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ABSTRACT

One empirical phenomenon that has received little attention in the franchising literature is the tendency for individual franchisees to own not just one but several units of a given franchised chain. Most current theories of franchising, based on incentives, information asymmetries, and strategic arguments, have little capacity to explain this phenomenon. In fact, several of them imply that all units should be independently owned and operated. However, given the existence of multi-unit owners, most of the theories have implications for the extent to which units owned by a single owner should be 1) geographically near each other, 2) located in areas where populations display similar demographic characteristics, and 3) contiguous to each other, that is, should share a market boundary.

This paper provides empirical evidence that restaurants of individual owners in the six largest fast-food chains in Texas are geographically close to each other, that they are located in areas with similar demographic characteristics, and that they are contiguous. This evidence suggests among other things that franchising is not a strategic delegation device, and that the location of units is not determined by the franchisee's desire to diversify away risk. Instead, the minimization of monitoring or free-riding costs, and the franchisor's reliance on the franchisee's local market expertise, appear to be central concerns in the allocation of units across franchisees.

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1. INTRODUCTION

The literature on franchising, both theoretical and empirical, has grown significantly over the last decade.[1] Still, many interesting features of this organizational form have barely been documented, let alone studied in any detail. For example, in theoretical as well as empirical analyses, the franchised chain is typically described as a combination of franchisor-owned and franchisee-owned units, with the presumption that the latter are all individually owned and operated. Yet a more realistic characterization of the franchised component of a chain is that it is composed not only of units of single-unit franchisees, but also of many franchisee-owned "mini chains" (Bradach, 1995). On average, for example, McDonald's franchisees own about three franchised restaurants. Robicheaux, Dant and Kaufmann (1994) report that 87% of the 160 fast-food franchised systems covered in their survey included multi-unit owners, with an average 33% of the franchisees in these systems operating more than one unit. The data set used here shows that over 88% of the franchised fast-food restaurants of the six largest chains in Texas are operated by multi-unit franchisees.

As can be seen from these statistics, multi-unit franchising is a pervasive phenomenon. Yet only a few studies have explicitly focused on it. In particular, Kaufmann and Kim (1995) examined empirically the relationship between "master franchising," a type of multi-unit franchising that includes those owners who are given all at once the right to develop several units in a given territory, and system growth rates (in number of units). They find that the use of master franchising correlates positively with chain growth. Kaufmann and Dant (1996) confirm these results, and further show that the use of

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[1] For general overviews of single-unit franchising theories, see for example Brickley and Dark (1987), Lafontaine (1992a), and Lafontaine and Shaw (1996). For a recent review of the empirical literature, see Lafontaine and Slade (1997).

franchising relates negatively to the average number of units of franchisees. Bradach (1995) considered more generally the reasons why firms use multi-unit franchising. Using in-depth interviews, he found that chain executives perceive multi-unit franchisees to be better than single-unit franchisees in terms of adding units, of maintaining uniformity within the chain, and of system-wide adaptation to changes in the firm's competitive environment. However, executives also considered that owners of mini-chains may not adapt to local conditions as well as single-unit owners do. Finally, Brickley (1995) relates the extent to which firms use area development agreements, which give rise to multi-unit franchising, to a classification of businesses based on the degree of repeat business they generate. Consistent with his argument that area development agreements are used to reduce free-riding problems - expected to be particularly acute in non-repeat businesses - he finds that area development agreements are significantly more likely to be used by franchisors involved in non-repeat customer industries.

This paper contributes to this embryonic literature on multi-unit franchising by providing information on several characteristics of franchisee-owned mini-chains, and relating these characteristics to existing theories of franchising. More specifically, we derive and assess a set of implications arising from the theories as to how close one should expect the units of an individual franchisee to be to each other, in terms of geographic distance and in terms of the demographic characteristics of the populations around them, and about whether we should expect the units to be contiguous or not, meaning whether they would share a market boundary (given distance). We do this using data on all the restaurants of the six largest franchised fast-food chains operating in the State of Texas as of December 1995. We provide evidence that units of a franchisee tend to be 1) geographically close to each other, 2) located in markets with similar demographic characteristics, and 3) contiguous. Finally, we find that the franchisor-owned component of these chains displays different locational patterns in that, given distance, contiguity and demographic similarity do not contribute anything further to the likelihood of franchisor ownership.

The paper is organized as follows. In the next section, we discuss the theories that have implications regarding the attributes of franchisee-owned mini-chains. We also discuss which of these implications should apply to franchisor-owned units. The third section describes data sources and provides some descriptive statistics. The empirical methods and results are discussed in the fourth and fifth sections respectively. Concluding remarks are found in section six.

2. THEORETICAL ARGUMENTS AND IMPLICATIONS

There are two main ways in which franchisees become multiple-unit owners. The most common is by the sequential acquisition of franchised units. Typically, in these cases, franchisees are assessed the then current franchise fee and royalty rate for each additional units, namely the fees that other franchisees joining the chain at that point in time are required to pay.[2] However, data in Bhattacharyya and Lafontaine (1995) show that in some chains, franchisees buying additional units are assessed a lower franchise fee for these units.

The other way to become a multi-unit owner is with an area development agreement, where the area developer is granted the right to establish a pre-specified number of units in an exclusive territory over a prescribed time table.[3] In Bond's 1996 Franchise

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[2] See Lafontaine (1992a and 1992b) and Sen (1993) for evidence that contracts are mostly standardized for all franchisees of a given franchisor joining the chain at a given point in time.
[3] Area development agreements are different from subfranchising agreements where the subfranchisor is granted the right to find the franchisees to develop a territory, and to contract with them. In other words, under an area development agreement, the grantee establishes and operates the units, whereas under a subfranchising agreement, the grantee is given the right "to grant to others the right to

Guide, 164 of the 218 restaurant franchisors for which these data are available use area development agreements.[4] The standard practice in these cases is for the area developer to be the franchisee for all these units, that is to own and operate them all, by himself or via some partnership. According to Lowell (1991), the area developer is assessed a fixed fee for the right to develop his or her territory, and then pays the then current franchise fee and royalty rate for each unit as it becomes operational. Bond (1996) argues that both the franchise fee and the royalty rate are sometimes reduced under this type of agreement. However, Bhattacharyya and Lafontaine (1995) find reduced franchise fees but no reduction in royalty rates for area development agreements among the 55 franchisors in their sample.

A number of different theoretical arguments have implications with respect to the characteristics of the franchisee-owned mini-chains. We present these below, starting with those that relate to geographic distance, followed by those related to the demographic characteristics of markets surrounding the units, and ending with those that relate to the contiguity of the units. Table 1, at the end of this section, summarizes this discussion. Most importantly, this table establishes that while some of the theoretical arguments give the same implications, others go in opposite directions. Thus the issue of how franchised mini-chains are organized physically is empirical, and assessing the patterns in the data can help us sort out which theoretical arguments for franchising, and other forms of contracting and

establish and operate units" in the territory, which means the grantee is the one who contracts with the franchisees (Lowell, 1991, p. 22). Note that both types of agreements are forms of master franchising. See Lowell (1991), Kaufmann and Kim (1995), and Bond (1996) for more on this.

[4] Of the six chains in this study, Burger King and McDonald's do not use area development agreements. Subway uses subfranchising agreements which do not imply multi-unit franchising as the subfranchisee may choose a different franchisee for each unit within its territory. Finally, Dairy Queen and Pizza Hut use area development agreements, and while we were unable to confirm this completely, we believe Taco Bell also does. Looking at the maps in Appendix A, however, it is not obvious that these agreements have played much of a role in the development of the Texas market for those chains that do use them.

vertical relationships, may be most promising.

2.1 On the Geographic Distance Between Units of a Multi-Unit Owner

In the existing literature on franchising, authors typically assume that franchise contracts provide higher powered incentives to franchisees than employment contracts provide to managers of franchisor-owned units (Rubin, 1978; Mathewson and Winter, 1985; Brickley and Dark, 1987; Lutz, 1995).[5] As a result, there is a greater need to monitor managers than franchisees.[6] Authors have tested and found support for the hypotheses that the need to keep down monitoring costs for franchisor-owned units would lead franchisors to operate directly mostly units that are relatively close to headquarters (Brickley and Dark, 1987; Minkler, 1990), or units that are close to each other (Brickley, Dark and Weisbach, 1991a).[7]

As noted by Brickley and Dark (1987), multi-unit franchisees face a similar problem to franchisors in franchisor-owned units: they hire managers with contracts that give them relatively low-powered incentives. Monitoring the behavior of these managers will thus be particularly important to the success of the mini-chain. As a result, the multi-unit franchisee would want to own units that are close enough to their monitoring headquarters, and/or close enough to each other, to make this monitoring less costly. Further, franchisors lose nothing, and may even gain something if they can extract some of the higher profits of the franchisee, by assigning units to franchisees so that monitoring costs are minimized. Therefore, based on incentive and monitoring issues, one would

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[5] In some of the literature, the different incentives are taken to arise mostly from observed differences in residual claimancy rights. In other models, they arise from differences in the ownership of assets.
[6] See Dnes (1992: e.g. at 130) and Lafontaine (1992b) on differences in the frequency of monitoring franchisees versus managers of franchisor-operated units, and Bradach (1994), and Kaufmann and Lafontaine (1994) on the amount of resources devoted to overseeing managers and franchisees in a chain.

expect the units of a franchisee-owned mini chain to be close to each other.

The free-riding argument provides another reason to expect units of a multi-unit owner to be close to each other. This argument is a classic externality one: franchisees, because they have residual claimancy rights, internalize fully the benefits of reducing quality - say by using lower quality inputs at lower prices, or putting less resources into promotion or advertising - but bear only part of the cost of this reduction in quality. Thus they choose too low a level of quality, and free-ride on the value of the tradename or on the services provided by other franchisees and managers of company-owned units (see e.g. Klein, 1980, and Brickley and Dark, 1987). Brickley and Dark (1987) and Brickley (1995) argue that multiple-unit ownership resolve to some extent the free-riding problem in that the multi-unit franchisee internalizes a larger proportion of the cost of quality debasement, making him choose a higher level of quality than what he would choose if he owned only one unit. In that sense, the free-riding argument provides a rationale for franchisors using multi-unit ownership. In addition, if one assumes that the externality problem is mostly localized, in that the units that are close to a particular unit suffer most from quality debasement at that one unit, then allowing a franchisee to own several units close to each other would be a particularly effective way to combat the free-riding problem. Under such circumstances, franchisors would want to cluster the units of their multi-unit franchisees within local areas, and maybe use area development agreements as suggested by Brickley (1995). Note that the same desire for clustering would arise from the existence of a different externality problem, namely "too much" localized competition among units. We come back to this issue below.

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[7] Equivalently, the notion that chains with more geographically dispersed units would franchise more has also been supported in the literature. See e.g. Lafontaine (1992a) and Scott (1995).

A different strand of literature, in organizational theory, suggests that the ability to transmit knowledge between units owned by the same owner makes multi-unit ownership an efficient mode of organization. Darr, Argote and Epple (1995) for example note that stores belonging to single unit owners "were not able to benefit from production experience at other stores. Consistent with our results, they were less productive than their counterparts in multiple store franchises." (p. 1761) These authors point to regular communication, personal acquaintances and more frequent meetings as the mechanisms used to transfer knowledge, and note that geographic proximity would facilitate all of these. Hence, from a cost minimization perspective, franchisees would again want their units to be located near each other, and franchisors should see no harm in allowing this either.

Going against the above arguments, there is one main reason to expect franchisees to want units that are far apart geographically: assuming that the franchisee is risk averse, spreading the units he or she operates over a larger territory provides some diversification benefit. This implies that the franchisee would require a lower risk premium to operate a set of units that are far apart compared to a set of units clustered together. As this is costless to franchisors, and may even benefit those who find ways to extract the extra rents thereby created, one would expect that franchisors would allow franchisees to own units that are far apart geographically if multi-unit franchisees are risk averse and, as a result, seek to diversify their franchise holdings.

2.2 On the Demographic Characteristics of the Markets Served by Units of a Multi-Unit Owner

The franchisee's knowledge of local market conditions has been put forward as a reason for franchisors to use franchising in a number of models: authors have pointed to the franchisee's knowledge of realized local demand (Matthewson and Winter, 1985; Norton, 1988), of consumer tastes (Minkler, 1990 and 1992), and, more generally, of unit productivity (Lafontaine and Bhattacharyya, 1995). Of course, multi-unit franchisees face an information asymmetry problem similar to franchisors' when they attempt to operate units located in demographically diverse areas: they may have little knowledge of supply conditions or local tastes in these different markets. They too must rely on managers who may not reveal information truthfully, or may simply not act on what they know because their employment contracts do not give them incentives to do so. Hence multi-unit franchisees might do best to operate units in markets that are familiar to them, and similar to each other. Further, as the franchisee could operate units in such areas most efficiently, franchisors should not mind, and may even benefit from, assigning units to franchisees who are knowledgeable about these local markets. Thus the need for local market expertise suggests that we should find units of a multi-unit owner concentrated in demographically similar areas.

However, here again, franchisee risk aversion might lead to the opposite conclusion. That is, if local knowledge is not an issue, a risk averse franchisee in search of diversification might prefer to operate units that are in demographically varied markets so as to maximize the risk reduction effect associated with owning a given number of units. Of course, if local knowledge is important, risk averse franchisees might choose to operate units in similar demographic areas - that is they may want to concentrate on markets they know about. This, however, brings back the issue of local knowledge rather than risk aversion as the main determining factor of the ownership choices these franchisees make.

2.3 On Unit Contiguity

If units of a multi-unit franchisee are far apart, they will of course not be contiguous to each other. Thus the argument above that franchisees want to diversify their holdings implies not only far apart units, but also, by definition, non-contiguous units. If, however, the units are close to each other, one can ask whether there are any benefits or costs that would lead franchisors or franchisees to want units in a mini-chain to share market boundaries.

There are two main strands in the franchising literature that have implications as to whether units of a multi-unit franchisee should be contiguous or not. The first includes papers where franchising is a strategic device that firms use either to credibly preempt entry (Hadfield, 1991) or to commit to a higher level of output (Baye, Crocker and Ju, 1996) or to higher prices (e.g. Gal-Or, 1992; Rey and Stiglitz, 1995). Given the existence of multi-unit owners, these strategic arguments imply mostly that units of a single franchisee should never share a market boundary.[8] The second set of papers relies on franchisee incentives and market power arguments: contiguity confers some degree of market power to the multi-unit owner, allowing him or her to earn some rents under standardized contract terms, and the franchisor to benefit from the incentives thereby created. These arguments imply that contiguity may be beneficial. We discuss each of these strands of literature in more detail in what follows. Note that one underlying assumption for both sets of models is that franchisees get to choose prices in their units. This is a reasonable assumption in the U.S. market in particular given that franchisees are independent businesses from their franchisors under the law, and that rules against resale price maintenance apply to franchised businesses.[9]

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[8] If we relax the assumption of strict localized competition embedded in the location models, then the implications would be that competing units in general should not be owned by the same person. If units that are close to each other geographically generally compete with each other, this would mean that not only should contiguous units not be owned by the same owner, but neither should any close units.

[9] See e.g. Lafontaine (1995) for evidence of price dispersion in franchised chains.

a. Strategic Arguments

Eaton and Lipsey (1979) assert that a monopolist with geographically dispersed retail outlets will open more outlets than necessary for monopoly profits in order to prevent competitors from locating close by and driving down prices.[10] However, Judd (1985) shows that for the incumbent to open more units than would be optimal for a monopolist to open is not a credible means of pre-emption. If the potential entrant does in fact open a unit next to one of the monopolist's units, the price at that location will be driven down to marginal cost. The price at neighboring units will also be driven down. Thus, it is in the interest of the incumbent to close the unit at the contested location in order to raise the price at neighboring units.

Hadfield (1991) argues that single-unit franchising specifically overcomes this problem. She notes that if units in areas vulnerable to entry are franchised, the franchisees do not gain by closing down the contested units, because they do not benefit from the resulting higher prices at the neighboring units. This argument of course critically depends on franchisees not owning contiguous units. Thus if franchisors use franchising to deter entry, we would expect that they would not grant contiguous units to the same franchisee. Multi-unit franchisees would not want contiguous units either as this would make them vulnerable to entry.

Similarly, in their model of divisionalization, Baye, Crocker and Ju (1996) argue that by splitting itself into many competing parts, either with separate profit maximizing divisions or by franchising individual units, a firm can increase its share of its market. [11] Thus each firm has an incentive to do this. This mechanism for increasing its output

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[10] Schmalensee (1978) presents a similar result for product space overcrowding in the breakfast cereal industry.

[11] Of course, ultimately, all firms in the industry end up with lower profits because the sum of their

however is only credible if all the separate parts individually maximize profits. Multi-unit franchising is especially anomalous in this context: if firms want to subdivide in many parts that all credibly compete with one another, they must keep the individual parts separate. If, for some reason, the firm decides to allow multi-unit franchising, it must at least make sure that no individual owns two contiguous units. Otherwise, these will not compete to the desired extent.

Finally, in the vertical separation literature, authors argue that franchising is a device by which upstream firms delegate pricing to downstream operators, and as a result of double marginalization, reduce the intensity of upstream competition.[12] Under this type of model, the optimal wholesale price, or in the context of business-format franchising, the optimal royalty rate one would have to assess the franchisee to obtain the "right" downstream prices would be lower for owners with contiguous units than for single-unit owners and owners of non-contiguous units, and would have to be adjusted for the number of contiguous units an owner has. As we discuss in more detail below, if assessed the single-unit owner royalty rate, a multi-unit franchisee will choose a price that is too high from the franchisor's perspective. As franchisors do not use different royalty rates for franchisees with different number of contiguous units, the process of upstream collusion via vertical separation will be facilitated if units of multiple-unit operators are not contiguous.

From the above arguments, if franchising is a mechanism for the types of strategic behaviors discussed here, then empirically, we should not find contiguity among the units of multi-unit franchisees.

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parts produce more output than what they would have produced as single entities.

[12] See e.g. Vickers (1985), Bonanno and Vickers (1988), Katz (1991), Gal-Or (1992) and Rey and Stiglitz (1995).

b. Franchisee Market Power and Incentives Arguments

All franchised chains possess some degree of market power because they offer differentiated products. Given the demand for their products, franchisors will exploit their market power in franchisor-owned units by setting price at the monopoly level. However, as units in a chain are geographically separated, each unit within it also may possess some degree of market power relative to units in the same chain because of transportation costs faced by consumers. As a result, when faced with the same costs as in franchisor-owned units, and with no royalty rate, franchisees will choose to set prices below the monopoly level in order to attract customers from neighboring units of the same chain. Thus there is "too much competition" downstream, yielding a lower total profit for the franchisor.[13] The franchisor can reduce the degree of downstream competition by allowing franchisees to own several contiguous units. Alternatively, Schmidt (1994) shows that franchisors can use the combination of a revenue royalty and a fixed fee to induce franchisees to charge the monopoly price.[14] The franchisee earns no rents in this case as the franchisor can set the franchise fee at a level that extracts all residual profits given the royalty rate.[15]

In this model, a franchisee who owns two adjacent or contiguous units would have incentives to set a different, higher price at these two units than what single-unit owners would choose to implement, for any given royalty rate, and would derive higher profits from doing so. As noted by Levy and Reitzes (1992), however, this effect is completely

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[13] See Schmidt (1994) for a formal model. Note that double marginalization would predict that franchisees will charge higher prices than the monopolist if they faced cost above marginal cost, and will charge equal prices otherwise. The different outcome arises here because the franchisees compete with each other on the Hotelling line.

[14] This solution works through the standard double margin argument except that instead of an input markup, which shifts up the marginal cost curve of the downstream firm, the "first margin" here takes the form of a royalty on sales, which shifts down the downstream demand curve.

[15] However, existing evidence suggests that franchisee fees are not set to extract all economic profits given the royalty rate. Instead, they appear mostly to cover for the costs the franchisor incurs in setting up the new franchise. See Dnes (1992), Lafontaine (1992a), and Lafontaine and Shaw (1996) on this issue.

predicated upon contiguity: if there is even one unit between a multi-unit franchisee's two units, the franchisee will not have the power to raise prices in either unit above the single-unit owner equilibrium price.

As a result of the extra market power that multi-unit franchisees with contiguous units enjoy, the revenue royalty that the franchisor would have to assess to get them to charge the monopoly price is lower than the royalty rate assessed on the single-unit owner. To deal with this problem, franchisors could set different royalty rates for mini-chains, where the rates would vary with the number of units owned. We know from above that this is rarely, if ever, done. Alternatively, franchisors could locate restaurants owned by a single owner closer together to generate the "right" level of downstream profits given contiguity. This is not likely to prove a very practical solution as ownership decisions are often made after promising locations are found, and ownership is likely to be transferred a few times over the life of the unit. Finally, franchisors could extract the extra profits generated by the allocation of contiguous units via some fixed payment. As noted earlier, this is what is done under an area development agreement which, by definition, implies contiguous units for a given owner.

Thus whether or not franchisors allow the contiguity of the territories of a franchisee's units will depend on how costly this is to them, given the various mechanisms they can use to reduce or extract multi-unit franchisee rents, and on whether franchisors derive any benefits from allowing contiguity. The fact that franchisors use area development agreements where contiguity is automatic already suggests that there are circumstances under which this is an acceptable outcome.

In fact, franchisors may want to allow contiguity because direct franchisee competition fosters a lack of cooperation among them and possibly too much price competition: McDonald's, for example, explicitly states that it tries to minimize the intermingling of different franchisees' restaurants because intermingling leads to "too much intrachain competition." (Kaufmann and Lafontaine, 1994, at footnote 39)

In addition, good franchisees are difficult and costly to find. In fact, franchise executives mention the high cost of finding high-quality franchisees as a major reason for using multi-unit franchising (Bradach, 1995). Thus franchisees who have established that they are good franchise operators in a particular system may be able to bargain for contiguous units. In addition, as noted by Brickley (1995), allowing contiguity and some of the associated rents may be a good way to reward particularly valuable franchisees within a system that functions under mostly uniform contract terms, and the threat of losing these rents may keep them from free-riding.[16]

Finally, the ownership of contiguous units may be a particularly potent mechanism to reduce free-riding not just because of the extra rents at stake for the franchisee, but because the externality effect may be especially large for units that share a market boundary. If the ownership of contiguous units implies that franchisees will internalize a larger share of the externality than what would obtain if they owned the same number of non-contiguous units, then from the franchisor's perspective, the benefit of reducing free-riding in this way might dominate the cost associated with franchisee market power.

We conclude that the benefits of contiguity to the franchisor, namely the more efficient transfer of information across units and the greater internalization of externality

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[16] See Kaufmann and Lafontaine (1994) and Michael and Moore (1995) for evidence that some franchisors leave rents with their franchisees. The authors explain the existence of these rents as a type of efficiency wage, or a mechanism for contractual self-enforcement in a context where franchisees do not have the capital resources to post a bond large enough to guarantee performance. The granting of future units on a merit basis also provides incentives to franchisees if there are rents to be earned from each new unit. Contiguity would further enhance the amount of rents associated with these units.

effects, imply that franchisors may let multi-unit franchisees own contiguous units. This is especially true given that franchisors may directly benefit from the downstream incentives created by these rents, and that they have tools at their disposal to minimize the rents themselves.

Table 1: The Expected Effects of Characteristics of Pairs of Outlets on the Probability of Same Ownership Based on Various Theoretical Arguments.

Underlying Argument:	Explanatory Variables:		
	Geographic distance	Demographic Differences	Contiguity
Monitoring cost minimization	negative effect	no prediction	no prediction
Need for efficient knowledge transfer	negative effect	no prediction	positive effect
Internalizing externalities (free-riding or competition)	negative effect	no prediction	positive effect
Franchisee's risk aversion and need for diversification	positive effect	positive effect	negative effect
Franchisee knowledge of local market characteristics	negative effect	negative effect	no prediction
Pre-emption or strategic delegation of quantity or price choices	no prediction	no prediction	negative effect
Franchisee market power and incentives	no prediction	no prediction	positive effect

2.4 Implications for Franchisor-Owned Units

While the discussion above is all in terms of multi-unit franchisees, many of the effects in Table 1 would apply also to franchisor-owned "mini-chains." In particular, the effects related to monitoring cost minimization and to the efficient transfer of knowledge should also occur in company-owned mini-chains. Similarly, franchisors should want to minimize the differences in the demographic characteristics of the markets their company units operate in if local knowledge is important. Finally, franchisors would have incentives to not locate franchisor-owned units contiguously if pre-emption was their goal. [17]

However, one reason franchisors give for operating units directly is that this allows them to learn about the markets their franchisees are operating in. This argument, often called the "window-on-the-industry" argument, has been used for example by Garvie and Ware (1996) to explain why governments may want to operate government-owned firms in regulated industries. Basically, the idea is that the government is thereby able to learn about the costs of private firms. Similarly, franchisors could learn about local markets by establishing company-owned units. However, if the franchisor is to learn from a variety of markets, franchisor-owned units must be present in all submarkets, or at least they must not be concentrated in just a few.[18] Thus this argument suggests first and foremost that franchisor-owned units should be in different geographic and demographic markets, which in turn implies that they would not be contiguous.

3. DATA

The data used in this study consist of the street addresses and latitude and longitude coordinates of the 3,400 restaurants of the six largest fast-food chains in the State of Texas, as well as the identity of their owners and the year in which the current owner assumed ownership. The address and ownership data for the units come from the Texas Sales and Use Tax Permit Holder Information database. This database contains a complete address

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[17] Note that internalizing externalities across units is not an issue for the franchisor as managers of company-owned stores have no incentive to cut input quality if they are not paid in relation to their unit's profits. Too much or too little competition (unit market power) are not issues either as the franchisor sets prices in franchisor owned units. And of course, franchisee risk aversion is not relevant.
[18] Minkler (1990) uses data on 154 Taco Bell restaurants in California to show that franchisor and franchisee-owned units are interspersed. He argues that this is because the franchisor needs to learn about local markets from franchisees. Minkler (1992) develops the formal argument. Because the franchisor learns from franchisees, not from corporate units, this is not, however, a "window-on-the-industry" argument.

for all sales-tax paying institutions in Texas, including all individual fast-food outlets.[19] We verified the completeness of the sales-tax permit holder file by comparing the contents with those of other data sources. While the files of other states, such as Pennsylvania for example, allow business owners to register only once regardless of the number of businesses they own, the Texas authorities include in their file a record for each business or, in this case, outlet owned by an individual or a corporation. To verify this fact, we compared the number of units in the Texas data against the ABI Business Phone Disc, which contains phone numbers and addresses for all businesses listed in the yellow pages throughout the United States. Table 2 below shows that with the exception of Dairy Queen, the Sales Tax Permit file has a more complete coverage than the ABI Phone Disc.

Two issues arose with the Sales-Tax Permit Holder Data. First, out of 3,530 initial restaurants for the six chains, 130 were found to be duplicate records and so were removed. Second, we discovered that many owners owned several corporations with different names, where each corporation could own several restaurants. Therefore, instead of using owner name to assign ownership to units, we assigned same ownership based on owner address.[20]

From the data for these 3400 restaurants, we find that single-unit owners make up less than 11% of total units. On the other hand, more than 30% of units are owned by franchisees with 5 or more units. In addition, only three franchisors operate units directly

[19] The quality of this type of government data is discussed in King and Wicker (1993).

[20] After checking the Texas State Incorporation file, we determined that this was the correct procedure, because in a large majority of cases, units with different corporation names but the same owner address could be linked to a single individual who owned several corporations. After defining our owners based on their addresses, we investigated the extent of cross-onwership among the chains in the data, knowing for example that a company like McDonald's does not allow owners to be involved in other businesses while also operating franchises. There is only one instance in the data where a Dairy Queen and a Subway shared the same owner address, but about 40 other local businesses shared this same "owner" address. The state authorities who released the data to us suggested that these firms probably listed the address of their accountant. Fortunately, there was no

in Texas, namely Pizza Hut, Taco Bell, and McDonald's, with 303, 227, and 57 units respectively. A detailed breakdown of the number of owners and their sizes (number of units they own) is shown in Table 2. The Hirschman-Herfindhal index (HHI), which captures the degree to which ownership of units is concentrated in the hands of a few franchisees (and the franchisor), is also reported at the bottom of Table 2. This index shows a large difference in concentration of ownership between Taco Bell and Pizza Hut versus the remaining chains, confirming a fact that the trade press has frequently noted.

Table 2: Number of Owners and Size of their Mini-Chains

Size of Owner (in Units)	Burger King	Dairy Queen	McD	Pizza Hut	Subway	Taco Bell	Total # of Owners
1	21	130	59	6	143	2	361
2	15	24	41	2	48	2	132
3 to 5	15	26	53	6	57	5	162
6 to 10	11	10	23	1	12	3	60
11 to 20	3	7	4	5	3	0	22
20 to 50	3	4	2	2	2	3	16
51 to 100	0	2	1*	1	0	1	5
101 +	0	0	0	1*	0	1*	2
Total # of Owners	68	203	183	24	265	17	760
Total # of Units	329	729	686	608	643	405	3400
HHI	0.039	0.033	0.019	0.28	0.011	0.35	
# Units from ABI	320	798	634	579	608	335	

Note: * indicates that the owner is the franchisor.

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other such occurrence in the data.

The demographic data were obtained on a zip code basis from the 1990 U.S. Census. The census gives data for 1633 zip codes in Texas. Unfortunately, this set did not include all of the zip codes in which our restaurants were located according to the tax file. Most likely, some of the zip codes in the tax file were miskeyed, while in other cases, the zip codes must be new.[21] In any case, as we were unable to assign demographic data to any restaurant outside the 1633 zip codes of the census, we eliminated from our data the 85 restaurants for which this was a problem, leaving us with 3,315 restaurants for which we had all necessary information.

Finally, longitude and latitude coordinates were assigned to about 70% of the units in the five major urban areas in the state of Texas, namely Austin, Dallas, Forth Worth, Houston, and San Antonio, using the address matching component of the Arcview geographic information systems software.[22] Arcview however could not locate the remaining 30% of the units in these cities. Also, for units outside these areas, we found that Arcview was too often unable to locate the unit. Thus, for all other restaurants, we used the Delorme Mapping Company's U.S. Gazetteer on the internet to find the centroid point of the zip code in which the restaurant is located, and assigned to each restaurant the longitude and latitude coordinates of its zip code centroid.[23] The zip code centroid points are available for 1,844 Texas zip codes in use at the end of 1995.[24]

The assignment of longitudes and latitudes also enabled us to map the locations of

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[21] The demographic data are from the tape file STF3B. Note that new zip codes are created every year in areas where population is growing. Also, boundaries for existing zip codes change in such areas over time.

[22] We tried to do this for El Paso as well, but the software was too often unable to find addresses in that city.

[23] This procedure was especially appropriate outside of major urban areas as it was very rare in these cases to find more than one restaurant of a given chain in a given zip code area. In major urban areas, by contrast, one would find regularly two or three units of a given chain in the same zip code.

[24] Note again the discrepancy with the number of zip codes according to the census. As noted above, new zip codes are created regularly in areas where population is growing.

the units of the six chains.[25] The resulting maps, in Appendix A, show that in all six chains, the units of multi-unit owners are concentrated within fairly narrow geographic areas. Dairy Queen has the most geographically dispersed mini-chains. In other chains, such as McDonald's and Subway, the units of large owners are concentrated in the cities, particularly Dallas, Houston, and Austin. Franchisor-owned units, shown as squares on each map, are mostly found in Dallas and Houston. We explore these data patterns in more detail below.

4. METHODS AND ANALYSIS

4.1 The Variables

The hypotheses of interest in this paper relate to the differences between the characteristics of units (e.g., geographic distance between two units) *within a chain*. We are not concerned with the absolute levels of these characteristics (e.g., longitude and latitude of the restaurant location, median household income). Therefore, the appropriate unit of analysis is not the restaurant unit in the chain, but rather the restaurant pair, or "dyad". All the explanatory variables, therefore, are differences in attribute levels between two units from a given franchised chain.

The operationalization of the geographic and demographic distance measures is straightforward. The geographic distance is merely the distance in miles between any pair of units. The several demographic variables used all pertain to the zip codes in which the units are located. These variables are percentage of Blacks, percentage of people of Hispanic origin, population density, percentage urban, per capita income, and average education. Population density for each zip code was calculated by dividing the total

[25] This was also done with the Arcview geographic information systems software.

population count within the zip code by the land area. For all these variables, the "demographic distance" between a pair of units is measured as the difference between the variable's value in the zip code of the first unit and the value of the same variable in the zip code of the second unit of the pair. Finally, we include a different type of variable, SCOUNTY, which is a dummy variable equal to one if the two units are in the same county, and equal to zero otherwise. We include this variable as a way to capture the possibility that knowledge of local authorities and ordinances may affect the franchisor's choice of owner for a given unit.[26]

Contiguity is somewhat more complex to assess than are geographic and demographic distance. We use the Thiessen polygon process to determine the status of "contiguity", or the sharing of market boundaries, for a given pair of units. This process is described in detail in West (1981), and so is only briefly reviewed here. In order to determine the appropriate set of neighbors for each unit, Thiessen polygons are drawn around the given unit. The Thiessen polygon surrounding a given unit is constructed by drawing lines between that unit and all other units in existence at the time this unit is established.[27] These lines are then perpendicularly bisected in their middle. In any direction from the given unit, the bisecting line that is closest to that unit is considered to be the side of the unit's polygon in that direction. The contiguous units, or neighbors, at a point in time, are those that share a side of their Thiessen polygons.[28] The Thiessen polygon measurement is used instead of a distance-based measure of contiguity because it

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[26] Note that although the number of zip codes per county can be just one, counties and zip codes are in general quite different. More specifically, there are 256 counties in the state of Texas, with Harris county containing 140 different zip codes, while 100 counties have under 5 zip codes (12 counties have just one).

[27] We use the date at which owners take possession of their units to determine the relevant set of pre-established units.

[28] Contiguity of the polygons is symmetric but not transitive: if A is a neighbor of B, then B is also a neighbor of A. However, if A is a neighbor of B, and B of C, A may or may not be a neighbor of C.

prevents the selection of multiple units in the same direction as neighbors. For example, if several units are located on a straight line and are close together - as they can be along a franchise strip - a distance-based measure would consider them all to be neighbors. The discussion of spatial market power above demonstrates the need for a measure that does not assign the status of contiguity to two units separated by another unit of the same chain. The Thiessen polygons assure that we correctly capture the essence of contiguity.[29]

Table 3 summarizes the independent variable definitions and notation.

Table 3: Variable Definitions and Notation

CONT	contiguity of units =1 if the two units (both drawn from the same chain) are contiguous as per Thiessen Polygons.
DIST	Euclidean geographical distance between the two units. Measured in miles.
DIFBLACK	Difference in the percentage of Blacks between the zip codes in which the two units of the pair are located.
DIFHISP	Difference in the percentage of Hispanics between the zip codes in which the two units of the pair are located.
DIFPOP	Difference in the population per square mile between the zip codes in which the two units of the pair are located, where population is measured in thousands.
DIFURB	Difference in the proportion of the percentage of urban population between the zip codes in which the two units of the pair are located.
DIFINC	Difference in the per capita income between the zip codes in which the two units of the pair are located, where income is measured in thousands of dollars.
DIFEDUC	Difference in the average education level of the populations in the zip codes in which the two units of the pair are located.
SCOUNTY	Dummy variable =1 if the two units in the pair are located in the same county.

[29] The measure does have one problem, however, regarding units on the boundary of the area under study. For these units, there will be no neighbors in some directions, and far away units will represent the "neighbors" in other directions. To remove far away units from consideration as neighbors, a distance maximum of 25 miles was used. Units greater than 25 miles apart are not considered neighbors even if they do share a side of their Thiessen polygons. The 25 mile cutoff is somewhat arbitrary, but was chosen to represent a maximum distance that a customer living midway between two units would drive for fast food. Our results remained basically the same when we used a 6 mile, 12 mile, or 50 mile cutoff.

4.2 The Dyadic Logit Model

In order to test our hypotheses, we estimate the following logistic regression model:

SAMEOWNER = f(CONT, DIST, DIFBLACK, DIFHISP, DIFPOP, DIFURB, DIFINC, DIFEDUC, SCOUNTY, %UNITS),

where SAMEOWNER is a binary variable equal to 1 if the same owner owns both units, and equal to 0 if the units are owned by different owners.

Analysis at the "pair" or "dyad" level greatly increases the potential number of observations in our study, because there are ((n-1)*n)/2 pairs for any n units in the population. However, this also causes problems of dependence among observations that require special sampling techniques. This is because the same unit plays a part in n separate pairs. For example, if there are five restaurants of the same chain, with numbers 1, 2, and 3 owned by one owner and numbers 4 and 5 owned by another, then the addition of a sixth unit will add five new dyadic observations to the population. If the first owner opens the new unit, unit pairs 1-6, 2-6, and 3-6 will all have a '1' for the dependent variable, and pairs 4-6 and 5-6 will have a zero. Thus, the single decision of the franchisor to allow the first owner to acquire the additional unit has simultaneously determined the values of the dependent variable for all five new dyads. If this dependence is not corrected for, the logit model will have artificially small standard errors, potentially leading to insignificant coefficients being mislabeled as significant.[30]

To overcome the dependency problem, we sample randomly only one unit from

[30] The reason for the artificially small standard errors is intuitive. The standard error decreases with the number of observations yet, as the observations are dependent, the information that is gained from an additional observation is less than would be gained from an entirely independent observation. Therefore, the standard error increases faster than the amount of information.

each group of pairs related to the addition of any new restaurant. This is tantamount to a spatial technique known as "coding" described in Cressie (1993). Using the example presented above, the addition of the sixth unit yields five new pairs from which only one is sampled. We use the data we have on the date at which the current owner took possession of the unit to identify the sequence in which restaurants were established, and thus the set of existing restaurants from which to draw our second unit of the pair for any given restaurant. In the end, only one pair per new restaurant is included in each sample, eliminating all correlation across observations. Thus, for n restaurants, we have a total of (n-1) independent dyadic observations.[31] While this approach requires discarding many data points, it yields correct standard errors.[32] As noted by Cressie (1993), many different samples can be generated from the original data using this procedure. A form of bootstrapping (Efron and Tibshirani, 1993) can then be used to generate a single coefficient for each independent variable, along with empirically derived standard errors and probability values.[33]

Finally, we include one control variable in some of our regressions, namely %UNITS, which is the proportion of existing units in the chain owned by the franchisee

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[31] Note that our reliance on information about dates of opening to determine the set of dyads from which to pick our observation implies that each of our 1000 samples includes the first two units opened in Texas (within 150 miles of each other given our restriction on distance explained below), and then one of the two dyads associated with the opening of the 3rd unit, etc. This explicitly accounts for what we consider an important characteristic of the decision-making process, namely its sequential aspect. However, we reran our regressions using only the set of units created after 1980 as potential first units in a pair, and found that our results remained the same. Thus we conclude that our results are not driven by the repetition of the first few dyads across samples.

[32] Shepard (1993, footnote 19) solves a similar problem by omitting from her data observations on areas containing duplicate gasoline stations. She can eliminate these observations because the majority of her areas do not contain duplicate stations, and thus are independent. For our case, achieving independence among the observations requires the type of sampling method described in the text.

[33] One alternative avenue used in the literature to overcome a similar dependence problem is to add a dyadic lag to the right-hand side of the equation to eliminate autocorrelation. (The dyadic lag is discussed in Lincoln (1984), and used in Lincoln, Gerlach, and Takahashi (1992) in their exploration of the Keiretsu. Lincoln's lag model is based on the AR1 spatial autocorrelation model of Cliff and Ord (1981).) Unfortunately, this correction will not work in the case of binary dependent variables

who is taking possession of the new unit. We add this variable in some regressions because, for any given total number of units in the chain, the probability that the owner of the new unit also owns any other existing unit we might draw to form the pair is directly proportional to the number of units that the franchisee already owns. Thus we want to ensure that our results are not sensitive to this effect.[34]

5. RESULTS

One thousand samples, each consisting of n-1 statistically independent pairs, were drawn from the ((n-1)*n)/2 possible pairs for each chain. Further, to ensure that enough same-owner pairs were included in each sample, we only selected pairs that were within 150 miles from each other. [35] While this is an explicit acknowledgment of the likely inverse relationship between distance and same ownership, if anything, this exclusion biases the results toward a rejection of the distance hypothesis in the remaining sample. Without this restriction, many pairs chosen were from the opposite ends of Texas, and few such pairs were owned by the same owner. Some units were excluded completely from the samples because there were no other units within 150 miles of them at the time they were opened or taken over by the current owner. However, this applied to only 38 of the 3,315 units with valid zip code information.

The tables below give descriptive statistics and regression results for the overall sample used in this paper, one that incorporates the data from all 6 chains. Chain-specific results are reported in Appendix B . However, note that in the overall sample as in

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because such variables do not yield meaningful results when first-differenced.

[34] Though results presented in tables include this variable in a linear way, we also tested its effect on other variables when it was allowed to enter the regression in a very non-linear way. Qualitative results were unaffected by this transformation.

[35] Results were not qualitatively different when we used no constraint, or a 250 miles limit, or 200, or 100 miles. We chose 150 miles as a reasonable maximum distance for regularly visiting a site. When we did not impose any such constraint, we ran into convergence problems in some chain-specific

Appendix B, each data point, that is each pair of restaurants and set of characteristics pertaining to it, is formed of two restaurants from the same chain.

Table 4 gives descriptive statistics for all variables, estimated across the thousand samples drawn. Note that minimum values are not reported as they are zero for all variables. Table 5 shows the mean of the one thousand separate regression coefficients obtained from running our regressions on each of the samples of dyads of franchisee-owned units. The standard errors and probability values are derived empirically as described in Efron and Tibshirani (1993). Finally, Table 6 reports, for each continuous variable, the marginal effect of the variable on the probability of same ownership, calculated at the means of all the variables.[36] It also shows the probability of same ownership at the minimum and maximum value of each independent variable, assuming all others are held constant at their mean. In all tables, results relative to the set of franchisee-owned units only are presented first. Results pertaining to franchisor-owned units are shown next.[37] Note that in this latter case, only franchisor-owned units are used as starting points for the creation of pairs of units. Each franchisor-owned unit is combined with a second unit drawn randomly from all existing units, whether franchisee or franchisor owned. If the second unit is also franchisor-owned, the dependent variable SAMEOWNER is set equal to '1', otherwise it is equal to 0. Note that as only three of the six chains included in this study operate units directly in the state of Texas, the results for franchisor-owned units purport to only those three chains.

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subsamples due to the very large number of zeros for the dependent variable.

[36] We do not report the marginal effect of the contiguity and the "same county" variables as these are 0-1 dummy variables.

[37] As the hypotheses are in some instances different for franchisee and franchisor-owned units, we kept those two sets of units separate in our estimation. Statistical tests confirmed that the two gave different regression results.

Table 4: Descriptive Statistics for Same Chain Pairs of Units

	FRANCHISEE OWNED			FRANCHISOR OWNED		
	Mean	Std.Dev.	Max.	Mean	Std.Dev.	Max.
Same Owner	0.14	0.35	1.00	0.58	0.49	1.00
Distance	76.40	47.21	149.99	63.63	47.13	149.98
Contiguity	0.09	0.29	1.00	0.09	0.29	1.00
Δ % Blacks	0.10	0.13	0.95	0.12	0.16	0.94
Δ % Hisp.	0.14	0.15	0.93	0.13	0.15	0.92
Δ Pop. Den.	0.70	0.74	5.38	0.77	0.66	4.03
Δ % Urban	0.23	0.26	1.00	0.15	0.20	1.00
Δ Per Cap Inc	4.68	4.83	43.85	6.06	6.40	43.85
Δ Ave. Educ	0.98	0.80	5.33	1.08	0.82	5.01
Same County	0.17	0.38	1.00	0.26	0.43	1.00
% Units	0.05	0.08	0.67	0.51	0.18	0.80

Table 5: Logistic Regression Results (Dependent Variable is SameOwner)

	Franchisee-owned Units Only		Franchisor-owned Units Only as First in the Pair	
Contiguity	1.205**	1.140**	-0.528	-0.527
(25 miles)	(0.19)	(0.20)	(0.64)	(0.64)
Distance	-0.020**	-0.023**	-0.029**	-0.029**
	(0.00)	(0.00)	(0.00)	(0.00)
Δ%Blacks	-1.432**	-1.372**	1.024+	0.958
	(0.57)	(0.62)	(0.72)	(0.71)
Δ %Hisp	0.394	0.354	0.520	0.349
	(0.43)	(0.50)	(0.79)	(0.79)
Δ Pop.Den	-0.249**	-0.385**	-0.047	-0.072
	(0.10)	(0.11)	(0.16)	(0.17)
Δ % Urban	-0.274	0.012	-0.935*	-0.955*
	(0.26)	(0.29)	(0.54)	(0.55)
Δ Per Cap Inc	-0.024	-0.024	0.030	0.026
	(0.02)	(0.02)	(0.03)	(0.03)
Δ Ave. Educ.	-0.227*	-0.235*	-0.286+	-0.269+
	(0.12)	(0.14)	(0.20)	(0.20)
Same County	-0.095	0.033	1.099**	1.067**
	(0.19)	(0.21)	(0.43)	(0.44)
% Units		13.460**		4.221**
		(0.91)		(1.34)
Chain Dummies	Yes	Yes	Yes	Yes
Actual 1's Predicted	136.9/392.8	181.7/392.8	281.5/335.7	280.3/335.7
Actual 0's Predicted	2242.9/2308.2	2233.2/2308.2	178.9/234.3	179.7/234.3

NOTES: Coefficients are the means of those obtained from each of the 1,000 independent samples. Empirical standard errors in parentheses. Tests based on empirical probability values, with +: $p < 0.1$; *: $p < 0.05$; and **: $p < 0.01$.

Table 6: Marginal Effects and Probabilities at the Min. and Max. of Each Variable

	Franchisee-owned Units Only		Franchisor-owned Units Only as First in the Pair	
Marginal Effect of Each Continuous Variable at the Means				
Distance	0.00	0.00	-0.01	-0.01
Δ% Blacks	-0.10	-0.08	0.23	0.22
Δ % Hisp	0.03	0.02	0.12	0.08
Δ Pop.Den	-0.02	-0.02	-0.01	-0.02
Δ % Urban	-0.02	0.00	-0.21	-0.22
Δ Per Cap Inc	0.00	0.00	0.01	0.01
Δ Ave. Educ.	-0.02	-0.01	-0.07	-0.06
% Units		0.75		0.97
Probabilities at the Minimum Value of Each Variable (Mean of Others)				
Contiguity	0.07	0.05	0.66	0.65
Distance	0.28	0.27	0.92	0.92
Δ% Blacks	0.09	0.07	0.62	0.61
Δ % Hisp	0.07	0.06	0.63	0.63
Δ Pop.Den	0.09	0.08	0.65	0.66
Δ % Urban	0.08	0.06	0.68	0.68
Δ Per Cap Inc	0.09	0.07	0.60	0.61
Δ Ave. Educ.	0.10	0.07	0.71	0.71
Same County	0.08	0.06	0.58	0.58
% Units		0.03		0.17
Probabilities at the Maximum Value of Each Variable (Mean of Others)				
Contiguity	0.20	0.15	0.53	0.53
Distance	0.02	0.01	0.13	0.13
Δ% Blacks	0.02	0.02	0.81	0.80
Δ % Hisp	0.10	0.08	0.73	0.70
Δ Pop.Den	0.03	0.01	0.61	0.59
Δ % Urban	0.06	0.06	0.45	0.44
Δ Per Cap Inc	0.03	0.02	0.85	0.83
Δ Ave. Educ.	0.03	0.02	0.37	0.39
Same County	0.07	0.06	0.80	0.80
% Units		1.00		0.86

As most of the hypotheses above were about franchisee-owned units, we first focus on results relevant to those. As can be seen from the above tables, the likelihood of same ownership for franchisee-owned units is clearly negatively affected by geographical distance. Furthermore, the results show that *holding distance constant*, contiguity, or the sharing of market boundaries, relates positively to the likelihood of same ownership. Hence franchisors choose to allocate contiguous units to franchisees even when the option of a same distance non-contiguous unit is available. We conclude from that that the data do not support pre-emptive arguments for franchising, nor the notion that franchising is used to commit to high output or high prices. Interestingly, looking at the firm-specific regressions in Appendix B, the effect of contiguity is especially pronounced and significant in the two chains in our data, Burger King and McDonald's, that only allow multi-unit ownership resulting from the sequential acquisition of units. As these firms do not rely on area development agreements, this rules out the possibility that we are merely observing a pattern resulting from the use of these types of agreements.

The results relative to the demographic variables and the same county dummy variable are somewhat more mixed, but still informative. They show, for example, that differences in the proportion of Blacks, in population densisty, and in the average level of education of the population surrounding the restaurant all have a negative effect on the probability of same ownership, as one would expect if local market knowledge plays a role in determining who is best suited to become the owner of any given unit. Only differences in the proportion of Hispanics has a positive effect on same ownership, and this effect is not statistically different from zero. Thus we conclude that the results generally support the idea that it is beneficial to franchise units in demographically similar markets to the same person. The fact that the same county dummy does not seem to affect the choice of owner suggests that knowledge of local authorities is not a central concern in the choice of franchisee for a given unit.

Results above also imply that franchisees' relative risk aversion does not explain the locational patterns of the restaurants: the units of an individual franchisee not only tend to be close to each other, they also share market boundaries and are located in similar demographic markets. Finally, in terms of franchisee ownership, we see that the proportion of units owned by the franchisee who is assigned the new unit of a pair has a major impact on our dependent variable. However, more important for our purposes, we note that the inclusion of this control variable does not really affect any of our qualitative results.

Turning now to franchisor-owned units, Tables 5 and 6 also show that franchisors locate their units close to each other. However, contiguity does not affect the likelihood that two units are owned and operated by the franchisor. Chain-specific results in Table A2 in Appendix B show in fact that in two of the three chains with franchisor-owned units, this variable has a very small and insignificant effect on franchisor same ownership, whereas at Taco Bell, this effect is negative and significant. Results in Tables 5 and 6 also suggest that demographic similarity is less important in determining whether or not a unit is franchisor owned. In fact, variables such as differences in proportions of Blacks and in population density, which had an important effect on who was chosen among franchisees to own a unit, have no effect or even a positive effect in the case of franchisor-owned units. At the same time, variables that had little effect on franchisee ownership, such as % urban or the same county dummy variables, are important determinants of franchisor ownership. The result relative to % urban is consistent with earlier studies that have found that urban locations are often franchisor owned (see for example Norton (1988) and Brickley, Dark, and Weisbach (1991a)). Similarly, the same county result may arise because franchisors choose urban locations.

In general, the results suggest that the considerations that guide the allocations of units among franchisees are not the same as those that affect which units the franchisor chooses to operate directly. These different locational patterns might be explained in part by the franchisor's need to establish units in a variety of markets in order to obtain a useful "window on the industry."

It is worth pointing out that the results described above remained the same whether or not we included units that owners had obtained before 1980 in the creation of our pairs. We excluded these units both to verify the effect of repeating the first few unit pairs in each of our samples, and because we felt that our 1990 demographic data may not approximate well the conditions at the time these units were established and allocated to their owner. Results were also unaffected by the use of different distance cut-off points in the definition of contiguity (results above use a 25 mile limit), or different distance cut-offs in the creation of the pairs (results above use a 150 mile limit). We also confirmed that the results remained the same when we used a Probit rather than a Logit estimator. Finally, qualitative results were not sensitive to the set of demographic variables included in the regressions, or to the addition of a squared distance term that might have been related in some way to our measure of contiguity. In these ways, the results presented here were surprisingly robust.

6. CONCLUSION

Using data for all the restaurants in the six largest fast-food franchised chains in Texas, this paper has shown that geographic distance decreases the likelihood that two franchised units are owned by the same franchisee. In addition, given distance, we found that contiguity, or the sharing of market boundaries, has a positive effect on the likelihood of same ownership. Finally, differences in the demographic characteristics of the markets surrounding the units decreased the likelihood of franchisee same ownership.

This evidence suggests that franchising is not a strategic device to deter entry or commit to high output or high prices. In addition, the location of units in a mini-chain is not determined by the franchisee's desire to diversify away risk. Instead, the minimization of monitoring and free-riding costs, and the franchisor's reliance on the franchisee's local market expertise, appear to be central factors in the allocation of units across multi and single-unit franchisees.

For franchisor-owned units, we found that contiguity did not increase the likelihood that two units are owned by the franchisor, and that demographic similarity was not sought at least in the same way. We suggest that the franchisor's desire to learn from different markets may explain these different results.

This paper could be extended in several useful ways. First, it would be worth determining whether the same results would arise in chains involved in different types of businesses. Industry-specific factors such as the level of competition could influence the extent of multi-unit franchising as well as the way in which chains would choose to allocate units across franchisees. Furthermore, direct measures of variables such as costs and prices could shed more light on the degree of market power and intra-chain competition. Finally, it would be interesting to determine the effect of competitive pressures on organizational choices, for example to see whether a firm's decision to use multi-unit franchising in general, and to assign an area to a multi-unit franchisee in particular, is affected by the structure of ownership of other chains in the same industry in the same market area. We leave these issues for future work.

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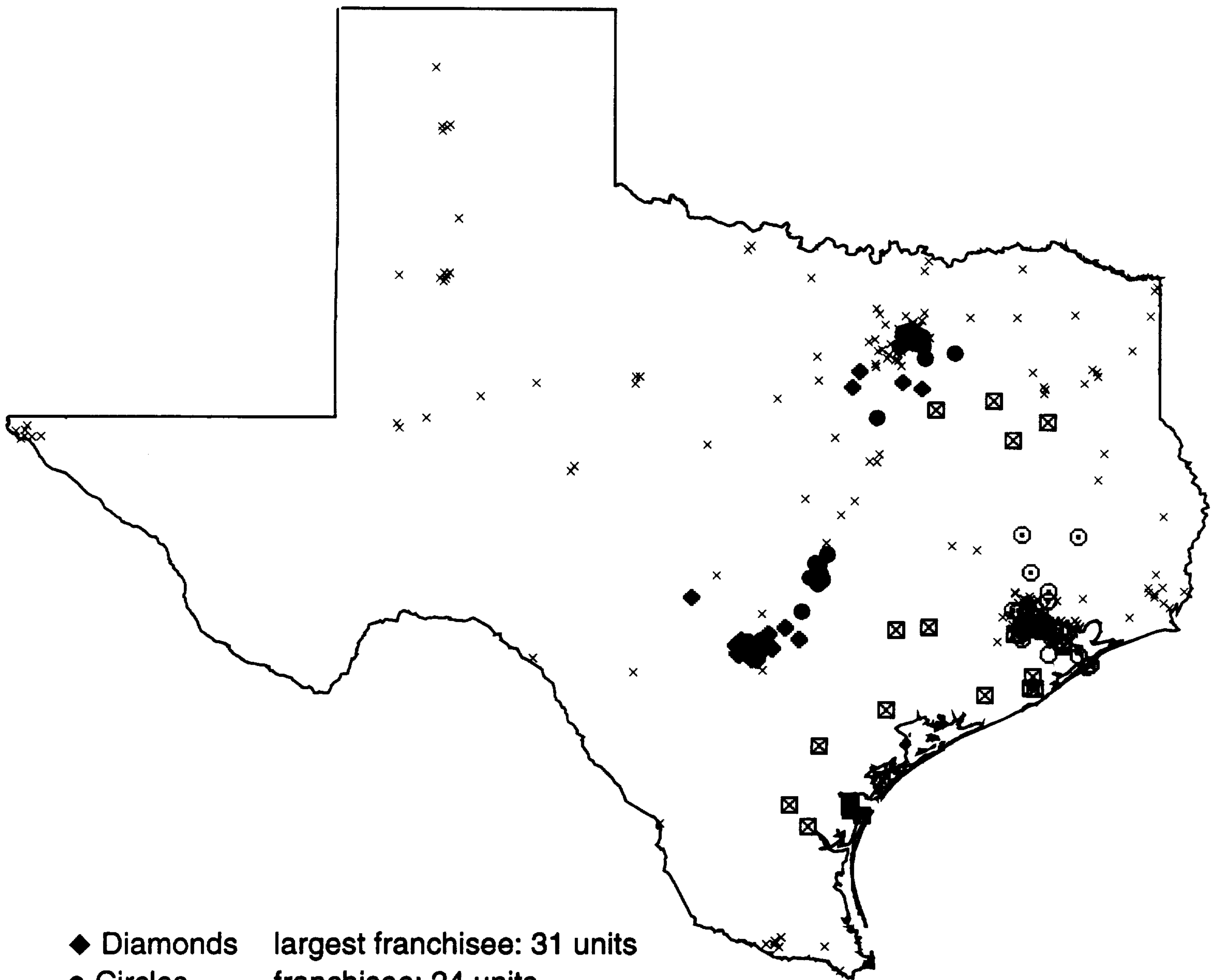
APPENDIX A: Texas Maps

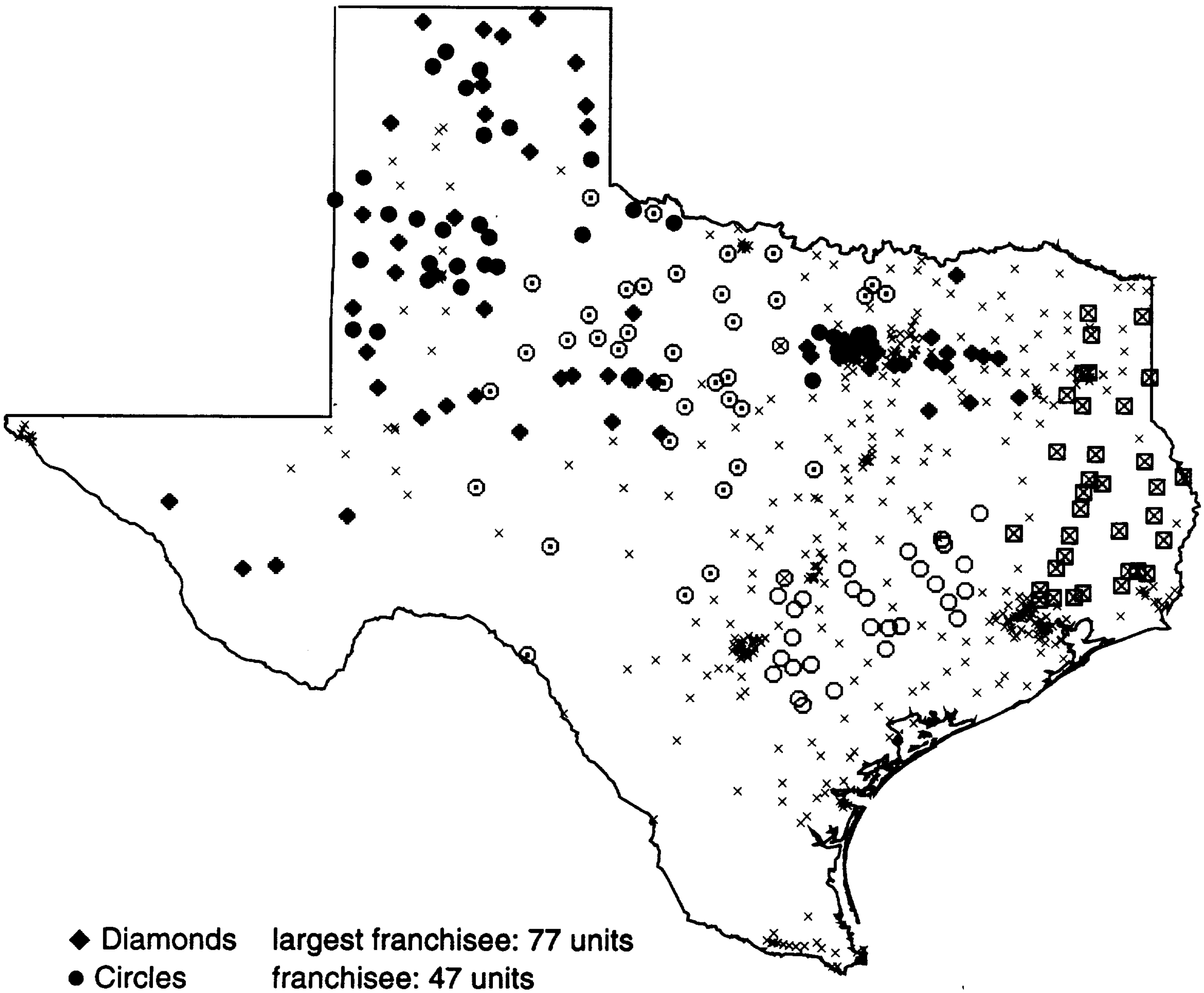
BURGER KING units in Texas as of December 1995



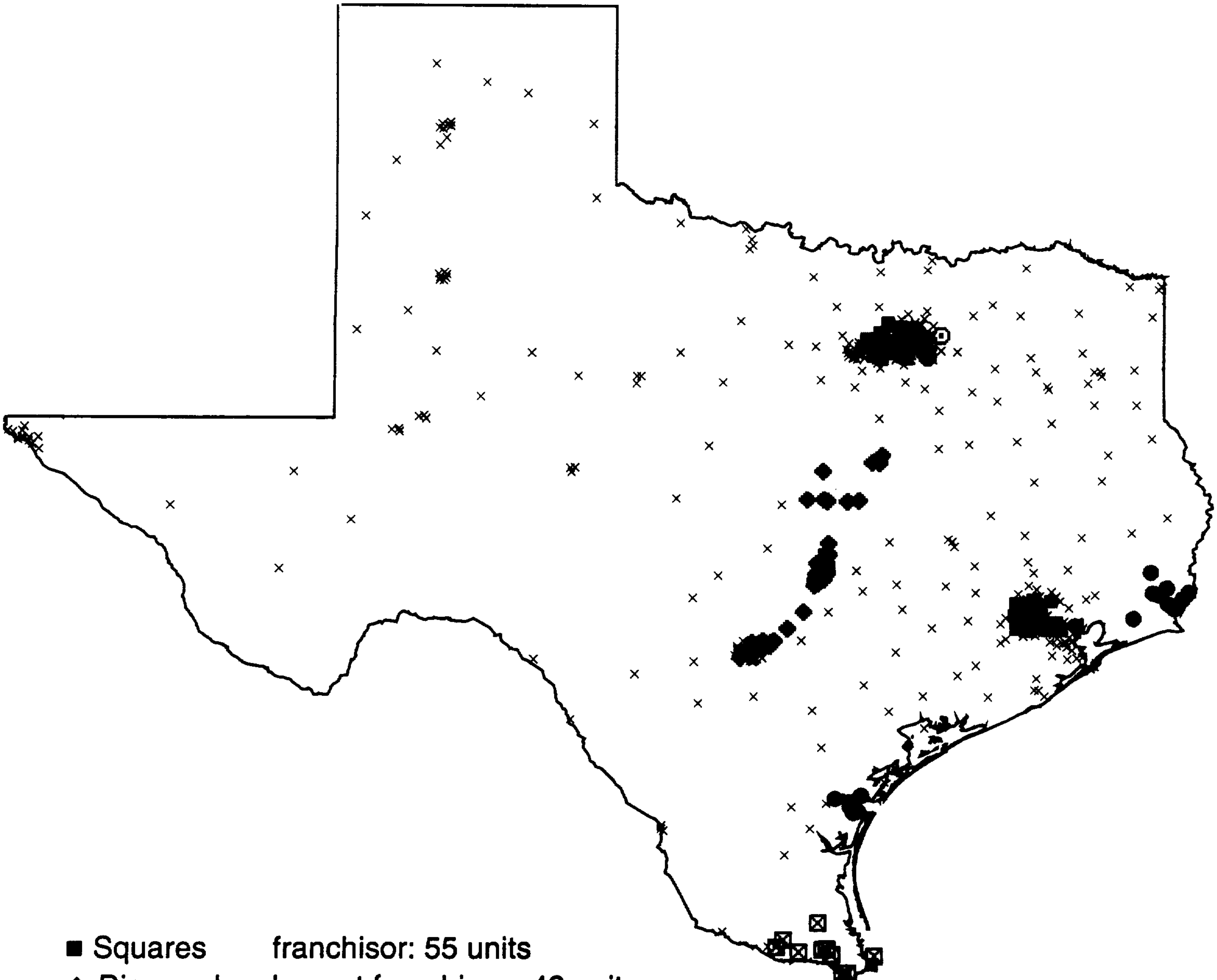
- ◆ Diamonds — largest franchisee: 31 units
- ● Circles — franchisee: 24 units
- ⊠ Boxes — franchisee: 23 units
- ⊙ Circles — franchisee: 22 units
- ○ Circles — franchisee: 18 units
- × Crosses — all other franchisees: 207 units

Total: 325 units

DAIRY QUEEN units in Texas as of December 1995

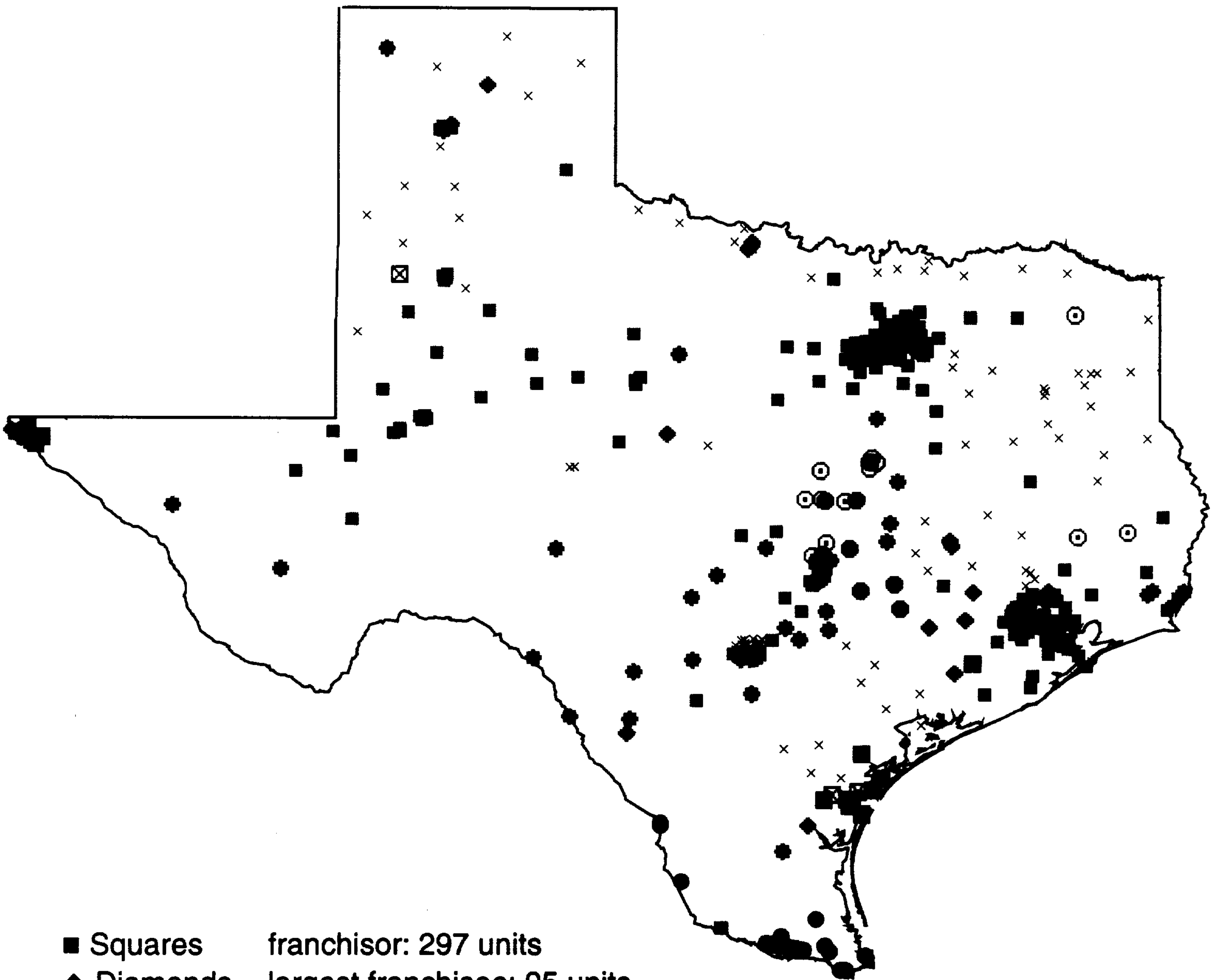


MCDONALD'S units in Texas as of December 1995



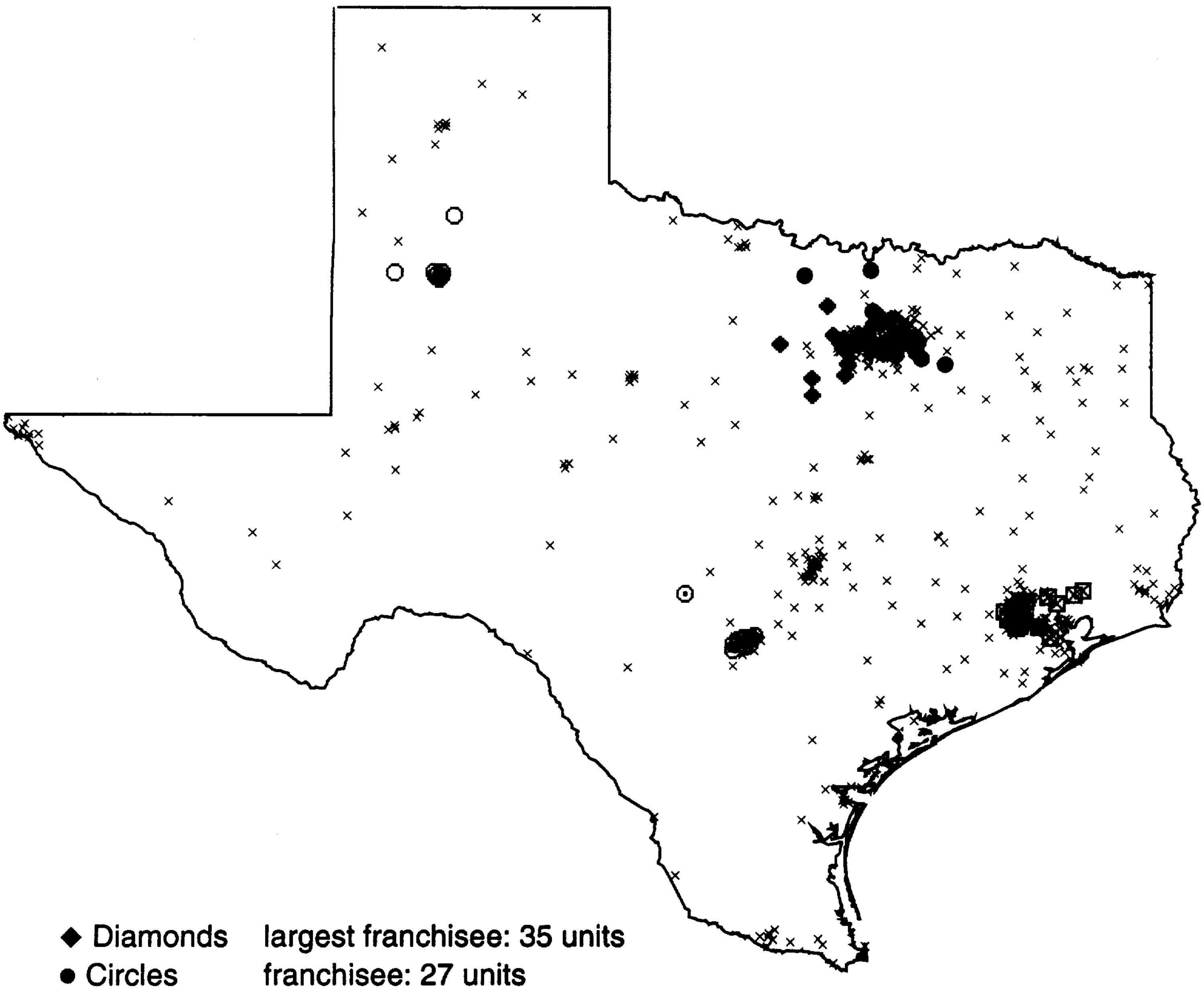
■ Squares	franchisor: 55 units	
◆ Diamonds	largest franchisee: 43 units	
● Circles	franchisee: 29 units	
⊠ Boxes	franchisee: 15 units	
⊙ Circles	franchisee: 13 units	
× Crosses	all other franchisees: 515 units	Total: 670 units

PIZZA HUT units in Texas as of December 1995



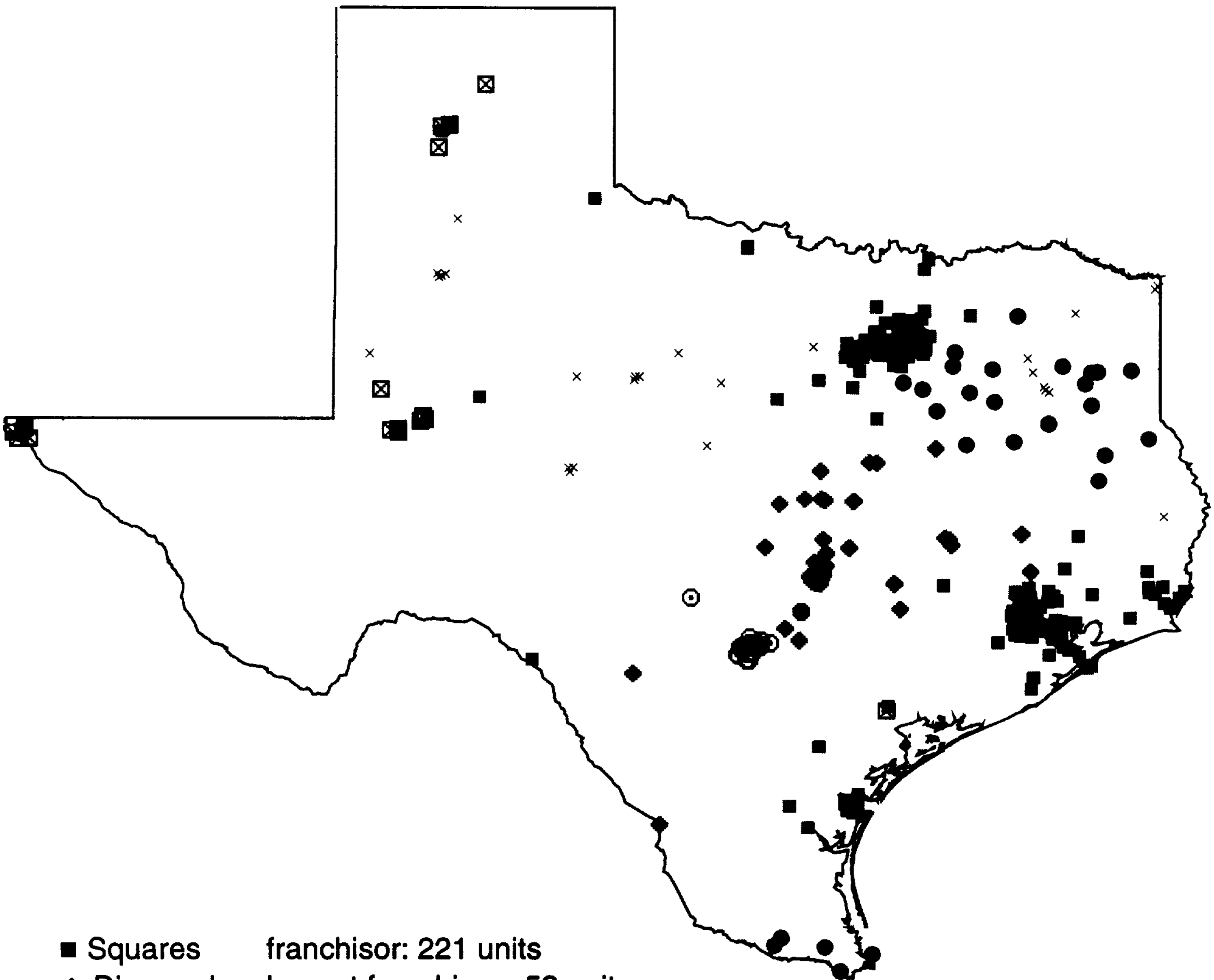
■ Squares	franchisor: 297 units	
◆ Diamonds	largest franchisee: 95 units	
● Circles	franchisee: 32 units	
⊠ Boxes	franchisee: 31 units	
⊙ Circles	franchisee: 23 units	
× Crosses	all other franchisees: 115 units	Total: 593 units

SUBWAY units in Texas as of December 1995



◆ Diamonds	largest franchisee: 35 units	
● Circles	franchisee: 27 units	
⊠ Boxes	franchisee: 16 units	
⊙ Circles	franchisee: 13 units	
○ Circles	franchisee: 12 units	
× Crosses	all other franchisees: 523 units	Total: 626 units

TACO BELL units in Texas as of December 1995



■ Squares	franchisor: 221 units	
◆ Diamonds	largest franchisee: 53 units	
● Circles	franchisee: 28 units	
⊠ Boxes	franchisee: 24 units	
⊙ Circles	franchisee: 22 units	
× Crosses	all other franchisees: 46 units	Total: 394 units

APPENDIX B: Chain-Specific Results

Table B1: Chain-Specific Logistic Regression Results for Franchisee-Owned Units Only (Dependent Variable is SameOwner)

	Burger King		Dairy Queen		McDonald's	
Contiguity	1.52**	1.41**	0.59	0.57	2.11**	1.87**
	(0.46)	(0.53)	(0.54)	(0.65)	(0.47)	(0.54)
Distance	-0.03**	-0.03**	-0.02**	-0.02**	-0.02**	-0.04**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Δ%Blacks	-0.57	-1.63	-3.09**	-2.72+	-1.01	-1.58
	(1.19)	(1.51)	(1.50)	(1.95)	(1.00)	(1.42)
Δ %Hisp	2.64*	2.62*	0.79	1.44	-0.41	-0.05
	(1.21)	(1.41)	(0.94)	(1.17)	(1.19)	(1.59)
Δ Pop.Den	-0.14	-0.19	-1.43**	-1.40**	-0.10	-0.25
	(0.25)	(0.28)	(0.37)	(0.51)	(0.22)	(0.31)
Δ % Urban	0.07	0.58	-0.41	-0.38	-1.19+	-0.22
	(0.75)	(0.91)	(0.41)	(0.49)	(0.96)	(1.12)
Δ Per Cap Inc	-0.02	-0.02	-0.10	-0.09	-0.01	0.01
	(0.06)	(0.07)	(0.09)	(0.10)	(0.04)	(0.05)
Δ Ave. Educ.	-0.34	-0.35	-0.27	-0.24	-0.28	-0.34
	(0.33)	(0.38)	(0.36)	(0.43)	(0.29)	(0.39)
Same County	-0.16	0.20	0.37	0.63	-0.83*	-0.74+
	(0.44)	(0.52)	(0.54)	(0.63)	(0.47)	(0.55)
% Units		22.48**		18.52**		22.03**
		(3.74)		(2.48)		(5.21)
Constant	-0.46	-1.79**	0.27	-0.96*	-0.64+	-0.90+
	(0.57)	(0.72)	(0.40)	(0.50)	(0.47)	(0.64)
Actual 1's Predicted	24.2 / 56.5	29.0 / 56.5	11.2 / 83.4	28.0 / 83.4	17.0 / 53.6	26.6 / 53.6
Actual 0's Predicted	250.1/262.5	251.3/262.5	608.5/616.6	603.0/616.6	543.2/554.4	544.6/554.4

NOTES: Coefficients are the means of those obtained from each of the 1,000 independent samples. Empirical standard errors in parentheses. Tests based on empirical probability values, with +: $p < 0.1$; *: $p < 0.05$; and **: $p < 0.01$.

Table B1 (cont'd)

	Pizza Hut		Subway		Taco Bell	
Contiguity	0.63	0.68	0.95*	0.76	1.29	1.37
	(0.56)	(0.63)	(0.52)	(0.60)	(3.24)	(3.28)
Distance	-0.02**	-0.02**	-0.04**	-0.05**	-0.03**	-0.03**
	(0.00)	(0.00)	(0.01)	(0.02)	(0.01)	(0.01)
Δ%Blacks	-2.57	-1.21	-3.32	-3.32	1.02	0.40
	(2.11)	(2.08)	(3.41)	(3.71)	(2.49)	(3.17)
Δ %Hisp	-0.33	-0.53	1.70	2.34	-1.57	-1.89
	(1.11)	(1.17)	(1.83)	(2.11)	(1.68)	(1.98)
Δ Pop.Den	0.22	-0.01	-0.61*	-0.55+	0.09	-0.20
	(0.23)	(0.25)	(0.37)	(0.43)	(0.34)	(0.41)
Δ % Urban	0.13	0.43	1.24+	1.51+	-0.85	-0.10
	(0.68)	(0.77)	(0.95)	(1.07)	(1.17)	(1.36)
Δ Per Cap Inc	-0.07	-0.08	-0.045	-0.04	-0.02	-0.05
	(0.07)	(0.08)	(0.07)	(0.07)	(0.06)	(0.08)
Δ Ave. Educ.	-0.21	-0.18	-0.223	-0.33	0.16	0.08
	(0.27)	(0.29)	(0.42)	(0.46)	(0.41)	(0.45)
Same County	-0.35	-0.21	-0.06	-0.12	2.89*	3.27*
	(0.58)	(0.66)	(0.50)	(0.58)	(3.71)	(3.75)
% Units		7.43**		39.99**		12.95**
		(1.10)		(8.80)		(2.89)
Constant	1.30**	0.02	-1.12*	-1.87**	1.37*	-0.29
	(0.43)	(0.53)	(0.63)	(0.70)	(0.68)	(0.81)
Actual 1's Predicted	53.3 / 98.7	57.6 / 98.7	2.0 / 30.3	9.2 / 30.3	47.7 / 70.3	54.7 / 70.3
Actual 0's Predicted	165.9/189.3	165.2/189.3	587.5/588.7	586.6/588.7	86.1 / 96.7	84.8 / 96.7

NOTES: Coefficients are the means of those obtained from each of the 1,000 independent samples. Empirical standard errors in parentheses. Tests based on empirical probability values, with +: $p < 0.1$; *: $p < 0.05$; and **: $p < 0.01$.

Table B2: Chain-Specific Logistic Regression Results for Franchisor-Owned Units (Dependent Variable is SameOwner = 1 if both Units are Franchisor Owned)

	McDonald's		Pizza Hut		Taco Bell	
Contiguity	1.01	1.44	2.62	2.70	-2.97**	-3.02**
	(2.22)	(2.10)	(4.90)	(4.93)	(1.44)	(1.47)
Distance	-0.05	-0.03	-0.02**	-0.02**	-0.05**	-0.05**
	(0.06)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Δ%Blacks	-0.32	-1.08	0.52	0.54	3.23*	2.75*
	(3.81)	(3.75)	(0.93)	(0.93)	(1.78)	(1.80)
Δ %Hisp	0.55	0.66	0.46	0.25	0.51	0.52
	(4.54)	(3.81)	(0.97)	(0.97)	(2.11)	(2.17)
Δ Pop.Den	-0.31	-0.47	-0.09	-0.12	0.26	0.21
	(1.35)	(1.27)	(0.21)	(0.21)	(0.42)	(0.43)
Δ % Urban	-3.34	-4.42+	-1.01+	-1.11+	-0.80	-0.61
	(4.09)	(3.44)	(0.72)	(0.72)	(1.08)	(1.14)
Δ Per Cap Inc	0.02	0.03	0.03	0.03	0.04	0.03
	(0.21)	(0.14)	(0.04)	(0.04)	(0.05)	(0.05)
Δ Ave. Educ.	-0.15	-0.26	-0.31	-0.32+	-0.25	-0.18
	(1.53)	(1.29)	(0.27)	(0.27)	(0.39)	(0.43)
Same County	1.19	1.23	2.35**	2.27**	0.84	0.88
	(1.90)	(1.96)	(2.83)	(2.83)	(1.15)	(1.18)
% Units		0.92		3.65*		5.48*
		(5.48)		(1.66)		(2.90)
Constant	-1.08	-1.36	1.92**	0.29	4.56**	0.90
	(2.37)	(2.01)	(0.40)	(0.84)	(0.91)	(2.15)
Actual 1's Predicted	4.5 / 9.1	4.8 / 9.5	122.8/164.7	123.1/164.7	154.8/162.9	154.8/162.9
Actual 0's Predicted	44.0 / 45.9	43.9 / 45.5	98.3 /132.3	98.3 /132.3	40.9 / 55.1	41.2 / 55.1

NOTES: Coefficients are the means of those obtained from each of the 1,000 independent samples. Empirical standard errors in parentheses. Tests based on empirical probability values, with +: $p < 0.1$; *: $p < 0.05$; and **: $p < 0.01$.