdings			0.0586			0.246
			(0.38)			(0.91)
Tobin's Q			0.0217			0.0189***
			(1.55)			(3.95)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	9979	2178	7072	9979	2178	7072

B: 2SLS in the first stage regression (*Excluded variables)*

△Other Market Population	-0.190	-0.0291	-1.041	△Other Market House Owner Expenses	-0.0662**	-0.0451**	-0.0804
	(-0.33)	(-0.06)	(-1.46)		(-2.00)	(-2.05)	(-1.43)
△Other Market Unemployment	0.115*	0.107	0.138	△Other Market House Value	0.329***	0.307**	0.388*
	(1.91)	(1.63)	(1.67)		(3.09)	(2.17)	(2.01)
△Other Market Income	0.147	0.148	0.232	△Other Market Rent	-0.400*	-0.300	-0.392
	(0.36)	(0.33)	(0.42)		(-1.91)	(-1.30)	(-1.50)
Private firms included	Yes	Yes	No	Private firm included	Yes	Yes	No
Public firms included	Yes	No	Yes	Public firms included	Yes	No	Yes

Table 2.7: Effect of Competitors' Leverage-Weighted Cash Flow Changes on a Firm's Expansion During the Crisis

This table reports the OLS estimates and the 2SLS estimates from Eq. (2.3.1) with a binary dependent variable, where e*xpansion (=1)* or *no change (=0).* $\triangle$*Competitor Cash Flow from Other Markets* is the competitors' weighted cash flows generated from other markets, which provides more weights to the decrease in a highly-leveraged competitor's cash flows, using a competitor's leverage before the crisis. See Eq. (2.3.3) for more details. See Table2.2 for the definition of $\triangle$*Own Cash Flow* and the variables representing the changes in market conditions, and see Table 2.1 for the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: OLS and 2SLS in the second stage regression

	OLS	2SLS
$\triangle$Competitor Cash Flow from Other Markets	-0.407**	-0.229**
	(-2.62)	(-2.42)
$\triangle$Own Cash Flow from Other Markets	0.304**	0.0902
	(2.14)	(0.46)
$\triangle$Population	0.249	0.243
	(1.24)	(1.20)
$\triangle$Unemployment	-0.131***	-0.134**
	(-2.90)	(-2.39)
$\triangle$Income	0.331	0.307
	(1.48)	(1.36)
$\triangle$House Owner Expenses	-0.0277***	-0.0299***
	(-3.54)	(-3.40)
$\triangle$House Value	-0.408***	-0.363***
	(-3.40)	(-3.21)
$\triangle$Rent	0.367**	0.378**
	(2.21)	(2.54)
Market Share	0.00824	0.0113
	(0.25)	(0.26)
Market Dependence	0.494***	0.623*
	(2.94)	(1.69)
Total Sales	0.0339***	0.0202
	(3.11)	(1.17)
Leverage	0.0192	-0.0159
	(0.25)	(-0.18)
Cash Holdings	0.0759	0.200
	(0.49)	(1.12)
Tobin's Q	0.0216	0.0160***
	(1.55)	(3.82)
N	7103	7103

B: 2SLS in the first stage regression (*Excluded variables only)*

$\triangle$Other Market Population	-0.704	$\triangle$Other Market House Owner Expenses	-0.0134
	(-1.60)		(-0.77)
$\triangle$Other Market Unemployment	-0.0945**	$\triangle$Other Market House Value	0.512***
	(-2.33)		(3.83)
$\triangle$Other Market Income	-0.395	$\triangle$Other Market Rent	0.143
	(-1.56)		(0.74)

Table 2.8: Effect of Competitors' $MMCS$-Weighted Cash Flow Changes on a Firm's Expansion During the Crisis

This table reports the OLS estimates and the 2SLS estimates from Eq. (2.3.1) with a binary dependent variable, e*xpansion (=1)* or *no change (=0)*. $\triangle$*Competitor Cash Flow* is the competitors' weighted cash flows, constructed giving more weights to the decrease in a high-$MMCS$ competitor's cash flows. See Eq. (2.3.4) for more details. See Table 2.2 for the definition of $\triangle$*Own Cash Flow*, and variables for the changes in market conditions, and see Table 2.1 for the definition of $MMCS$, and the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: OLS and 2SLS in the second stage regression

	OLS			2SLS (2nd Stage)		
△Competitor Cash Flow from Other Markets	-0.989***	-0.0576	-1.150**	-0.430***	-0.172***	-0.405***
	(-4.08)	(-0.26)	(-2.41)	(-4.43)	(-3.02)	(-3.13)
△Own Cash Flow from Other Markets	0.187*	2.052***	0.190**	0.142	2.046***	0.104
	(1.86)	(2.91)	(2.08)	(1.51)	(2.86)	(0.93)
△Population	0.276*	0.684**	0.241	0.225	0.557*	0.207
	(1.94)	(2.06)	(1.24)	(1.62)	(1.74)	(1.10)
△Unemployment	-0.132***	-0.143*	-0.136***	-0.120***	-0.107	-0.151**
	(-3.37)	(-1.75)	(-2.86)	(-2.61)	(-1.34)	(-2.41)
△Income	0.468***	0.967***	0.317	0.433***	1.008***	0.316
	(3.64)	(2.61)	(1.50)	(2.87)	(2.66)	(1.53)
△House Owner Expenses	-0.0273***	-0.0248	-0.0284***	-0.0274***	-0.0220	-0.0297***
	(-3.90)	(-1.52)	(-3.77)	(-3.90)	(-1.29)	(-3.71)
△House Value	-0.460***	-0.692***	-0.376***	-0.356***	-0.514**	-0.304**
	(-4.31)	(-3.17)	(-3.23)	(-3.57)	(-2.35)	(-2.56)
△Rent	0.391**	0.364	0.384**	0.409**	0.390	0.377***
	(2.51)	(1.06)	(2.44)	(2.56)	(1.11)	(3.21)
Market Share	0.0317	0.0460	0.0150	0.0943***	0.102**	0.0652*
	(1.43)	(1.04)	(0.51)	(3.27)	(2.10)	(1.92)
Market Dependence	0.198***	0.214***	0.639***	0.0341	0.187***	0.368
	(2.63)	(4.06)	(2.79)	(0.34)	(3.33)	(1.30)
Total Sales	0.0212**	0.0355***	0.0367***	0.0234**	0.0372***	0.0278*
	(2.29)	(4.12)	(3.08)	(2.45)	(3.93)	(1.68)
Leverage			-0.00835			-0.0332
			(-0.11)			(-0.31)
Cash Holdings			0.105			0.262*
			(0.71)			(1.78)
Tobin's Q			0.0185			0.0118**
			(1.32)			(2.10)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	10535	2180	7103	10535	2180	7103

B: 2SLS in the first stage regression (*Excluded variables)*

△Other Market Population	-2.797	-1.790	-3.854	△Other Market House Owner Expenses	-0.365***	-0.0789	-0.529**
	(-1.31)	(-1.56)	(-1.38)		(-4.08)	(-0.90)	(-2.32)
△Other Market Unemployment	0.110	0.262	-0.311	△Other Market House Value	1.452***	0.491	2.477*
	(0.61)	(1.39)	(-0.51)		(3.15)	(1.19)	(2.01)
△Other Market Income	-3.667	3.094	-10.28	△Other Market Rent	-0.745	-3.440***	3.096
	(-1.60)	(1.35)	(-1.34)		(-0.59)	(-2.75)	(0.68)
Private firms included	Yes	Yes	No	Private firm included	Yes	Yes	No
Public firms included	Yes	No	Yes	Public firms included	Yes	No	Yes

Table 2.9: Effect of Competitors' Cash Flow Changes on a Firm's Retrenchment Decisions

This table reports the results from OLS regressions and the 2SLS regressions with a binary dependent variable, where *retrenchment (=1)* or *no change (=0)*. See Table 2.2 for the definitions of $\triangle$*Competitor Cash Flow from Other Markets,* $\triangle$*Own Cash Flow from Other Markets,* and the variables representing the changes in market conditions, and see Table 2.1 for the other independent variables. *Market Share, Market Dependence,* and *Total Sales* are one-year lagged when the dependent variable is measured in the even-numbered years and two-year lagged if the dependent variable is measured in the odd-numbered years, because of data limitations (See Section 1.4.1 for more details). *Leverage, Cash Holdings,* and *Tobin's Q* are lagged one year, while standard errors are clustered at the firm level. ***Significant at 1%; **significant at 5%; *significant at 10%.

A: OLS and 2SLS in the second stage regression

	OLS			2SLS (2nd Stage)		
△Competitor Cash Flow from Other Markets	-0.0394	0.0948	-0.0293	0.155***	0.055	0.107*
	(-0.57)	(0.65)	(-0.43)	(3.06)	(0.41)	(1.77)
△Own Cash Flow from Other Markets	-0.156	0.421	-0.276*	-0.0149	0.394	-0.149
	(-1.08)	(0.51)	(-1.84)	(-0.09)	(0.48)	(-0.82)
△Population	-0.478***	-0.691	-0.521**	-0.365**	-0.585	-0.453**
	(-2.88)	(-1.29)	(-2.58)	(-2.11)	(-0.93)	(-2.31)
△Unemployment	0.405***	0.245***	0.402***	0.367***	0.220**	0.396***
	(7.86)	(3.08)	(5.75)	(6.29)	(2.13)	(5.38)
△Income	-1.244***	-0.651	-1.099***	-1.264***	-0.662	-1.156***
	(-4.47)	(-1.44)	(-3.25)	(-4.35)	(-1.47)	(-3.36)
△House Owner Expenses	0.0195***	0.0351**	0.0103	0.0240***	0.0337**	0.0143
	(2.96)	(2.21)	(1.36)	(3.26)	(2.06)	(1.61)
△House Value	0.569***	0.441**	0.310***	0.597***	0.459**	0.325***
	(2.96)	(1.99)	(2.73)	(3.03)	(2.03)	(3.06)
△Rent	-1.090***	-0.944***	-0.855***	-1.179***	-0.960***	-0.904***
	(-4.94)	(-3.39)	(-4.28)	(-4.95)	(-3.38)	(-4.50)
Market Share	0.108***	0.0200	0.0564	0.122***	0.0259	0.0506
	(2.90)	(0.35)	(1.42)	(3.22)	(0.43)	(1.43)
Market Dependence	0.299**	0.211***	0.558**	0.439***	0.238***	1.306**
	(2.16)	(4.19)	(2.05)	(2.80)	(3.73)	(2.46)
Total Sales	0.0233	0.0290***	-0.00141	0.0298*	0.0302***	0.0149
	(1.38)	(3.81)	(-0.12)	(1.72)	(3.83)	(0.88)
Leverage			0.135			0.125
			(1.48)			(1.32)
Cash Holdings			-0.0542			-0.192
			(-0.42)			(-1.13)
Tobin's Q			0.0148			0.0162***
			(1.46)			(3.56)
Private firms included	Yes	Yes	No	Yes	Yes	No
Public firms included	Yes	No	Yes	Yes	No	Yes
N	10510	2158	7100	10510	2158	7100

B: 2SLS in the first stage regression (*Excluded variables)*

△Other Market Population	-0.570	-0.551	-1.435**	△Other Market House Owner Expenses	-0.0608*	-0.0390	-0.0631
	(-0.87)	(-1.02)	(-2.23)		(-1.93)	(-1.57)	(-1.31)
△Other Market Unemployment	0.192***	0.204***	0.164**	△Other Market House Value	0.483***	0.428**	0.449**
	(2.17)	(1.79)	(1.25)		(3.93)	(2.33)	(2.66)
△Other Market Income	0.0575	0.671	0.279	△Other Market Rent	0.341	-0.0410	0.171
	(0.14)	(1.10)	(0.48)		(1.22)	(-0.13)	(0.46)
Private firms included	Yes	Yes	No	Private firm included	Yes	Yes	No
Public firms included	Yes	No	Yes	Public firms included	Yes	No	Yes

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