Performance and Control Across Multiple Markets

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Abstract:

Chain organizations typically operate units across different types of markets, with significantly diverging customer bases. Such market-type dispersion potentially influences performance through two channels: it makes performance a noisier indicator of store manager effort, and it makes chain level decisions less optimal for individual stores. This paper examines the impact of market-type dispersion on chain and store performance in the convenience store industry. Our findings indicate that market-type dispersion has a negative impact on chain and store performance; they also indicate that these effects are more severe in un-franchised and un-standardized units.

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I. Introduction

Managers in chain organizations frequently operate in widely diverse markets with different demand conditions. While diversification across multiple markets may allow the company to derive economic rents from leveraging its brand and replicating a successful business model across different locations, it may also result in significant control problems due to the information asymmetries between the units facing the customers and the headquarters.

In this paper, we explore whether a chains' performance is affected by their serving of different markets. We also examine how firms choose to manage different markets through their organizational setup. Specifically, we examine whether retail firms with higher market-type dispersion are able to improve their performance when (a) they transfer ownership via franchising to managers operating units in markets that serve customers significantly different from the average customers served by the chain, with the intention of customizing the service to the local market; or when (b) instead, the chain standardizes its operations across units serving divergent markets, preserving the uniformity of the firm's service.

We define a new measure, market-type dispersion, as the variation in certain store location characteristics within a chain; the relevant location characteristics are those affecting a store's demand conditions (Campbell, Datar, and Sandino 2007). Market-type dispersion can be measured at the chain level and at the store level. At the chain level, the degree of market-type dispersion is the amount of variation in location characteristics between stores within a chain. For example, a chain with all of its stores in Harvard Square would have a lower level of market-type dispersion than a chain with stores in Harvard Square, Boston, and the suburbs of Massachusetts. At the store level, the degree of market-type dispersion is how much a store's location characteristics differ from the average location characteristics in a chain. For example, if a chain has one store in Boston and the rest of its stores in Harvard Square, then the store in Boston should have higher market-type dispersion than the stores in Harvard Square. It is important to note that market-type dispersion is not necessarily correlated with geographic dispersion; stores in a chain can be located far from each other but still have similar location characteristics, and vice versa.

Market-type dispersion potentially influences store performance through two different channels, and we label these channels as the *monitoring effect* and the *customization effect*. In the monitoring effect, market-type dispersion increases the randomness of store performance and the noise and cost with which the headquarters observes store manager effort. As a result, the store manager exerts less effort. In the customization effect, market-type dispersion results in more varied customer bases across the stores, and as a result, chain level decisions such as marketing strategies and policies for store operations become less optimal for individual stores and store managers.

In this paper, we motivate three empirical predictions based on the literature from marketing and economics: 1) market-type dispersion decreases performance both at the chain and at the store level, 2) market-type dispersion decreases the performance of un-franchised chains more than that of franchised chains because franchising motivates a store manager with superior information to exert more effort and adapt to market conditions, and 3) the way standardization interacts with market-type dispersion to affect performance is an empirical question: market-type dispersion will decrease the performance of more (less) standardized firms if the customization effect dominates the monitoring effect (if the monitoring effect dominates the customization effect).

We test these hypotheses at the chain-level, using data from the National Association of Convenience Stores and at the store-level, using data from a convenience store chain in New England.[1] Our results generally support predictions 1 and 2. Increasing a chain's level of market-type dispersion from zero to the industry average level is associated with a $34,000 decrease in

[1]The chain has requested that its identity be kept confidential.

average annual store sales. The magnitude of this decrease can be reduced by $12,000 if a chain franchises a portion of its stores. These magnitudes are relevant for convenience stores, which typically generate $800,000 in annual sales. Additionally, our findings distinguish between the monitoring and customization effects of market-type dispersion (prediction 3) by exploiting the fact that they interact differently with a chain's degree of standardization. We find that for a chain, a change from no market-type dispersion to the average level of market-type dispersion in the sample is associated with a $110,000 decrease in average annual store sales if the chain has no standardization in product assortment, but nearly no decrease in average store sales if the chain is completely standardized in product assortment. This result is incompatible with the customization effect: standardization decreases store adaptability to local conditions, and therefore market-type dispersion should lead to a larger reduction in chain performance when standardization is high. Instead, the monitoring effect explains this result, because standardization enables the chain manager to monitor the store manager's effort with less noise and at a lower cost.

While the empirical results support our predictions, potential omitted variable bias and survivorship bias could undermine the validity of our empirical analysis. However, these alternative explanations are less plausible for some results than others. Market-type dispersion is less endogenous at the store level than it is at the chain level, because store managers take their store locations as fixed, and thus the store level empirical results are more robust against omitted variable bias. Survivorship bias is also less likely at the store level because we find that stores closed down due to poor performance tended to have higher, rather than lower, levels of market-type dispersion.

The rest of the paper is organized as follows: Section 2 reviews the literature that provides a background for analyzing the effects of market-type dispersion and outlines our empirical predictions based on this literature. Sections 3 and 4 empirically test these predictions at the chain level and at the store level, respectively. Section 5 discusses alternative interpretations of the empirical results, and Section 6 concludes.

II. Literature Review and Hypothesis Development

Expansion into different markets may allow efficient chain organizations to strengthen (and derive economic rents from) their brand name; leverage their expertise and managerial skills; take advantage of economies of scale; and exploit the benefits of risk diversification (Berger and DeYoung 2001). However, serving multiple markets may also result in negative consequences for the chain. Expansion into diverse markets can create higher uncertainties and reduce efficiency as coordination, communication, and monitoring problems arise. Specifically, an increase in a chain's market-type dispersion generates two major control problems from the headquarters' perspective:

Greater agency conflicts from monitoring ("Monitoring Effect")

The headquarters of a chain confronts an agency problem if the store managers' actions do not reflect the best interests of the company as a whole. This problem is likely to arise in situations where the headquarters lose oversight of the store managers' actions. Market-type dispersion creates one of such situations, since monitoring store managers in units serving heterogeneous markets is a challenging task due to the differences in expected performance across locations. In these settings, the headquarters' relative expertise and knowledge about how to operate the stores is likely to be diminished vis-à-vis store managers with local knowledge (Baiman, Larcker and Rajan 1995). Thus, store managers gain an informational advantage over the headquarters, impairing the ability of the headquarters to limit opportunistic store managers from engaging in shirking or perquisite-taking (Jensen and Meckling 1976) and from providing a lower-quality service while free-riding on the chain's brand name (Brickley and Dark 1987).

Greater difficulties serving customers in different markets ("Customization Effect")

While market-type dispersion has the effect of limiting the information flows to headquarters, it also generates a greater need to adapt to the tastes of divergent customers, increasing the value of the store manager's input in the sales process (Lafontaine 1992). A number of studies in marketing and service operations provide evidence that different types of customers place different importance on the attributes that lead to customer satisfaction and consumption in chain organizations (Anderson and Mittal 2000; Mittal, Kamakura and Govind 2004). For instance, Mattila (1999) finds that the importance customers place on the physical environment attribute of luxury hotels is associated with their ethnicity; Mittal, Kamakura and Govind (2004) finds that the customers' responsiveness to automobile dealership services varies with their income, age, education, and ethnicity; while Campbell and Frei (2006) find that local market characteristics across bank branches, such as income and competition, affect customers' evaluations of service quality. Thus, a chain serving a diversity of markets requires effective controls that will motivate store managers to increase their efforts to adapt to the tastes of local customers while coordinating their actions with those of the chain headquarters. An uncontrolled expansion could result in an inconsistent quality of service across stores that could hurt the chain's brand.

In summary, the monitoring effect hypothesizes that market-type dispersion increases the randomness of store performance making it more difficult for headquarters to monitor and improve the performance of individual stores. The customization effect predicts that when market-type dispersion is high, chain level marketing strategies and policies are suboptimal for an individual store. Both effects unambiguously lead to the prediction, formalized as hypotheses H1, that market dispersion lowers average store performance:

H1a: Higher market-type dispersion leads to lower average store performance in a chain.
H1b: At the store level, higher market-type dispersion leads to lower store performance.

We test H1 at both the chain and store levels. Market-type dispersion is less endogenous at the store level than it is at the chain level, because store managers take their store locations as fixed, and thus the store level empirical results are more robust against omitted variable bias.

The effect of market-type dispersion on performance is likely to be contingent on various organizational design choices. Campbell, Datar, and Sandino (2007) provide evidence that chain organizations respond to market-type dispersion through increased decentralization and incentive pay for store managers and by franchising more intensively. The negative performance consequences of market-type dispersion arising through the monitoring and customization effects would tend to be mitigated by such design choices. For example, franchisees largely bear the wealth consequences of their effort as compared to a non-franchisee. Further, franchisees tend to be more entrepreneurial and have more decision authority over store operations putting them in a better position to adapt store marketing strategies and operations to local conditions. Thus, we predict that

H2: Higher market-type dispersion is less negatively associated with average store performance in chains with a higher proportion of franchised stores.

Distinguishing between the Monitoring and Customization Effects

Hypotheses H1 – H2 yield unambiguous predictions for the influence of market-type dispersion on chain and store performance because both the monitoring and the customization effects influence performance in the same direction. Therefore, H1-H2 do not distinguish between the two different effects of market-type dispersion. However, the monitoring effect and the customization effect would yield contradicting predictions on how market-type dispersion influences the benefit of standardization for a chain. Standardization involves a tradeoff between increasing the ability to monitor the operations of the chain's stores and allowing individual stores to better adapt to their local conditions. Standardization decreases randomness in store performance because when all the stores in a chain offer the same products and services, the amount of noise in store performances varies less across the chain. On the other hand, standardization prevents stores from changing their product and service offerings to adapt to local demand. As a result, the chain level marketing and operations decisions are even less suitable for the individual store.

Given the standardization trade-off, the monitoring effect and the customization effect would interact with standardization in opposite ways. In the monitoring effect, when market-type dispersion is high, the benefit of standardization – decreasing the cost of monitoring and degree of randomness in store performance – becomes even more valuable, and the interaction effect would be positive. In the customization effect, when market-type dispersion is high, the cost of standardization – preventing stores from adapting to local conditions – becomes even more damaging, and the interaction effect would be negative. We test the following hypothesis, stated in null form, in order to distinguish between the monitoring and customization effects of market-type dispersion.

H3: There is no difference in the relationship between market-type dispersion and average store performance in chains with high vs. low levels of standardization.

III. Chain-Level Empirical Analysis

In this section, using chain-level data, we examine whether market-type dispersion is associated with lower firm performance (Hypothesis 1a). We also test whether two control mechanisms—franchising and standardization—interact with market-type dispersion in ways that mitigate the negative effect that market-type dispersion has on firm performance (Hypothesis 2 and Hypothesis 3). In the next subsections we describe the data, measures, research methods and empirical results, related to these tests.

3.1 Data

Our analyses utilize data from the convenience store industry. We focus on this industry for several reasons. First, convenience store chains across the United States serve very different types of customers. Second, convenience store chains essentially compete on location and are relatively undifferentiated in other dimensions, reducing the number of factors to be considered for empirical analysis. Third, focusing on a relatively homogeneous industry allows us to control for several industry-specific conditions such as the degree of regulation, the nature of the products offered, etc.

We obtain our data from three sources: the National Association of Convenience Stores (NACS) 2003 State of the Industry Survey, the 2004 Environmental Systems Research Institute (ESRI) Business Location Data, and the 2000 US Census. The State of the Industry survey is directed to the NACS' convenience store members, and has the objective of generating data to help convenience store companies benchmark their performance against the industry. Most respondents operate chain stores rather than one-store convenience stores. If one considers only chain operations as the target population, then the NACS data covers 39.2% of the target population. A part from its large coverage of the population, the survey also has the advantage that it is confidential, decreasing the companies' incentives to distort reported numbers. Although the NACS dataset provides detailed information about the operations and financial performance of the chains, it does not contain information related to the markets served by the chain stores. We gather these data from the ESRI dataset and the US Census. The ESRI dataset tracks the locations of all business entities in the US (including all stores in every chain), while the US Census provides data describing demographic characteristics of the population. We measure location characteristics based on the block-group each store belongs to.[2]

[2] In the US Census, a block-group is the smallest geographic area over which location characteristics are measured; it generally contains between 600 and 3,000 people, with an average size of 1,500 people.

Merging the three datasets created some challenges. First, the latest US Census was taken in 2000, the NACS survey was taken in 2003, and the ESRI business location data was collected in 2004. Although these differences in time may add some random noise, we believe it is unlikely they will result in significantly different store locations or population characteristics. Second, we were not always able to identify a match between the chains in the NACS survey and those in the ESRI dataset, thus we had to drop nine chains from the dataset. Furthermore, we did not always find exact matches for the chain stores in the NACS and ESRI datasets (perhaps due to the one year difference in the datasets), however the number of stores that each chain operates, as provided by the NACS dataset was usually within 5% of the number of stores located through the ESRI data.

3.2 Measurement of Chain Level Market-type Dispersion

Consistent with Campbell, Datar and Sandino (2007), we define market-type dispersion as the variation of certain location characteristics among stores within a chain. We focus on the location characteristics that, according to the marketing literature, are the most relevant drivers of customer purchasing behavior in grocery and retail stores (Gupta and Chintagunta 1994; Hoch et al. 1995; Kalyanam and Putler 1997; Mulhern, Williams and Leone 1998; Gomez, McLaughlin and Wittink 2003). These characteristics include three demographic characteristics (population density, household income, and population ethnicity); as well as number of competitors and number of nearby businesses.

We obtain the demographic characteristics from the US census. We use the US Census definition of *household income* (in dollar terms) and compute *population density* as the number of inhabitants per square mile. For *ethnicity*, we calculate the percentage of Black and Asian population (we do not use the Hispanic percentage since it overlaps with other groups and we drop the White percentage to avoid multicollinearity). Competition and nearby businesses are calculated from the ESRI business location dataset. *Competition* is measured by counting the number of business establishments categorized as grocery stores or gasoline stations under the North American Industry Classification System, located in the same block-group as the store. Nearby businesses, which are expected to capture a sense of non-residential passer-bys, are computed by counting the total number of business establishments recorded in the store's zip-code.[3]

We calculate dispersion by estimating the standard deviation of each location characteristic *L* across all stores in a given chain i ($Std\ Deviation_{Li}$). We also normalize this standard deviation by the average value of the location characteristic to be able to aggregate the dispersion measures of different location characteristics.

$$Normalized\ Dispersion_{Li} = \frac{Std\ Deviation_{Li}}{Mean_{Li}} \quad (1)$$

This metric captures variation in proportion to the typical value of a given location characteristic in the chain. We aggregate the normalized dispersion values of the five location characteristics for each chain *i* in two ways: we add them ($MDispersion\_Sum_i$) and we multiply them ($MDispersion\_Mult_i$). The added dispersion measure assigns equal weights to the five location characteristics, while the multiplied measure contains interaction effects among the location characteristics. For example, more (less) weight is placed on each location characteristic if the household income normalized dispersion is high (low).

3.3 Research Methods and Descriptive Statistics

In order to test the effect of the chain's market-type dispersion (*MDispersion*) on firm performance and to test whether franchising and standardization mitigate the negative effects that market-type dispersion could have on performance, we run the following two OLS regressions, utilizing heteroskedasticity-robust standard errors:

$$Performance_i = \beta_o + \beta_1 * MDispersion_i + \beta_n * Controls_i + \varepsilon_i \quad (2)$$

[3] We calculate nearby businesses at the zip-code level rather than at the block-group level, because business establishments generate traffic throughout a larger region beyond the geographical area of the census block-group.

$$Performance_i = \alpha_o + \alpha_1 * MDispersion_i + \alpha_2 * CMechanism_i$$
$$+ \alpha_3 * MDispersion_i * CMechanism_i + \alpha_n * Controls_i + \varepsilon_i \quad (3)$$

where *Performance* is measured as the annual merchandise sales per store (*Sales per store*) and *CMechanism* captures the control mechanism (either franchising or standardization).

In the context of the market-type dispersion model, we consider average annual merchandise sales per store to be the most relevant chain performance measure. By using merchandise sales, we exclude miscellaneous sources of income, such as ATM surcharges and rental income.[4]

With respect to the control mechanisms, *Franchising* captures the degree of franchising in the chain by dividing the amount of royalties that each chain receives from franchisees by the number of stores in the chain,[5] while *Standardization* captures the degree of standardization across chains. We measure standardization in terms of product assortment, which is one of the most important dimensions of standardization according to Jain (1989). The NACS survey contains 28 product categories (such as cigarettes, frozen foods, liquor, etc.). For each product category in the NACS data, we calculate:

$$\text{Standardization per product} = |\, 50 - \%\text{ stores within chain offering the product}\,| \quad (4)$$

This measure equals zero when a chain has no standardization for a product category and 50 when the chain is completely standardized. For any product category, a chain with 50% of its stores offering that product would not be standardized, because stores within the chain are as likely to offer the product as not. When a chain is completely standardized on a product category, either all (100%) or none (0%) of its stores offers the product. The overall chain's *Standardization* is the average of the standardization values for individual products.

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[4] Other commonly used performance measure in the retail industry is sales per sqft, but this measure also measures efficiency in sqft utilization, creating a bias against stores in areas where real estate is inexpensive.

[5] In the dataset, 33.4% of the chains receive royalties.

Finally, we control for a number of chain and location characteristics to alleviate concerns with correlated omitted variables. We include the five location characteristics that predict customer demand described in section 3.2 and we identify the following chain characteristics from the NACS survey as the most relevant predictors of performance: the number of stores in the chain, average square-footage per store, number of employees per store, advertising per store, corporate general and administrative spending per store, percentage of stores with gas stations, and number of stores opened over the past year.[6] The number of stores opened over the past year indicates how rapidly a chain is expanding. Chains that are expanding into new locations might have higher market-type dispersion, but at the same time new stores might generate lower store sales.

Table 1 provides descriptive statistics for all the variables utilized in our analyses. An average chain in the sample sells $833,042 in merchandise per store annually, owns 208 stores,[7] has 2,553 square feet per store, employs 10 workers per store, and opens three to four stores a year. For location characteristics, chains in the dataset typically locate stores in areas with average household income of $40,260, with 9.8% of the population being black and 1.8% of the population being Asian, and with three competitors within the same census block-group.

With respect to the control mechanisms, the summary statistics in Table 1 indicate that for the chains in the sample, the average royalties per store[8] amount to $3,916 with a minimum of $0 and a maximum of $137,492; while the average degree of product standardization is 36.2, with a minimum of 0, and a maximum of 50; thus, the sample contains the full range of chains from those

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[6] The number of stores closed over the past year has a 0.781 correlation with the number of stores opened, so we exclude this variable to avoid multicollinearity, although the result patterns are essentially unchanged if this variable is included.

[7] The average number of stores per chain is particularly large given that the sample includes a few very large chains. The median value of the number of stores per chain is 36.

[8] Royalty rates are usually a percentage of the sales from franchised units. The more franchisees a chain has, the more royalties it receives. A disadvantage of the royalty-per-store measure is that it may also be capturing the success of the chain (i.e. it may be higher for chains recording higher levels of sales per store). We think this concern is not a significant problem since the correlation between the royalty-per-store and the sales-per-store measures is only 0.094.

that are completely un-standardized to those that are fully standardized, according to the product assortment criterion.

We also observe wide variation on the market-type dispersion measures. For example, in Table 1, the average for *Standard Deviation* along household income is 13.566, which means that in a typical chain, the income levels at store locations vary by a standard deviation of $14,566. The *Normalized Dispersion* measures, which are comparable across location characteristics, generally have similar distributions (i.e., average, standard deviation, and min-max ranges). One exception however, is *Normalized Dispersion* in % of population black, which has a much higher average and standard deviation than the other variables.

Table 2 compares the various constructions of market-type dispersion. It suggests that the multiplied, aggregated market-dispersion variable under-weighs dispersion in competition, and overweighs dispersion in household income and the Asian percentage of the population. In comparison, the added, aggregated market-dispersion variable represents the dispersion along all location characteristics more evenly, although it also seems to under-weigh the dispersion in competition. It is also possible to note that the dispersion values for different location characteristics are not highly correlated with each other, mitigating multicollinearity concerns.

3.4 Empirical Results

H1a Test: Effect of Market-type Dispersion on Performance

In order to test H1a, we regress equation (2) employing the different measures of market-type dispersion. Table 3 indicates that the coefficients on the market-type dispersion variables are generally negative and significant, consistent with H1a which states that higher levels of market-type dispersion in a chain lead to lower chain performance. Model (1) indicates that, although not all the disaggregated dispersion measures are individually significant, they are significant at a 5% level when considered as a group with an F-value equal to 2.4. Models (2) and (3) also show negative and significant coefficients for the aggregated measures of dispersion. This result is robust to the method of aggregation, since both, aggregation by multiplication and by addition produce similar results.[9]

With respect to the control variables, Table 3 shows that higher average store sales are associated with having more employees per store, more corporate G&A, and more square-footage per store. The results also indicate that store location characteristics, such as higher household income and higher population densities, are associated with higher store sales. More counterintuitive is the observation that, in some specifications, the number of nearby competitors was positively and significantly associated with store sales, which may be a result reflecting the chains' decision to open more stores in areas with higher sales potential.

The models examined use heteroskedasticity-robust standard errors and have high explanatory power, as described by R-Squared values of at least 70%. The consistency and robustness of our results suggest a robust negative association between market-type dispersion and store performance. The economic significance of this result can be assessed by observing magnitudes of the coefficients on the aggregated dispersion variables. For example, the coefficient on the multiplied, aggregated dispersion measure in specification (2) is -197.162. The summary statistics had indicated that the average of the multiplied, aggregated dispersion measure across chains in the sample is 0.165. Thus, increasing a chain's level of market-type dispersion from zero to the industry average level is associated with a $32,532[10] decrease in *Sales per store*. This amount could be substantial, since it represents 3.9% of the average Sales per store in the sample ($833,000).

[9] Although not reported in the table, we also test the quadratic form of market-type dispersion to see if the impact of market-type dispersion on Sales per store is either more or less negative for high levels of market-type dispersion. The regression results indicate that the coefficient of the quadratic term on market-type dispersion is insignificant.

[10] -197.162 * 0.165 = -32.532. Since Sales per store is reported in thousands of dollars, this number translates to -$32,532.

H2 Test: Moderating Effect of Franchising

To test H2, we regress equation (3) using franchising as the main control mechanism, and the aggregated rather than the disaggregated measures of market-type dispersion (to preserve the degrees of freedom for the interaction terms). The resulting equation is:

$$Performance_i = \alpha_o + \alpha_1 * MDispersion_i + \alpha_2 * Franchising_i + \alpha_3 * MDispersion_i * Franchising_i + \alpha_n * Controls_i + \varepsilon_i \qquad (3a)$$

H2 predicts a significantly positive coefficient α_3, under the rationale that market-type dispersion decreases performance more in un-franchised than in franchised units.

The regression results are presented in Table 4. In models (1) and (2), we first add the franchising variable by itself, without the interaction term. The coefficient on franchising is insignificant,[11] while the coefficient on market-type dispersion remains essentially the same, indicating that franchising is unlikely to be an omitted variable in the H1a test. We then add the interaction terms between market-type dispersion and franchising in Models (3) and (4), and show that the related coefficient is positive and significant, as predicted by H2, regardless of the method of aggregation utilized (i.e., both the multiplied and added aggregated market-type dispersion measures yield significant results when interacted with franchising). The positive and significant interaction terms support the idea that franchising is more beneficial to chain performance when market-type dispersion is high, than when market-type dispersion is low. The magnitude of the interaction effect is also economically significant. For example, the summary statistics in Table 1 indicate that in the sample, the average level of franchising is $3,916 per store, and that the average for the multiplied, aggregated dispersion variable is 0.165. In model (3), the coefficient on the interaction term is 18.221 and the coefficient on market-type dispersion is -203.103. These

[11] This result is consistent with previous studies on franchising, which on average have not found conclusive evidence on the relationship between franchising and performance (Combs, Michael and Castrogiovanni 2004).

magnitudes imply that for a chain, a change from no market-type dispersion to the average level of market-type dispersion is associated with a \$33,677[12] decrease in average store sales if the chain is un-franchised, but with only a \$21,905[13] decrease in average store sales if the chain is franchised at the mean level[14].

The magnitude and significance of the coefficients on the control variables are essentially the same, with the only exception that advertising spending becomes a significant predictor of average store sales in equation (2). The explanatory power of the models is also similar to those in Table 3, with R-squares greater than 0.70.

H3: Moderating Effect of Standardization

As explained in Section 2, the results in the H1 and H2 tests can be driven by either of two effects: the monitoring effect and the customization effect. Thus, whether the monitoring or the customization effect is the dominant effect of market-type dispersion remains an empirical question. To examine which effect dominates, we exploit the fact that these two effects would lead to opposite predictions regarding the effect of standardization on chain performance. If the monitoring effect dominates, standardization should have a positive effect on chain performance, since standardization would decrease the randomness of performance across chain stores serving different markets. If the customization effect dominates, standardization would negatively impact chain performance, since it would prevent store managers from adapting their stores to their local markets. To test the effect of standardization (H3), we regress equation (3) using standardization as the main control mechanism:

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[12] -203.103 * 0.165 = -33.677

[13] -33.677+18.221*0.165*3.916 = -21.905

[14] If H2 is correct and the coefficient of the interaction term can be interpreted as having a causal effect on Sales per store, then the magnitudes of the coefficients also give a sense of when a chain should increase its level of franchising. For example, for specification (3), the coefficient on franchise is -12.304 and the coefficient on the interaction term is 18.221. Thus, if a chain has market-type dispersion level that is above 0.676 (as measured by the multiplied, aggregated dispersion), then the chain should increase its franchising level, because the positive impact of the interaction term will outweigh the negative impact of the franchising term.

$$Performance_i = \alpha_o + \alpha_1 * MDispersion_i + \alpha_2 * Standardization_i$$

$$+ \alpha_3 * MDispersion_i * Standardization_i + \alpha_n * Controls_i + \varepsilon_i \quad (3b)$$

If the monitoring effect dominates, then α_3 should be significant and positive; whereas if the customization effect dominates, then α_3 should be significant and negative.

Table 5 presents our results. In Models (1) and (2), we add the standardization measure by itself, without the interaction with market-type dispersion. The coefficient on standardization is insignificant, consistent with the idea that there exist costs and benefits of standardization, and the market-type dispersion coefficients remain negative and highly significant. Models (3) and (4) incorporate the interaction term for market-type dispersion and standardization, and show that the coefficient for this interaction is positive and significant. This suggests a dominant effect of the monitoring effect over the customization effect, where the benefit of standardization is higher the higher the market-type dispersion of the chain. This result is economically significant based on the size of the coefficients. For example, the summary statistics in Table 1 indicate that the average for the multiplied, aggregated dispersion variable is 0.165. The standardization variable is constructed such that 0 represents no standardization and 50 represents full standardization. In model (3), the coefficient on market-type dispersion is -698.140, and the coefficient on the interaction term is 13.906. These magnitudes imply that for a chain, a change from no market-type dispersion to the average level of market-type dispersion is associated with a \$115,193[15] decrease in average store sales if the chain has no standardization in product assortment, but only a \$468[16] decrease in average store sales if the chain is completely standardized.[17]

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[15] -698.140 * 0.165 = -114.193

[16] -114.193+50*0.165*13.906 = -0.468

[17] A possible explanation for the dominance of the monitoring effect is that convenience store chains essentially compete on location, and are relatively undifferentiated in other dimensions. Thus, the monitoring effect of market-type dispersion may dominate the customization effect because customization is relatively low and irrelevant in convenience stores in comparison to the need to effectively monitor operations across different locations.

Although our overall empirical results suggest that market-type dispersion negatively affects chain performance, our determination of causality may be limited due to two endogeneity concerns. First, it is possible that convenience store chains with certain characteristics may choose similar levels of market-type dispersion, and that these chain characteristics would also affect chain performance. If these characteristics were missing from our model, the regression results would only indicate that lower market-type dispersion is correlated with higher chain performance. Second, a reverse causality problem may exist if chains with certain performance levels are more likely to choose a certain level of market-type dispersion. For example, an alternative explanation to our results (although not very likely) would be that chains with low performance try to enter new markets and target different customer bases, resulting in higher levels of market-type dispersion for unsuccessful chains.

We attempt to address the endogeneity concerns described above in two ways. First, we include chain-characteristic controls in the regression specification. These controls should mitigate omitted variable concerns, assuming we are not leaving out one or more unobserved characteristics that are strongly correlated with both performance and market-type dispersion. Second, market-type dispersion is less endogenous at the store level, because the store manager takes his/her store location as given. Thus, we conduct further tests at the store level in the following section.

IV. Store-Level Empirical Analysis

We use store-level data to test the prediction that higher market-type dispersion is associated with lower store performance (Hypothesis 1b). In the next subsections we describe the data, measures, research methods and empirical results, related to this test.

4.1 Data

The dataset that we employ for the store level empirical analysis is different from that of the chain level analysis. The store level data is provided by a single, privately held convenience store chain with 75 store locations throughout New England, all of which are directly owned by the chain. The dataset includes sales and profit numbers, store characteristic measures, as well as corresponding location characteristic information on each of the chain's stores in 1999. This dataset is particularly suitable for testing H3, because all the stores are homogenous in terms of their operations (i.e., their compensation system, technology, management structure, and product pricing), making it easier to isolate the effect of market-type dispersion on store performance.

4.2 Measurement of Store Level Market-type Dispersion

As defined earlier (in Section 2), market-type dispersion at the store level is the extent to which the store's location characteristics differ from the average location characteristics in the chain. To differentiate these measures from those at the chain level, we refer to store-level dispersion measures as "market divergence" measures. As in the case of the chain level dispersion measures, the relevant location characteristics are those that affect a store's demand. At the chain level, we identified five relevant location characteristics: population density, household income, competition, population ethnicity, and the number of business establishments in the region. Here, we employ these same location characteristics, with the exception of population ethnicity and the number of business establishments in the region, which unfortunately are not available from the store level dataset. In the store level dataset, the location characteristics are measured within a quarter-mile radius around each store. The quarter-mile radius area corresponds with the census block-group area in the chain level tests, because, on average, each quarter-mile area has a population size of 2,849, which is within range of the population size in a census block-group.

To calculate market divergence at the store level, we calculate the absolute value of the difference between the value of a location characteristic L for store j, and the average value of location characteristic L across all stores in the chain, i.e., $\left| L_j - \overline{L} \right|$. This measure has different units for different location characteristics (e.g. per capita income divergence is measured in dollar terms, while average household size is measured in number of persons). To make the measures of different location characteristics comparable, we normalize this divergence measure by the standard deviation of the L values for all stores in the chain. Thus, we define for each location characteristic:

$$Normalized\ Divergence_{Lj} = \frac{\left| L_j - \overline{L} \right|}{std\ deviation_L} \quad (5)$$

This measure indicates how many standard deviations store j's location characteristic L is away from the chain's average. We aggregate this normalized divergence metrics, through either multiplying ($MDivergence\_Mult_j$) or adding ($MDivergence\_Sum_j$) the *Normalized Divergence* measure across the three different location characteristics. As in the case of the chain level dispersion measures, the aggregated divergence metric constructed through addition would treat the five market characteristic dimensions as independent of one another, while the aggregated divergence measure constructed through multiplication would contain interaction effects for the different location characteristics.

4.3 Research Methods and Descriptive Statistics

To test Hypothesis 1b, we use a similar regression to that in equation (2), where the regression variables apply to store j rather than chain i. Our new OLS regression uses heteroskedasticity-robust standard errors and is specified as:

$$Performance_j = \gamma_o + \gamma_1 * MDivergence_j + \gamma_n * Controls_j + \varepsilon_j \quad (2)$$

The variable $Performance_j$ is measured as either annual store sales or annual store profits. None of the stores in the chain owns gas stations, and thus, both the sales and profits numbers are entirely derived from the convenience store business. $MDivergence_j$ is the store's level of market-type divergence. If H1a is correct, then the coefficient γ_1 should be significant and negative. Finally, $Controls_j$ is a vector of control variables for store j that includes store and location characteristics (listed in Table 6) that could potentially be correlated with both market-type divergence and store performance.

Table 6 presents descriptive statistics of all the variables utilized in our regression. The data shows that the chain has average annual store profits of $ 424,713 and average annual store sales of $1,176,770, which are within one standard deviation of the $ 833,042 average annual store sales for a typical chain in the firm level sample, shown in Table 1. Additionally, the chain in the store level data owns 75 stores and has an average store size of 2,110 square feet; these characteristics are also similar to those of a typical convenience store chain (shown in Table 1).

The summary statistics also indicate how much dispersion exists at the store level for different location characteristics. For example, for stores in the chain, the *Normalized Divergence* in household income has a minimum value of 0.004 and a maximum value of 3.317, indicating that some store locations have almost exactly the average level of household income within the chain, while other stores can be up to three standard deviations away from the chain average. The *Normalized Divergence* measures for different location characteristics also have similar distributions, since they have similar values for their average and standard deviation.

Table 7 shows that the disaggregated dispersion measures on population density, household income, and competition have low correlations with each other, suggesting multicollinearity is not a problem. Additionally, the multiplied, aggregated dispersion has a 0.901 correlation with the disaggregated competition dispersion, suggesting that the competition dispersion receives dominant weighting in the aggregated measure. On the other hand, the added, aggregated dispersion has a relatively high correlation with all three disaggregated dispersion measures. Overall, the added, aggregated and the multiplied, aggregated dispersion measures are highly correlated with each other.

4.4 Empirical Results

The regression results are consistent with H3, which states that higher market-type divergence leads to lower performance at a store level. In Table 8, the coefficients on all divergence measures are negative, as predicted by H3, regardless of whether the dependent variable is annual store sales (models 1-3) or annual store profits (models 4-6).

The coefficients on the aggregated versions of dispersion, however, are more significant than those on the disaggregated dispersion, and therefore provide stronger evidence for H3. In models (1) and (4), the F-values on the disaggregated dispersion variables are 1.74 and 1.96, which have a significance level of 16.8% and 12.9% respectively. In contrast, the aggregated dispersion measures in models (2), (3), (5) and (6) are all significant at the 5% or 10% level. The magnitudes of the aggregated dispersion coefficients give us a sense of the size of the market-type dispersion's impact on performance. For example, the coefficient on the multiplied, aggregated dispersion variable in model (2) is statistically significant and has a value of -149.664. The average value of the multiplied, aggregated dispersion variable is 0.358 in Table 6. Thus, model (2) indicates that for a store, an increase in market-type dispersion from a level of zero to the average level for stores in the chain is associated with a $53,580[18] decrease in annual store sales. This amount is substantial, since it represents 3.55%, of the average store sales ($1,176,770). It is worth noting that the magnitude of the impact that market-type dispersion has on performance is similar at both the chain level and the store level.

[18] -149.664 * 0.358 = -53.580, which translates to -$53,580 in sales.

The control variables also behave in a way that seems reasonable for a typical convenience store chain: manager tenure, the number of hours that a store is open, population density, and household income are positively associated with sales and profits. Nearby competition is also positively associated with sales and profits, perhaps because this variable captures the level of demand in the area. We notice that for both the chain and store level results, the coefficients on corresponding location characteristic controls are significant and in the same direction, suggesting that the chain in the store level dataset is representative of convenience store chains.

V. Alternative Explanations

In this section, we consider alternative explanations for our empirical results. We assess the possibility that our results be driven by outliers, survivorship bias, or endogeneity.

First, for all results, we check their robustness against outliers. We define outliers as observations with regression residuals three standard deviations away from the mean. By this criterion, there usually are one or two outliers for each regression specification. Our analyses show that the regression results are not significantly altered after excluding outliers.

Second, we consider survivorship bias. In order for survivorship bias to undermine our results, it must be the case that both the chains and the stores that have closed down due to low performance also had low levels of market-type dispersion. We test this possibility using data from the stores closed down by the New England convenience store chain over the three year period ending in 1999. Interestingly, the stores that closed down had higher levels of market-type dispersion than the average levels from all other stores in the chain along every location characteristic. This suggests that the magnitudes of the coefficient on market-type dispersion should be even larger than those observed in the regressions.

Finally, concerns with endogeneity are considered. As discussed earlier, the store level analysis alleviates endogeneity concerns (such as correlated omitted variables and reverse causality), since the store manager does not choose the store location and takes his/her store's level of market-type divergence as given. Although, some correlated omitted variables may persist if the chain chooses certain store characteristics for stores with higher levels of market-type dispersion (e.g. the chain could assign less experienced store managers in the stores with higher market-type dispersion). We attempt to control for such variables in our store-level analyses. Omitted variable bias also seems less plausible as an alternative in the market-type dispersion and control mechanism interaction tests for H2 and H3. Omitted variables are less likely to explain the fact that market-type dispersion affects the performance of franchised (standardized) and un-franchised (un-standardized) chains in different ways. If an omitted variable affects both a chain's franchising (standardization) and market-type dispersion decisions, then including franchising (standardization) in the equation should affect the magnitude and significance of the market-type dispersion variable. This is inconsistent with our findings, where the coefficients on market-type dispersion are similar with or without the control mechanisms included in the regressions.

VI. Conclusions

In this paper we examine the impact of market-type dispersion on performance. We conjectured that market-type dispersion would negatively influence chain and store performance as it creates higher information asymmetries that translate into a monitoring effect (where performance becomes a noisier indicator of store manager effort) and a customization effect (where stores have a higher need for customization, making the mainstream chain operations less optimal in stores with higher market-type divergence).

Consistent with our expectations, our empirical results suggest that: (1) higher market-type dispersion is associated with lower performance both at the chain-level and at the store-level; (2) two control mechanisms—franchising and standardization— are able to mitigate the negative effects that market-type dispersion has on performance. The standardization results are particularly interesting since they can only mitigate the negative effect of market-type dispersion if that effect comes from the monitoring effect rather than the customization effect. The fact that standardization is associated with higher benefits for chains with higher levels of market-type dispersion suggests the monitoring effect dominates the customization effect.

Our study is relevant to the academic literature as well as to practitioners since it provides insights on how an important factor (market-type dispersion) affects the performance of firms and points out to control mechanisms that could alleviate the control problems created by market-type dispersion. Nevertheless, our results need to be interpreted with caution for two reasons: (1) Although we do our best to account for survivorship and endogeneity biases, it is still possible that some of those biases remain unresolved; (2) Our two datasets are limited to an industry and a single convenience store chain. We believe the use of a single convenience store chain is not particularly problematic, because the store-level results are highly consistent in significance and magnitude with those at the chain-level.

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Table 1 - Summary Statistics (Firm Level Analysis)

Variable	Mean	Standard Deviation	Minimum	Maximum
Average Store Performance (Dependent Variable)				
Average merchandise sales per store (in $ thousands)	833.042	353.238	372.039	2389.360
Chain Characteristics				
Number of stores	207.920	660.643	2.000	5804.000
Average square feet per store	2552.607	611.301	1225.000	4156.000
Employees per store	10.415	4.190	4.090	31.280
Advertising spending (in $ millions)	1.677	5.558	0.000	44.600
Corporate G&A spending (in $ millions)	14.900	56.600	0.000	497.000
% stores with gas station	16.517	38.926	0.000	100.000
Stores opened previous year	3.404	11.129	0.000	95.000
Location Characteristics				
Nearby businesses	284.520	284.521	164.063	1771.692
Household income (in $ thousands)	40.261	7.707	27.107	70.373
Population density	2576.433	1925.451	108.300	12055.290
% population black	9.782	9.947	0.000	3.841
% population Asian	1.825	2.318	0.000	19.237
Competition	2.750	0.772	1.333	4.500
Terms for interaction				
Franchise	3915.681	16644.180	0.000	137491.700
Standardization	36.215	18.277	0.000	50.000
Disaggregated market-type dispersion				
St dev - nearby businesses dispersion	628.292	223.323	161.928	1367.986
St dev - household income dispersion (in $ thousands)	14.566	4.932	2.558	29.990
St dev - population density dispersion	2919.274	2965.336	11.282	19028.890
St dev - % population black dispersion	12.831	10.783	0.000	52.581
St dev - % population asian dispersion	2.819	2.864	0.000	1.752
St dev - Competition dispersion	1.724	0.764	0.500	4.724
Normalized - nearby businesses dispersion	0.575	0.204	0.148	1.251
Normalized - household income dispersion	0.334	0.113	0.059	0.687
Normalized - population density dispersion	0.707	0.718	0.003	4.608
Normalized - % population black dispersion	1.309	1.100	0.000	5.365
Normalized - % population Asian dispersion	0.823	0.836	0.000	5.112
Normalized - Competition dispersion	0.631	0.280	0.183	1.728
Aggregated Market-type dispersion				
Normalized - multiplied, aggregated dispersion	0.165	0.389	0.000	2.520
Normalized - added, aggregated dispersion	4.378	1.836	1.176	9.060

Table 2 - Market-Dispersion Measures Correlation Matrix

	Correlation							
Std_Deviation measure	Nearby Businesses	Income	Pop density	% black	% asian	Competition	Multiplied, Agg.	Added, Agg.
Nearby businesses	1.000							
Household income	0.048	1.000						
Population density	0.151	0.090	1.000					
% population black	0.049	0.586	-0.132	1.000				
% population asian	0.234	0.304	0.501	-0.066	1.000			
Competition	0.099	0.202	-0.202	0.250	-0.031	1.000		
Multiplied, Aggregated	0.220	0.454	0.384	0.249	0.497	0.142	1.000	
Added, Aggregated	0.327	0.630	0.544	0.606	0.661	0.225	0.608	1.000

Note: All correlations in the table are between different Std_Deviation measures and the aggregated measures that either multiply or add the individual normalized dispersion measures. Column labels are abbreviated, they should match the row labels.

Table 3 - H1a Test for Market-type Dispersion

	Dependent Variable: Average merchandise sales per store		
Explanatory Variables:	(1)	(2)	(3)
Market-type Dispersion			
Nearby businesses dispersion	-3351.153**		
	(161.064)		
Household income dispersion	-811.403**		
	(351.895)		
Population density dispersion	13.892		
	(79.563)		
% population black dispersion	34.763		
	(39.618)		
% population asian dispersion	-108.561*		
	(61.704)		
Competition dispersion	-172.335*		
	(90.419)		
Aggregated dispersion		-197.162**	-49.127**
		(70.890)	(22.600)
Location Characteristic Controls			
Nearby businesses	0.220*	0.019	0.020
	(0.122)	(0.112)	(0.0120)
Household income	12.477***	8.897*	8.179**
	(4.168)	(4.611)	(4.304)
Population density	0.0511**	0.049**	0.056**
	(0.025)	(0.022)	(0.025)
% population black	-6.374	-4.094	-2.369
	(4.148)	(2.472)	(2.814)
% population asian	-0.055	-25.282	-13.903
	(20.059)	(16.257)	(17.401)
Competition	102.244*	55.510	64.099*
	(52.356)	(37.423)	(38.357)
Chain Characteristic Controls			
Number of stores	-0.922***	-0.337**	-0.290**
	(0.179)	(0.102)	(0.117)
Average square feet per store	0.202***	0.116**	0.146***
	(0.052)	(0.043)	(0.046)
Employees per store	0.064***	27.584**	25.586*
	(0.022)	(13.533)	(13.093)
Advertising spending	7.293	10.615	15.280
	(11.619)	(11.128)	(10.471)
Corporate G&A spending	3.564***	4.059**	2.398***
	(1.115)	(1.067)	(0.859)
% stores with gas station	-0.948	-1.824	-2.300
	(1.928)	(1.495)	(1.628)
Stores opened previous year	12.412**	12.880*	11.846*
	(6.138)	(7.432)	(6.798)
Dispersion construction			
Disaggregated	Yes	No	No
Aggregation method	--	Multiply	Add
F test on Dispersion measures	F = 2.40 **	-	--
R-Squared	0.72	0.71	0.71
N	84	84	84

Note: Heteroskedasticity-robust standard errors appear in parenthesis below the coefficient. The dependent variable is measured in thousands of dollars. Coefficients that are significantly different from zero are denoted as follows: *10%, **5%, ***1%.

Table 4 - H2 Test for Interaction Effect of Market-type Dispersion and Franchising

	Dependent Variable: Average merchandise sales per store			
Explanatory Variables:	(1)	(2)	(3)	(4)
Market-type Dispersion				
Dispersion	-163.296**	-42.454*	-204.103**	-51.721*
	(80.855)	(24.168)	(81.837)	(26.248)
Franchise	-3.211	-3.568	-12.304**	-31.651**
	(2.61)	(2.250)	(6.167)	(13.066)
Dispersion * Franchise			18.221*	4.779**
			(9.624)	(2.092)
Location Characteristic Controls				
Nearby businesses	0.026	0.030	0.044	0.042
	(0.111)	(0.109)	(0.108)	(0.104)
Household income	9.053*	8.492*	8.079	6.953
	(4.744)	(4.477)	(4.948)	(4.665)
Population density	0.047**	0.054**	0.046**	0.053**
	(0.227)	(0.025)	(0.023)	(0.026)
% population black	-4.327*	-0.947	-4.745**	-1.242
	(2.471)	(2.915)	(2.505)	(2.982)
% population asian	-25.519	-15.710	-23.508	-11.373
	(16.585)	(17.946)	(16.541)	(18.581)
Competition	58.919	66.717*	69.105*	84.865**
	(36.746)	(37.896)	(38.818)	(42.180)
Chain Characteristic Controls				
Number of stores	-0.286**	-0.245*	-0.330***	-0.282**
	(0.129)	(0.137)	(0.123)	(0.133)
Average square feet per store	0.117***	0.142***	0.120***	0.146***
	(0.043)	(0.046)	(0.042)	0.047
Employees per store	30.246**	28.874**	34.708**	34.926**
	(13.564)	(13.249)	(13.870)	(13.776)
Advertising spending	13.023	17.044*	10.537	12.796
	(10.169)	(10.132)	(11.017)	(9.903)
Corporate G&A spending	3.148**	1.745	3.745**	2.351**
	(1.433)	(1.073)	(1.502)	(1.067)8
% stores with gas station	-1.792	-2.150	-1.563	-2.075
	(1.480)	(1.611)	(1.398)	(1.545)
Stores opened previous year	11.569	10.719	12.374*	11.777*
	(7.458)	(6.893)	(7.273)	(6.362)
Dispersion construction				
Aggregation method	Multiply	Add	Multiply	Add
F test on Dispersion	--	--	F = 4.11 **	F = 3.18 **
R-Squared	0.71	0.71	0.73	0.73
N	84	84	84	84

Note: Heteroskedasticity-robust standard errors appear in parenthesis below the coefficient. The dependent variable is measured in thousands of dollars. Coefficients that are significantly different from zero are denoted as follows: *10%, **5%, ***1%.

Table 5 – H3 Test for Interaction Effect of Market-type Dispersion and Standardization

	Dependent Variable: Average merchandise sales per store			
Explanatory Variables:	(1)	(2)	(3)	(4)
Market-type Dispersion				
Dispersion	-188.948***	-47.629**	-698.140**	-99.758***
	(69.233)	(22.518)	(260.979)	(37.264)
Standardization	914.387	1108.206	-493.679	-4014.34
	(1182.360)	(1176.032)	(1299.528)	(2855.041)
Dispersion * Standardization			13.906**	1.285*
			(6.428)	(0.689)
Location Characteristic Controls				
Nearby businesses	0.016	0.017	0.298	0.066
	(0.115)	(0.113)	(0.113)	(0.116)
Household income	9.454*	8.888*	10.345*	9.768*
	4.895	4.629	5.263	5.023
Population density	0.046*	0.052**	0.048**	0.054**
	(0.023)	(0.026)	(0.023)	(0.024)
% population black	-4.146	-0.390	-4.069	-0.448
	(2.542)	(2.914)	(2.603)	(3.045)
% population asian	-24.833	-13.695	-28.189	-15.0156
	(16.784)	(17.876)	(17.825)	(19.493)
Competition	54.541	62.674	53.783	66.840*
	(37.673)	(38.609)	(37.353)	(37.740)
Chain Characteristic Controls				
Number of stores	-0.320***	-0.271**	-0.379***	-0.300**
	(0.104)	(0.115)	(0.097)	(0.116)
Average square feet per store	0.116***	0.145***	0.107**	0.139***
	(0.044)	(0.047)	(0.043)	(0.045)
Employees per store	27.371**	25.378*	28.330**	25.155*
	(13.655)	(13.248)	(13.601)	(13.350)
Advertising spending	9.013	13.053	16.838	7.482
	(11.720)	(11.059)	(20.474)	(11.511)
Corporate G&A spending	4.019***	2.444***	8.136***	3.476***
	(1.023)	(0.835)	(2.661)	(1.032)
% stores with gas station	-1.872	-2.328	-1.829	-2.155
	(1.540)	(1.659)	(1.590)	(1.7036)
Stores opened previous year	13.032*	12.098*	16.998***	13.423**
	(7.028)	(6.306)	(5.650)	(5.237)
Dispersion construction				
Aggregation method	Multiply	Add	Multiply	Add
F test on Dispersion	--	--	F = 4.67 **	F = 3.67 **
R-Squared	0.71	0.71	0.73	0.72
N	84	84	84	84

Note: Heteroskedasticity-robust standard errors appear in parenthesis below the coefficient. The dependent variable is measured in thousands of dollars. Coefficients that are significantly different from zero are denoted as follows: *10%, **5%, ***1%.

Table 6 - Summary Statistics (Store Level Analysis)

Variable	Description	Mean	Standard Deviation	Minimum	Maximum
Store Performance (Dependent Variable)					
Profits (in $ thousands)		424.713	115.056	237.864	767.548
Sales (in $ thousands)		1176.770	293.165	706.138	2087.490
Location Characteristic Controls					
Population		2849.493	1788.244	195.000	7825.000
Household income (in $ thousands)		6.981	1.526	4.743	12.044
Nearby competitors		1.415	2.588	0.000	15.385
Store Characteristic Controls					
Store age		18.221	6.152	6.514	32.458
Square feet		2110.573	383.746	1270.000	2919.000
Manager tenure	Number of months at the store	52.078	53.288	4.899	272.871
Crew tenure	Number of months at the store	12.755	15.171	2.813	95.073
Open 24 hours	Dummy equaling 1 if store is open 24 hours, 0 otherwise	0.840	0.369	0.000	1.000
Visibility	How visible a store is, as judged by the chain on a scale of 0-5	3.080	0.749	2.000	5.000
Service quality	Judged by the chain based on a scorecard for a range of service categories, such as the cleanliness of the store, the number of customer complaints, etc.	0.964	0.039	0.865	1.041
Market-type Divergence					
Normalized - Population		0.814	0.573	0.038	2.782
Normalized - Household income		0.740	0.667	0.004	3.317
Normalized - Nearby competitors		0.509	0.859	0.012	5.397
Multiplied, aggregated		0.358	1.023	0.001	6.393
Added, aggregated		2.063	1.261	0.567	7.542

Table 7 - Market-Divergence Measures Correlation Matrix (Store Level Analysis)

	Correlation				
Divergence measure	Population	Household income	Competition	Multiplied, Aggregated	Added, Aggregated
Population	1.000				
Household income	-0.200	1.000			
Competition	0.242	-0.007	1.000		
Multiplied, Aggregated	0.272	0.182	0.901	1.000	
Added, Aggregated	0.514	0.434	0.788	0.834	1.000

Note: All correlations in the table are between different divergence measures and the aggregated measures that either multiply or add the individual normalized dispersion measures.

Table 8 – H1b Test for Market-Type Divergence (Store Level Analysis)

	Dependent Variable:					
	Sales			Profits		
Explanatory Variables:	(1)	(2)	(3)	(4)	(5)	(6)
Market-type Dispersion						
Population density dispersion	-52.924			-31.948		
	(63.084)			(24.632)		
Household income dispersion	-29.116			-11.488		
	(39.612)			(15.888)		
Competition dispersion	-192.732**			-74.704**		
	(96.588)			(35.688)		
Aggregated dispersion		-149.664**	-67.352*		-54.736**	-27.996*
		(58.356)	(35.820)		(21.636)	
Location Characteristic Controls						
Population density	0.023***	0.023***	0.023***	0.010***	0.009***	0.009***
	(0.051)	(0.042)	(0.048)	(0.002)	(0.002)	(0.002)
Household income	7.237	9.497**	10.744**	4.597**	5.286***	5.906***
	(4.675)	(3.828)	(4.042)	(1.866)	(1.739)	(1.759)
Nearby competitors	16.160*	13.121**	6.301	5.822*	4.109*	1.935
	(8.353)	(5.879)	(4.306)	(3.105)	(2.112)	(1.752)
Store Characteristic Controls						
Store age	0.685	0.308	0.909	0.106	-0.011	0.194
	(1.163)	(1.202)	(1.096)	(0.479)	(0.490)	(0.451)
Square feet	0.006	0.014	0.003	-0.001	0.003	-0.002
	(0.025)	(0.024)	(0.024)	(0.009)	(0.009)	(0.009)
Manager tenure	0.782***	0.796***	0.711***	0.316***	0.312***	0.283***
	(0.164)	(0.147)	(0.146)	(0.084)	(0.073)	(0.072)
Crew tenure	0.0277	0.045	0.328	0.048	-0.062	0.048
	(0.407)	(0.363)	(0.381)	(0.143)	(0.139)	(0.136)
Open 24 hours	60.671***	60.579***	57.548***	19.316***	18.587***	17.630***
	(15.604)	(15.406)	(15.905)	(6.710)	(6.902)	(7.090)
Visibility	4.393	1.247	3.169	1.818	1.327	1.812
	(9.513)	(8.959)	(9.142)	(3.692)	(3.397)	(3.531)
Service offering	128.396	79.636	189.689	19.234	-5.258	37.481
	(175.935)	(183.957)	(184.553)	(66.546)	(69.419)	(67.162)
Dispersion construction						
Disaggregated	Yes	No	No	Yes	No	No
Aggregation method	--	Multiply	Add	--	Multiply	Add
F test on Dispersion	F = 1.74	--	--	F = 1.96	--	--
R-Squared	0.56	0.57	0.54	0.60	0.60	0.58
N	75	75	75	75	75	75

Note: Heteroskedasticity-robust standard errors appear in parenthesis below the coefficient. The dependent variables, sales and profits, are measured in thousands of dollars. Coefficients that are significantly different from zero are denoted as follows: *10%, **5%, ***1%.