Dynamic Franchising Decisions*

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Abstract

To study *short-run* and *long-run* trade-offs faced in decisions about a retailer's franchising mix, we develop an estimable dynamic oligopoly model for retailing. In our model, forward-looking firms strategically choose expansion plans, while taking into account the relative benefits of franchised versus corporate outlets. We estimate this model using data about convenience-store expansion in Japan. Our main findings are as follows. First, we demonstrate noticeable differences in expansion strategies across ownership types. Second, we confirm that franchisee-run outlets generate higher revenues, all else held equal, than their corporate-run counterparts. Third, our cost function estimates reveal that it is more costly to open, operate, and close franchisee-run outlets compared with corporate-run outlets. Finally, our counterfactual simulations demonstrate a link between preemptive motives and corporate-based expansion.

Keywords: Cannibalization, Dynamic Structural Estimation, Encroachment, Entry Deterrence, Franchising, Industry Dynamics, Firm Performance, Market Structure, Monitoring Costs, Moral Hazard, Ownership Structure, Resource Scarcity, Retailing.

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1 Introduction

As retailers look to expand into new markets, franchising has become a key (and at times, default) instrument for increasing their market coverage and brand exposure.[1] Furthermore, franchising has been shown to have implications on both firm growth and survival (Shane, 1996). In light of the reliance of franchising in retail, this paper studies the underlying *short-run* and *long-run* trade-offs that affect decisions about organizational structure.[2] Short-run trade-offs may involve revenue[3] and cost[4] considerations of franchise-based expansion versus corporate-based expansion (e.g., Brickley and Dark, 1987; Carney and Gedajlovic, 1991; Combs and Ketchen, 2003; Fan, Kuhn, and Lafontaine, 2013; Gal-Or, 1995; Kalnins and Lafontaine, 2013; Lafontaine and Slade, 1996; Lafontaine and Slade, 2007; Martin, 1988; Maruyama and Yamashita, 2010; Mathewson and Winter, 1985; Minkler, 1990; Oxenfeldt and Kelly, 1969). Long-run trade-offs may involve a balancing act between own-brand cannibalization[5] (e.g., Azoulay and Shane, 2001; Barkoff and Garner, 1993; Blair and Lafontaine, 2005) and preemptive considerations (e.g., Blair and Lafontaine, 2005; Hadfield, 1991; Igami and Yang, 2015; Michael, 2003). As pointed out on Page 220 of Blair and Lafontaine (2005):

> [T]he possibility that other chains might enter the market will affect a franchisor's decision as to the optimal location and density of its stores. Specifically, assuming that there are some sunk costs related to establishing a store in a particular location, it has been shown that one way to prevent entry by a competing chain or independent competitors would be to proliferate the number of outlets in the market or enter earlier than these competitors. Though franchisees also would want their franchisor to be aggressive in preventing entry or expansion by other firms, they are unlikely to agree with their franchisor as to the extent of intra-brand development that this entails.

The short-run *cost versus revenue* and long-run *cannibalization versus preemption* trade-offs are likely to determine the extent of franchising in an industry. In light of these short-run

[1] See, for example, "10 Ways to Grow Your Business" (*Entrepreneur*, May 10, 2004).

[2] We refer the reader to Blair and Lafontaine (2005) for a comprehensive survey of the franchising literature.

[3] Revenues may improve with franchising for a few reasons. A commonly used argument is that franchising aligns incentives and helps circumvent agency issues such as moral hazard. It has also been posited that franchisees may have informational advantages about local demand.

[4] Costs may be reduced through corporate-based expansion. In particular, when the chain requires significant resources to recruit high quality franchisees.

[5] See, for example, "Franchise Encroachment, Part 1" (*Entrepreneur*, November 6, 2000). To resolve potential channel or vertical integration conflicts, territorial agreements can be made (e.g., Nair, Tikoo, and Liu, 2009; Rey and Stiglitz, 1995). However, cannibalization costs may be even larger if franchisors fail to uphold these agreements (Blair and Lafontaine, 2005).

and long-run trade-offs, our research aims to answer the following questions. First, what are the relative costs and benefits of franchisee-based versus corporate-based expansion? Second, how does a franchisor use its franchising mix strategy to deter competitors from entering or expanding, while taking into account potential encroachment of existing store sales?

A few generic features about the franchise industry across sectors are worth noting. First, there are considerable dynamics in the entry and survival of retail chain outlets across industries (e.g., Jarmin, Klimek, and Miranda, 2005; Kalnins and Mayer, 2004; Kosova and Lafontaine, 2010; Lafontaine and Shaw, 1998; Parsa, Self, Njite, and King, 2005; Shane and Foo, 1999).[6] Second, retail chains choose not only the number of outlets to open, but may also at the same time choose the mix of corporate-run and franchisee-run outlets, also known as the *franchising mix* (e.g., Lafontaine and Slade, 2007).[7] Finally, the mix of corporate-run and franchisee-run outlets is unlikely to be stable over time (e.g., Cyrenne, 2015; Lafontaine and Kaufmann, 1994; Thompson, 1994). These industry features motivate us to explore the underlying factors behind franchising from a different perspective by framing our analysis around a structural model that allows forward-looking and strategic firms to flexibly choose the franchising mix over time as market conditions and market structure evolve.

To study these trade-offs and how they impact organizational structure decisions, we introduce an estimable model where forward-looking retail chains choose *simultaneously* how many corporate-run and franchisee-run outlets to open. Estimates from such a model provide direct insights about the revenue-based and cost-based drivers behind franchise versus corporate expansion. Evidence that franchisee-run outlets systematically generate higher sales would be consistent with the notion that franchising yields revenue benefits. Furthermore, the difference in the costs between corporate-run and franchisee-run outlets would shed some light about the role of cost factors. Finally, the difference in cannibalization effects among corporate-run and franchisee-run outlets will help quantify the potential costs (accrued by the chain) of breaking territorial agreements in franchisor-franchisee contracts.

A dynamic retail expansion model is appropriate for studying the evolution of organizational form in franchise industries. Although much attention has been placed on the proportion or mix of ownership-types across firms and industries, we note that this proportion is often a consequence of an underlying expansion decision that is made across geographic market. That is, the proportion of corporate-run outlets is a cumulative result of years of expansion (or contraction) decisions. Furthermore, by focusing on the dynamic and strategic

[6] There is generally less dynamics observed in terms of contract terms. For example, Lafontaine and Shaw (1999) find evidence of persistence in the royalty rates and franchisee fees.

[7] Past studies have found that adaptation and flexibility is important for the performance and survival of franchisors (e.g., Castrogiovanni, Justis, and Julian, 1993; Szulansk, Jensen, and Lee, 2003; Yin and Zajac, 2004).

expansion decisions (that lead to certain franchising mixes), we can exploit even richer data variation. For example, if we see that 10% of stores are corporate-run, it could be because that 1 out of 10 outlets are corporate-run, or 10 out of 100, or 100 out of 1,000. Because the data generating processes that lead to 1 versus 100 corporate outlets are likely to be different (i.e., cannibalization concerns, market-specific heterogeneity, business-stealing from rivals, expectations about local market conditions, sunk costs), being able to distinguish between these cases may be important for understanding the demand and supply-side considerations behind retail expansion, and thus, has implications on the role of various factors in franchise decisions. Finally, dynamic expansion models often are set under the context of local geographic markets, which is especially appropriate if cannibalization is a relevant concern (Blair and Lafontaine, 2005).

We estimate the model using a comprehensive data-set on the convenience-store industry in Japan from 1982 to 2001. The data-set we use contains rich information about the number of corporate-run and franchisee-run outlets across geographic markets, as well as revenues broken down by each of these ownership types.[8] This setting is ideal for studying dynamic strategic motives in franchising decisions. First, the ownership-specific revenue information provides us "direct measures of outlet performance" that are necessary to infer driving factors behind franchising decisions (Bresnahan and Levin, 2012). Second, the convenience store industry, especially in Japan, has been widely cited as one where firms potentially engage in preemption via market saturation.[9] Third, the share of corporate-run outlets/sales versus franchisee-run outlets/sales exhibits noticeable variation over time. Furthermore, we see considerable variation in these shares across markets and time, where some of this variation can be explained by local market conditions including population, income, property value, minimum wage, and market structure (as demonstrated in our reduced-form policy function approximations). In this industry, the proportion of corporate-run outlets follows a non-monotonic pattern, as it was initially decreasing for several years, but experienced a rapid rise in recent years. The non-monotonic pattern suggests a potential counteracting force that works against revenue-based and cost-based concerns, such as disproportionate cannibalization costs. Finally, we show that competitive markets tend to have a greater share of corporate-run outlets.

Motivated by these reduced form patterns, we estimate the model using a combination of techniques introduced by Ellickson and Misra (2012) and Bajari, Benkard, and Levin (2007). The Ellickson and Misra (2012) method allows us to perform revenue regressions that take

[8] Lafontaine's (2014) survey about franchising research states that sector-level research is understudied, and that franchisor-level data provides "no information on the number of establishments of non-franchised chains," which further motivates why we focus on the *expansion* dynamics *within a specific industry*.

[9] See, for example, "Corporate Sardines" (*The Economist*, May 3, 2014).

into account potential selection biases, while the Bajari, Benkard, and Levin (2007) procedure helps incorporate forward-looking and strategic behavior. The setting we study provides a unique opportunity to look at the joint expansion and franchising decisions, as we are able to observe store counts and revenue across markets broken down based on whether the outlets are corporate-run or franchisee-run. To the best of our knowledge, this study is the first to utilize and analyze such detailed retail chain information. We then estimate the dynamic retail chain expansion model that accommodates for heterogeneity across ownership types (i.e., corporate versus franchisee). To further depart from the typical retail entry literature, we model jointly the simultaneous decisions about how many corporate-run and franchisee-run outlets to open.

Our estimated model reveals many differences between corporate-run and franchisee-run outlets. First, we show that the policy functions are different across ownership types. Second, our revenue regressions reveal that franchisee-run outlets systematically generate higher sales than their corporate-run counterparts. Third, our cost estimates show that the cost of expanding via franchisee-run outlets is higher than the cost of expanding via corporate-run outlets; furthermore, the fixed operational costs are lower for corporate-run outlets. Thus, our results reveal interesting trade-offs between the revenue benefits of franchisee-run outlets versus the lower costs of corporate-run outlets. Finally, we confirm the existence of long-run trade-offs by highlighting that preemptive motives may explain why retail chains expand rapidly via corporate-run outlets; in particular, one advantage of preemptive entry using corporate-based expansion is that corporate-run outlets appear to suffer less from cannibalization than their franchisee-run counterparts.

We proceed as follows. First, we conclude this section by providing a brief overview of related literature. In Section 2, we provide more descriptions about the empirical setting we study. Section 3 lays out the model of organizational structure dynamics under the context of retail chain expansion. The estimation procedure is discussed in Section 4. Given the novelty of the model we propose and estimate, we embark on a simple numerical exercise to demonstrate equilibrium existence as well as highlight interesting properties of the equilibrium in Section 5. Our main findings from the estimated model are summarized in Section 6. Finally, we provide concluding remarks in Section 7.

1.1 Related Literature

Comparisons between the performance of corporate-run and franchisee-run establishments is an active area of research, and the cross sectional variation in the mix of these types, or "plural form," has been well-documented in past work (e.g., Bradach, 1997; Thompson, 1994). In general, the results have been mixed in terms of which ownership type performs better in optimizing revenue and minimizing costs. For example, Kosová, Lafontaine and Perrigot (2013) find that corporate-run establishments perform better or at least as well as franchisee-run establishments. But in contrast, Caves and Murphy (1976), Lafontaine (1992), Martin (1988), and Shelton (1967) find the opposite. Furthermore, Novak and Stern (2008) show that vertical integration has a negative relationship with short-run performance. We contribute to this literature by making endogenous the organizational form decision itself, by analyzing this decision under the context of ownership-specific retail expansion across time. Such a model provides deeper insights into the underlying model primitives that may be driving one ownership-type choice over another, and ultimately, consequences of such choices. More generally, research that study franchising decisions have focused on static settings absent forward looking incentives (e.g., Blair and Lafontaine, 2005; Dant and Kaufmann, 2003; Lafontaine and Shaw, 2005; Minkler and Park, 1994; Scott, 1995).

Our work also contributes to the growing literature about retail entry and expansion[10] (e.g., Adams, Hayes, and Lampe, 2016; Beresteanu, Ellickson, and Misra, 2010; Blevins, Khwaja, and Yang, 2015; Gayle and Luo, 2015; Hollenbeck, 2013; Holmes, 2011; Igami and Yang, 2015; Nishida, 2013a, 2013b; Nishida and Yang, 2015; Orhun, 2013; Seim, 2006; Suzuki, 2013; Toivanen and Waterson, 2005; Varela, 2013; Vitorino, 2012; Yang, 2012, 2016; Zhu, Singh, and Dukes, 2011). We depart from this literature by focusing not only on the entry or expansion decision itself, but also the organizational form decision. Being able to distinguish between expansion via corporate-run stores and franchisee-run stores provides us an added layer of richness to study the underlying franchising decisions, especially so given that we also have ownership-specific revenue across markets and over time.

Finally, this paper complements recent research about retail cannibalization and preemptive motives. For example, prior work has studied cannibalization, encroachment, or own-brand business stealing effects in the convenience store (e.g., Nishida, 2013b), discount retail (e.g., Jia, 2008), fast food (e.g., Igami and Yang, 2015; Pancras, Sriram, and Kumar, 2012; Thomadsen, 2005), hotel (e.g., Jap and Kim, 2015; Kalnins, 2004; Mazzeo, 2002), and luxury fashion (e.g., Ngwe, 2013) retail sectors. With detailed sales data from both corporate-run and franchisee-run outlets, we add to this literature by determining the extent to which encroachment impacts these different ownership types. Being able to identify heterogeneous cannibalization effects across ownership types may help us better understand the discrepancy in perceived optimal number of outlets between franchisees and franchisors; theoretically, it can be shown that franchisors would prefer a larger number of outlets than

[10] For a comprehensive survey of retail entry models, we refer the readers to Aguirregabiria and Suzuki (2015).

franchisees (Blair and Lafontaine, 2005). There is considerably less empirical work on preemptive *motives* in the retail chain industry, largely because of the challenges associated with detecting such incentives when they are not directly observable in data. Much of the work has focused on how firms react under the threat of entry, as proliferation into new markets may become more rapid as the number of potential entrants grows (Bonanno, 1987); some examples of empirical work along this line include Goolsbee and Syverson (2008), Seamans (2012), and West (1981). One notable exception that investigates the preemptive motive itself is Igami and Yang (2015), who develop a simple counterfactual that can effectively switch off the preemptive motives. Going beyond Igami and Yang (2015), our objective is not solely the quantification of preemptive motives, but rather, whether or not preemptive motives can be linked to the observed franchising mix strategies (i.e., organizational structure).

2 Empirical Setting

In this section, we describe the data used in our analysis. Furthermore, we illustrate key patterns in the dynamics of expansion and sales across corporate-run and franchisee-run outlets.

2.1 Data Description

For our analysis, we use data from convenience-store chains in Japan. The study of convenience-stores in Japan is ideal for a couple reasons. First, this industry contributes a significant portion to Japan's overall economy and generates roughly $100 billion USD sales (i.e., 3.3% of private consumption). Second, the concept of convenience-stores in the Japanese industry's early years is not entirely new, as major chains (e.g., 7-Eleven) were established in the United States for several decades before entering Japan; this second point is worth noting, as the use of corporate-run outlets may be important for showcasing and demonstration of newly developed store concepts (e.g., self-serve frozen yogurt, fast casual restaurants).

Our analysis will focus expansion patterns, where such decisions are under the jurisdiction of real estate departments within these chains. All locations must be approved by the real estate department, even when proposed by prospective or existing franchisees. Therefore, the structural model we introduce in the next section attempts to capture the strategic and forward-looking decisions made by the chains' real estate groups.

We define each market as a prefecture. This market definition is ideal as each prefecture contains a corporate headquarters, which often house real estate departments in charge of growing their retail presence in the prefecture they are located in. Furthermore, as prefectures are the smallest governing units, their sub-markets are likely to be fairly homogeneous. Finally, the market definition we employ allows us to avoid potential demand spillovers markets, as the trade area for a convenience store is typically confined within a two to three kilometer radius in rural areas and a half kilometer radius in residential areas;[11] with a more granular market definition, adjacent markets may have spillovers on one another. Based on this market definition, there are in total 47 independent geographic markets, which can then used to link annual store counts/sales to each geographic market. The store counts and sales data are obtained from annual financial statements of the six largest convenience-store chains, namely, 7-Eleven, LAWSON, Family Mart, circle K, sunkus, and ministop. As for the time periods, we focus on the years 1982 to 2001. Because of inflation, we deflate nominal sales across years by using the annual GDP deflator from the Cabinet Office. Note that our data differs from past research that has studied a similar setting (e.g., Nishida, 2013a, 2013b; Nishida and Yang, 2015), in that our store counts and sales are further dichotomized based on ownership type (i.e., corporate-run, franchisee-run). To the best of our knowledge, this is the first study to have such granular detail about retail chains at the ownership, geographic, and temporal dimensions. Across the chains, franchisee-based outlets follow a fee structure of about 30% to 40% of gross profits. Furthermore, there are two types of contracts. The land and building are provided by the franchisee in the first type, while the land and building are provided by the franchisor in the second type. In general, a large majority of franchisee-franchisor agreements follow the second type of contract.

The market characteristics we use include population density, income, hourly minimum wages, and property value. The population information is obtained from the Census Bureau at the Ministry of Internal Affairs and Communications. Income data is obtained from the Cabinet Office. Hourly minimum wages are found in the Annual Handbook of Minimum Wage Decisions from the Ministry of Health, Labour and Welfare.[12] Finally, we get the property value data from Ministry of Land, Infrastructure, Transport and Tourism publications.

Table 1 provides a set of summary statistics from this data. In general, the number of franchisee-run outlets exceed the number of corporate-run outlets. Furthermore, we see a similar comparison when we focus on sales. Another way of showing this pattern is by calculating the proportion of corporate-run outlets and sales, which we display in Table 2. This table confirms that there are disproportionately fewer corporate-run outlets, and consequently, they contribute a small percentage of the total sales. A few additional observations

[11] Please refer to a 2013 policy report by the Ministry of Land, Infrastructure, Transport and Tourism, which can be downloaded here: http://www.mlit.go.jp/common/000998270.pdf.

[12] See Kawaguchi and Yamada (2007) for more details about the minimum wage data.

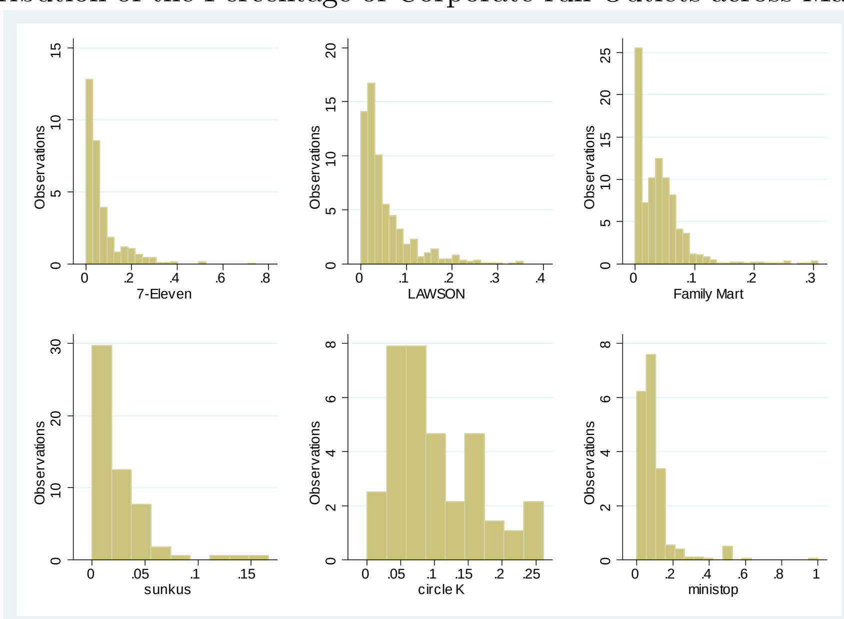
Table 1: Summary Statistics for Estimation Sample

Variable	Mean	Std. Dev.	Min.	Max.	N
Number of corporate-run outlets					
7-Eleven	5.8465	12.4567	0	148	1244
LAWSON	9.6675	30.2635	0	409	800
Family Mart	3.7045	8.9364	0	92	1279
sunkus	0.3179	1.8046	0	23	736
circle K	1.3514	5.4121	0	64	737
ministop	1.7095	4.7802	0	40	1439
Number of franchisee-run outlets					
7-Eleven	110.9703	197.6785	0	1311	1244
LAWSON	113.0063	151.6288	0	877	800
Family Mart	76.3829	144.5553	0	1019	1272
sunkus	12.0584	46.1287	0	410	736
circle K	15.2795	70.765	0	735	737
ministop	18.735	46.5680	0	285	1438
Sales of corporate-run outlets					
7-Eleven	899.6721	2119.4339	0	29668	1244
LAWSON	1653.7938	5265.6630	0	85094	800
Family Mart	512.0128	1344.9574	0	15213	1270
sunkus	45.8534	263.764	0	3335.64	736
circle K	160.1734	681.019	0	8438	737
ministop	236.2888	698.9484	0	5759	1402
Sales of franchisee-run outlets					
7-Eleven	25564.2586	48546.5122	0	332870	1224
LAWSON	18632.8825	26112.3284	0	163090	800
Family Mart	13235.0067	27871.8521	0	212651	1159
sunkus	2112.5925	8525.6606	0	82886	736
circle K	2652.0342	13233.2042	0	149495	737
ministop	2674.5477	7358.3389	0	50602	1386
Market characteristics					
Population density	0.6319	1.0968	0.0654	6.0383	1504
Income	2590.8465	538.3013	1347.643	5232.2506	1363
Land price	170522.4804	210785.0229	28426	2517346	1457
Minimum wage	575.2168	104.9705	358	869	1504

Table 2: Proportion of Corporate-run Outlets or Sales

	Outlets	Sales
7-Eleven	0.053	0.038
LAWSON	0.079	0.081
Family Mart	0.045	0.04
sunkus	0.025	0.021
circle K	0.08	0.056
ministop	0.087	0.081

Figure 1: Distribution of the Percentage of Corporate-run Outlets across Markets and Time

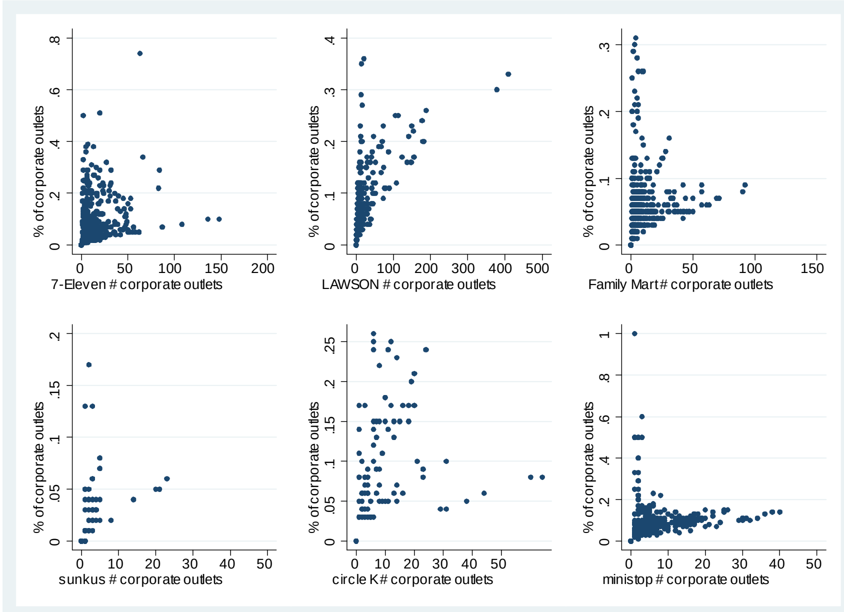


are in order. First, the proportion of corporate-run outlets is in general no greater than 9%, which is in line with Lafontaine and Shaw (2005), who document similar proportions across various franchise industries.[13] Second, it is interesting to note that this proportion does not vary drastically across chains, which is consistent with the observation that their franchising contracts (i.e., royalty rates, terms and conditions) are fairly uniform and follow an industry standard.

In Figure 1, we display a set of histograms for the percentage of corporate-run outlets. From these histograms, it is apparent that the percentage is skewed towards smaller values,

[13] In particular, Lafontaine and Shaw (2005) show that the median percentage of corporate-run outlets is about 9%, across the automotive, business services, restaurants, construction and maintenance, and retail sectors for franchising.

Figure 2: Variation in Number of Corporate-run Outlets Across Franchising Mixes



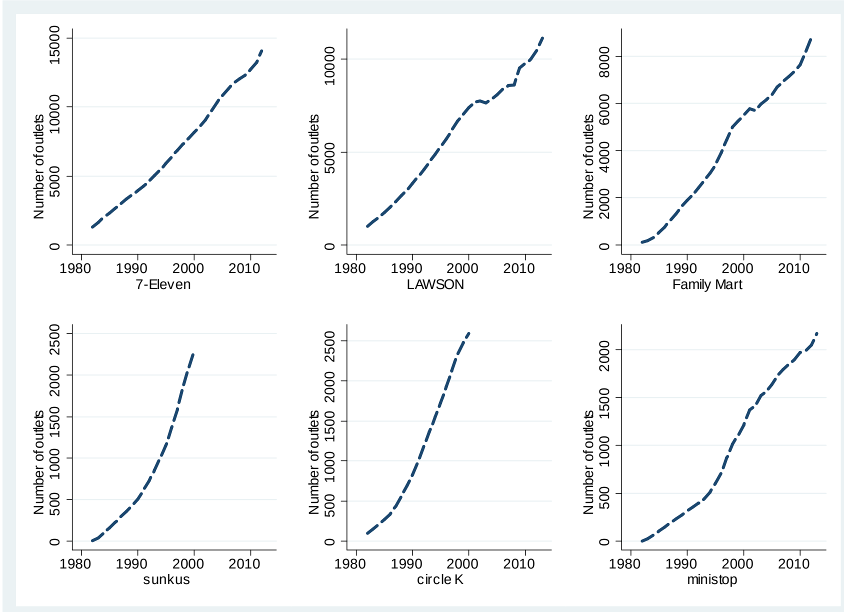
which should not be surprising given our earlier summary statistics. The distributions for these proportions also look qualitatively similar across the chains, with the exception of circle K. Despite the skewness in these distributions, we do see observations in which the proportion of corporate-run outlets exceeds 9%. In fact, this proportion can potentially be as high as 75% in some market-time observations. This diagram highlights rich variation in our data across markets, and across time. Our subsequent analysis will summarize some of the general patterns in the dynamics in franchising.

Next, we demonstrate the additional richness in variation if one focuses on the expansion and contraction patterns, as opposed to a commonly used measure like the franchising mix. Figure 2 provides a scatter plot where the horizontal axis represents the number of corporate-run outlets, while the vertical axis represents the proportion of corporate-run outlets. These scatter plots demonstrate that conditional on franchising mix, there is enormous variation in the number of corporate-run outlets. For example, in markets where 7-Eleven operates about 5% corporate-run outlets, the number of corporate-run outlets can range from 1 up to 150.

2.2 Dynamics of Expansion and Franchising Decisions

In this section, we illustrate some basic patterns of dynamics found in the data. First, we summarize the dynamics seen in aggregate expansion and sales numbers. Figure 3 provides

Figure 3: Evolution of the Total Number of Outlets



the evolution of store count, while Figure 4 presents the evolution of sales. These figures illustrate that the number of outlets and total sales have been steadily increasing over time.

Next, we investigate how the share of corporate-run outlets changes over time. Figure 5 summarizes these patterns. The graph demonstrates considerable time-series variation in the proportion of corporate-run outlets. For some chains such as 7-Eleven, LAWSON, and Family Mart, the proportion of corporate-run outlets diminishes over time, but at some point, this proportion increases. In contrast, the proportion of corporate-run outlets appears to have an upward trajectory for sunkus and circle K. For ministop, the overall trend over time is a decreasing share of corporate-run outlets. Furthermore, the changes in this share is quite drastic, and in some cases, the share can decrease by as much as 10%.

Similarly, we explore the dynamics in the share of sales from corporate-run outlets in Figure 6. In general, these sales patterns are similar (but not identical) to those exhibited in the share of corporate-run outlets. As in the share of corporate-run outlets, we see the minimum reached in 1990, 2005, and 1995 for 7-Eleven, LAWSON, and Family Mart, respectively. At their lowest points, the shares of corporate-run sales can be as low as 2%, 4%, and 2.5% for 7-Eleven, LAWSON, and Family Mart, respectively.

Furthermore, we investigate whether or not the amount of market power varies across ownership types. Figure 7 plots the Herfindahl-Hirschman Index (HHI) over time constructed using various measures. The first measure (solid line) is calculated using the HHI based only on corporate-run sales, while the second measure (dashed line) is calculated using the

Figure 4: Evolution of Total Sales

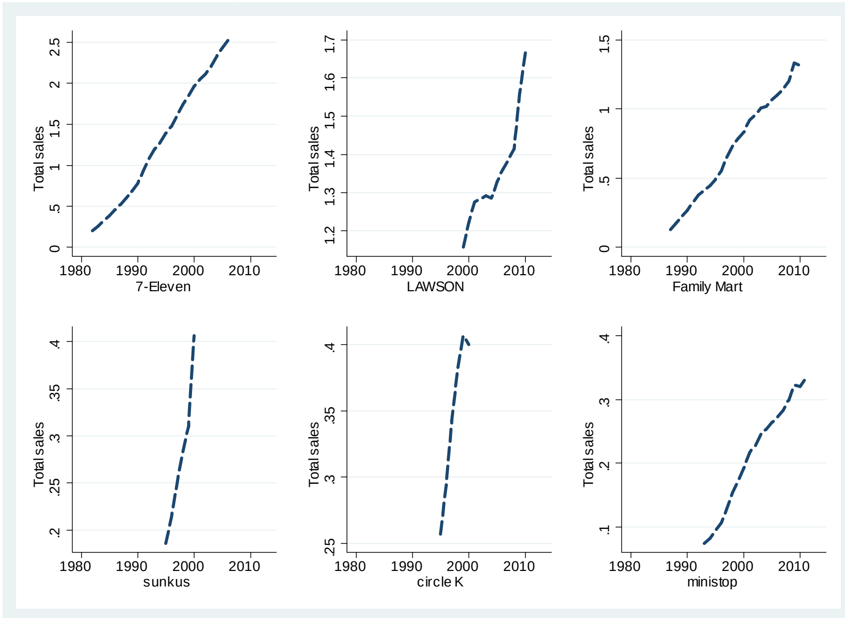


Figure 5: Dynamics in the Share of Corporate-run Outlets

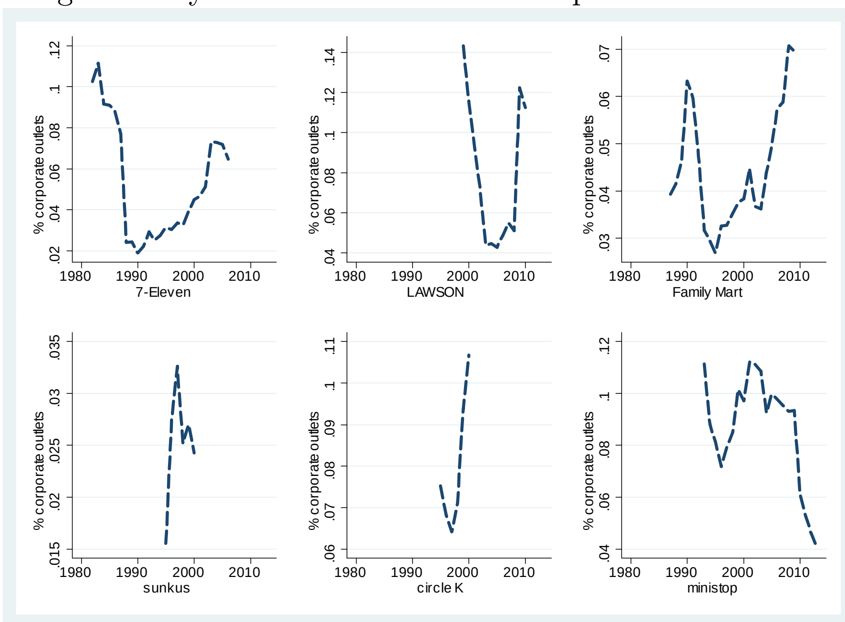
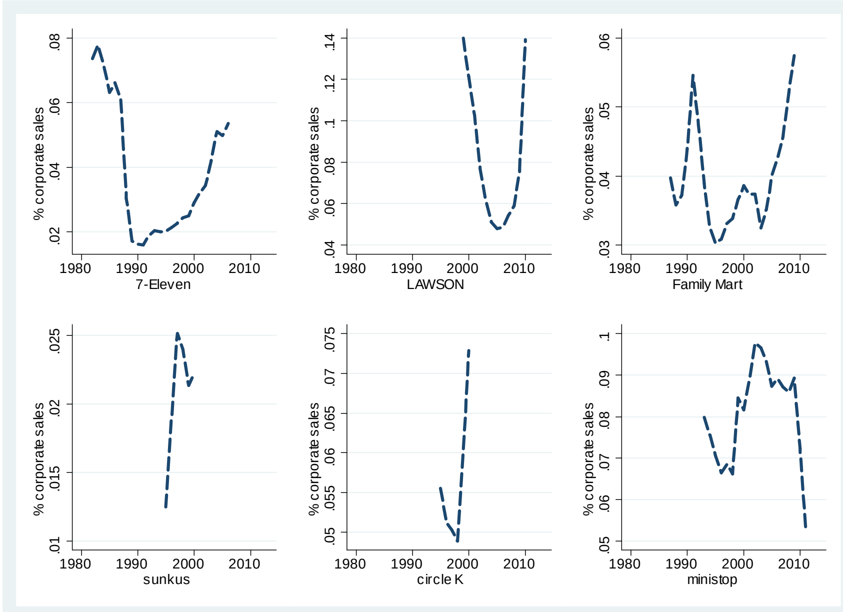


Figure 6: Dynamics in the Share of Corporate-run Sales



HHI based only on franchisee-run sales. This diagram shows that the corporate-based and franchisee-based HHI measures follow similar overall trends over time; however, there are clear differences in the HHI measures during certain periods. For example, the corporate-based HHI trajectory lies below the franchisee-based HHI trajectory prior to 2000, and after 2000, both trajectories exhibit a lot of overlap. This pattern suggests that for a period of time, sales from franchisee-run outlets are concentrated towards a small set of chains with market power, while corporate-run outlets appear to operate in more competitive local markets.

Finally, we study the drivers behind corporate-based expansion. A simple plot reveals that the proportion of corporate-run outlets appears to increase with the degree of competition, as shown in Figure 8. To study this pattern further, we conduct fixed effects regression analysis using the proportion of corporate-run outlets as the main dependent variable. Unlike past reduced form analysis of the drivers behind franchising mixes (e.g., Brickley and Dark, 1987; Lafontaine and Kaufmann, 1994; Lafontaine and Shaw, 2005; Martin, 1988; Scott, 1995), we are focusing our attention on the impact that competition has on the organizational form. The regression results in Table 3 demonstrate some interesting patterns. In particular, for almost all of the chains, the proportion of corporate-run outlets actually *increases* with the lagged number of competing outlets belonging to different brands; for example, a standard deviation change in the number of competing outlets can increase the

Figure 7: Comparison of HHI Across Ownership Type

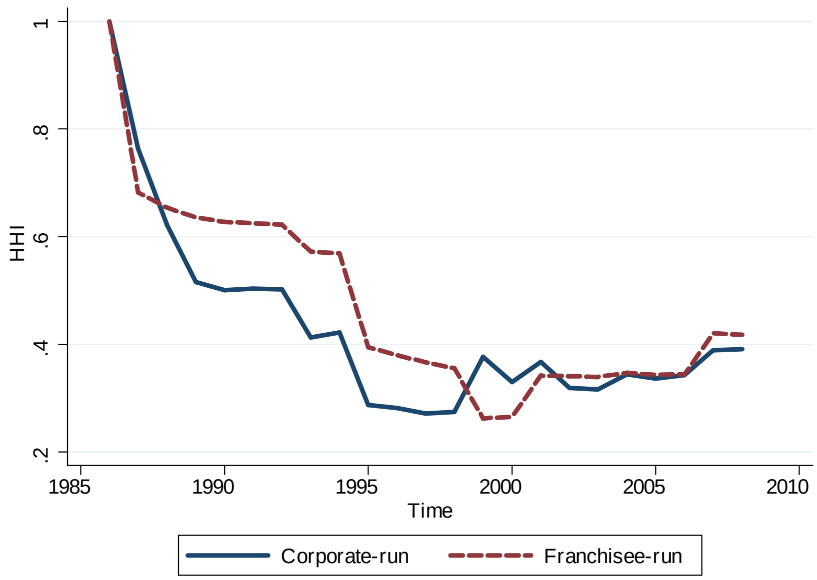


Figure 8: Relationship Between the Proportion of Corporate Outlets and Degree of Competition

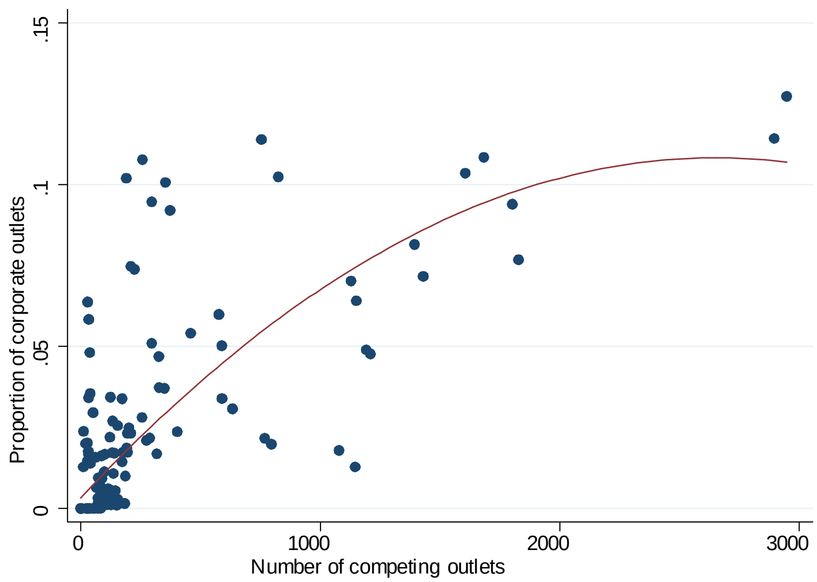


Table 3: Drivers Behind the Proportion of Corporate-based Outlets

	(1) 7-Eleven	(2) LAWSON	(3) Family Mart	(4) sunkus	(5) circle K	(6) ministop
Competition	0.0000672***	0.000153**	0.00000194	0.0000262***	0.0000546***	-0.00000495
	(0.0000154)	(0.0000497)	(0.0000118)	(0.00000523)	(0.00000786)	(0.0000161)
Population	-0.0000720**	0.0000395	0.0000176	0.0000130	-0.0000273	0.0000762
	(0.0000229)	(0.000104)	(0.0000177)	(0.00000751)	(0.0000142)	(0.0000446)
Income	-0.0000522***	-0.0000553**	0.0000183**	-0.00000110	0.00000774	-0.0000244*
	(0.0000140)	(0.0000206)	(0.00000678)	(0.00000356)	(0.00000923)	(0.0000116)
Land price	-1.95e-08	-7.94e-08	5.03e-09	-1.33e-08*	-2.21e-08	1.81e-08
	(1.40e-08)	(9.18e-08)	(8.69e-09)	(6.55e-09)	(1.62e-08)	(1.67e-08)
Minimum wage	0.0000909	0.000444***	-0.0000378	-7.73e-08	0.0000547	0.000138*
	(0.0000668)	(0.0000929)	(0.0000329)	(0.0000175)	(0.0000428)	(0.0000571)
Constant	0.294***	-0.146	-0.0594	-0.0272	0.0230	-0.182
	(0.0587)	(0.181)	(0.0437)	(0.0172)	(0.0339)	(0.102)
Observations	845	298	812	690	691	794
R^2	0.0868	0.4744	0.0403	0.1875	0.2556	0.0208

Standard errors in parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

proportion of corporate-run outlets by over 4% for some of the chains. Thus, competition appears to be positively correlated with disproportionate growth in corporate outlets.

These raw data patterns provide us evidence that the proportion of corporate-run outlets and sales exhibit noticeable intertemporal variation. Furthermore, this intertemporal variation ultimately translates into different evolutions of market power depending on ownership type. Lastly, competition appears to have an impact on the franchising mix, as corporate-run outlets appear to be conduit for strategic expansion in light of competitive threats. Such patterns warrant a closer look at franchising decisions, from a perspective that takes account for dynamic oligopolist behavior, especially when such decisions may be both forward-looking and strategic.

3 Model

This section describes the model of retail expansion that will be estimated. Our model extends the retail expansion models used in Blevins, Khwaja, and Yang (2015) and Nishida and Yang (2015) by disaggregating the expansion decision into simultaneous choices about the number of corporate-run outlets to open (or close) and the number of franchisee-run outlets to open (or close).

3.1 Basic Setting

We consider a model with I forward looking firms in a retail industry. At the beginning of each time period t, each firm i observes the current state and decides how many new stores to add or subtract in geographic market m. The type of outlet is denoted as $k \in \{C, F\}$, since a store is run by either the corporation (C), or franchisee (F). The firm simultaneously chooses set-valued actions that include both the number of corporate-owned outlets ($n^C_{imt} \in \mathcal{A}$), and franchised outlets ($n^F_{imt} \in \mathcal{A}$) that will be opened or closed in market m and time t,[14] where $\mathcal{A} = \{-A, ..., -1, 0, 1, ..., A\}$ is the set of all feasible actions the firms can take.[15]

Given these decisions, the total number of active corporate-owned and franchised outlets evolve according to $N^C_{imt} = N^C_{imt-1} + n^C_{imt} \leq \bar{N}$ and $N^F_{imt} = N^F_{imt-1} + n^F_{imt} \leq \bar{N}$ respectively. Here, denote the total number of outlets as $N_{imt} = N^C_{imt} + N^F_{imt}$, and the current period's market structure as $N_{mt} = \{N_{imt}\}_i$. Since firms are forward looking, they will be maximizing

[14] Our model allows for the possibility that a corporate-run outlet is converted to a franchisee-run outlet (or vice versa). In such cases, then $n^C_{imt} = -1$ and $n^F_{imt} = +1$ (or $n^C_{imt} = +1$ and $n^F_{imt} = -1$).

[15] Note that an alternative modeling choice would be to assume sequential ordering with respect to corporate-based expansion and franchisee-based expansion (e.g., Jeziorski, 2014). We avoid such an assumption as there is no anecdotal evidence about whether one type of expansion is used before the other, and thus, choosing the number of corporate-run and franchisee-run outlets simultaneously is more realistic.

the discounted profit stream $\sum_s \rho^s \Pi_{imt+s}$, where Π_{imt+s} is the one-shot payoff as defined by

$$\Pi_{imt} = R(n_{imt}, n_{-imt}, N_{imt-1}, N_{-imt-1}, Z_{imt}) - C(n_{imt}, N_{imt-1}, N_{-imt-1}, Z_{imt}).$$

In the one-shot payoff, $R(\cdot) = \sum_{k \in \{C,F\}} R^k(\cdot)$ is the total revenue that the firm receives from operating N_{imt} outlets, while $C(\cdot)$ are the sunk costs associated with adding or subtracting n_{imt} outlets. Furthermore, payoff relevant state variables are captured by the vector Z_{imt}. Note that the revenue function can be written as,

$$R^k(\cdot) = N^k_{imt} r^k_{imt}(Z_{imt}, N^C_{imt}, N^F_{imt}, N_{-imt}) + \omega^k_m + \varsigma^k_{1imt} + \xi^k_{1imt},$$

where $r^k_{imt}(\cdot)$ is the per-store revenue represented by the following

$$r^k_{imt}(\cdot) = \alpha^k_1 + \alpha^k_2 Z_{imt} + \alpha^k_3 N^C_{imt} + \alpha^k_4 N^F_{imt} + \alpha_5 N_{-imt}.$$

Based on this specification of revenue, we see that total sales is a function of the total number of outlets multiplied by the average per-store profits (in the brackets). A few observations are in order. First, we allow for heterogeneity in the effects from own-brand outlets (α^k_3 and α^k_4), which depend on whether they are related to corporate or franchisee run outlets. Cannibalization or encroachment materializes if $\alpha^k_3 < 0$ and/or $\alpha^k_4 < 0$. Note also that an alternative interpretation of cannibalization or encroachment would be decreasing returns (i.e., concavity) in total revenues with respect to the number of outlets. There is also another possible scenario in which $\alpha^k_3 > 0$ and/or $\alpha^k_4 > 0$, which we would then interpret as evidence of some form of size spillover (e.g., Blevins, Khwaja, and Yang, 2015). Second, we allow for rival-brand competition to enter via (α_5).[16] Third, our specification for the revenue process contains both private information (ς^k_{1imt}) and optimization error (ξ^k_{1imt}), as in Ellickson and Misra (2012). We assume that these shocks are i.i.d. and drawn from a Type I Extreme Value distribution. Finally, there are market-specific fixed effects (ω^k_m) in the revenue equation.

[16] We focus on the total number of competing outlets, such that the identity of competitors does not matter. This assumption is appropriate as customers are unlikely to exhibit strong brand loyalty. First, loyalty programs are not offered by the retail chains. Second, customers typically choose whichever stores are closest in proximity and most convenient. Finally, there is little true quality differentiation across the convenience store brands.

The cost function can be written as

$$
\begin{aligned}
C(\cdot) &= \beta_1 Z_{imt} + \beta_2 \cdot 1\{N_{imt-1} = 0, n_{imt} > 0\} \\
+\beta_3^C \cdot 1\{n_{imt}^C &> 0\} n_{imt}^C + \beta_3^F \cdot 1\{n_{imt}^F > 0\} n_{imt}^F \\
+\beta_4^C \cdot 1\{n_{imt}^C &< 0\} n_{imt}^C + \beta_4^F \cdot 1\{n_{imt}^F < 0\} n_{imt}^F + \beta_5^C \cdot N_{imt}^C + \beta_5^F N_{imt}^F + \varsigma_{2imt}^k + \xi_{2imt}^k.
\end{aligned}
$$

Key components of the cost function include the following. We allow cost-specific state variables to have an impact on costs (β_1). Ideally, these state variables will be different from the state variables in the revenue equation. The costs of entering are captured by β_2; such costs may include the cost of setting up a distribution network. Similarly, the expansion costs for corporate-owned and franchised outlets are represented by β_3^C and β_3^F respectively, while the contraction costs are β_4^C and β_4^F. Furthermore, variable or operational costs at the store level are represented by β_5^C and β_5^F. Finally, as in the revenue equation, there is both private information (ς_{2imt}^k) and optimization error (ξ_{2imt}^k). Note that in our cost function specification, we omit the possibility of scale economies or productivity (e.g., Blevins, Khwaja, and Yang, 2015; Nishida and Yang, 2015), as such dimensions of profitability will introduce new sources of serially correlated unobserved heterogeneity, which would be particularly complicated in this setting as firms are making joint decisions about both the number of corporate-run and franchisee-run outlets.

3.2 Equilibrium

We now define the Markov strategies that are used by the firms. Before describing these strategies, we note first that the pay-off relevant states are $S = (Z_{mt}, N_{mt-1})$. These strategies are $\sigma_i = (\sigma_i^C, \sigma_i^F)$, which consist of the corporate-run outlet strategy $\sigma_i^C : S \to \mathcal{A}$, and the franchise-run outlet strategy $\sigma_i^F : S \to \mathcal{A}$. Furthermore, n_i can be described as mappings from pay-off relevant states (S) to strategies (σ_i). Let $\sigma = \{\sigma_i\}_i$ be a Markov strategy profile. Assuming that the firms follow a stationary Markov Perfect Equilibrium,[17] we know that they will choose a strategy profile σ^* such that for all i,

$$V_i(S; \sigma^C, \sigma^F | \sigma_i^*, \sigma_{-i}^*) \geq V_i(S; \sigma^C, \sigma^F | \sigma_i, \sigma_{-i}^*)$$

for all σ_i, where $V_i(\cdot)$ is the Bellman equation defined as:

$$V_i(S; \sigma^C, \sigma^F) = E[\Pi_i(S; \sigma^C(S), \sigma^F(S)) + \rho E(V_i(S'; \sigma^C, \sigma^F) | S, n^C = \sigma^C, n^F = \sigma^F) | S]$$

[17] Refer to Ericson and Pakes (1995) for the general framework.

For simplicity, we restrict ourselves to symmetric equilibria (for a given ownership type).

Doraszelski and Satterthwaite (2010) lay out the key assumptions needed for existence of a MPE. At first glance, it is clear that our model satisfies most of the conditions. First, the state space in our model is bounded. That is, we restrict the total number of outlets a given market can have for a particular chain and ownership type to be $\bar{N}$. Furthermore, the observed market characteristics can be bounded if we make them discrete; note that Sweeting (2013) points out that the existence results in Doraszelski and Satterthwaite (2010) can be extended to allow "arbitrarily fine discretization of the continuous states." Also, optimization and private information shocks are drawn from distributions with positive densities and connected support. Finally, there needs to exist a maximizer to the Bellman equation for any set of value functions. It is this last condition that one would need to explore further in numerical analysis, as our model involves the joint decision of selecting how many corporate-run and franchisee-run outlets will be added.[18]

4 Estimation

Based on the retail expansion model we have introduced, the revenue and cost parameters we need to estimate are as follows:

$$\theta = (\alpha_1^k, \alpha_2^k, \alpha_3^k, \alpha_4^k, \alpha_5, \beta_1, \beta_2, \beta_3^k, \beta_4^k, \beta_5^k).$$

Note that unlike typical papers about retail entry and expansion, we allow for heterogeneity in these parameters across ownership types; that is, we *do not* restrict that $\alpha_1^C = \alpha_1^F$, ..., $\beta_5^C = \beta_5^F$, as it is an empirical question as to whether the underlying model primitives are the same between corporate-run and franchisee-run outlets. We can incorporate this heterogeneity with respect to organizational structure as ownership-specific store counts and revenues are observed in our data across markets and time.

To estimate the model, we proceed in three main steps. In the first step, we propose a flexible parametric estimator that approximates the corporate-run and franchisee-run expansion strategies across the firms. In the next step, we estimate revenue regressions that allow for potential selection biases using the method proposed by Ellickson and Misra (2012). Finally, using the approximated policy functions along with the estimated revenue equation, we estimate the sunk cost parameters via Bajari, Benkard, and Levin's (2007) forward simulation approach. Note that the standard errors are obtained using bootstrapping procedures.

[18] Note that the assumption we make about the shocks suggest that the best response function is well defined and continuous in the set of choice probabilities, and by Brower's fixed point theorem, there should exist at least one equilibrium (Aguirregabiria and Mira, 2007).

4.1 Policy Function Approximation

In this section, we discuss the flexible parametric approach we use to approximate the policy functions. The main objects we are interested in are $P(\sigma_i^C|S)$ and $P(\sigma_i^F|S)$. We use a flexible sieve estimator to obtain $\hat{P}(\sigma_i^C|S)$ and $\hat{P}(\sigma_i^F|S)$. To obtain these choice probabilities, we evaluate the likelihood function of a flexible ordered probit model that approximates the reduced form policy function.

In particular, we estimate an ordered probit model where the discrete choice set is $\mathcal{D} = \{d_1, d_2, \ldots, d_D\} \subset \mathcal{A}$ with $d_1 < d_2 < \cdots < d_D$. These values may range from negative to positive, representing expansion and contraction decisions by firms. Each firm's decision depends on the value of a latent index, y_{imt}^k, which can be flexibly specified to depend on the relevant state variables. Let W_{mt} denote the vector of endogenous and exogenous state variables Z_{mt}, along with all distinct pair-wise interactions and squares. Furthermore, we include as part of the state variables market fixed-effects, as in Suzuki (2013). We use the following simple, but flexible linear link function specification for y_{imt}^k that includes higher-order terms and interactions:

$$y_{imt}^k = \phi \cdot W_{mt}^k + \nu_{imt}^k.$$

The final term, ν_{imt}^k, is an independent and normally distributed error term with mean zero and unit variance.[19] Decisions are related to the latent variable by a collection of threshold-crossing conditions:

$$n_{imt}^k = \begin{cases} d_1 & \text{if } y_{imt}^k \leq \vartheta_1 \\ d_2 & \text{if } \vartheta_1 \leq y_{imt}^k \leq \vartheta_2 \\ \vdots & \vdots \\ d_D & \text{if } \vartheta_{D-1} \leq y_{imt}^k \leq \vartheta_D \end{cases}.$$

The values $\vartheta_1, \ldots, \vartheta_D$ are the D cutoff parameters corresponding to each outcome. These cutoffs are estimated using sieve maximum likelihood along with the index coefficients. Let ϕ denote the vector of all first-stage parameters. Given data $\{n_{mt}, Z_{mt}\}_{t=0}^T$ for the entire sample of $m = 1, \ldots, M$ markets, consistent estimates of ϕ can be obtained by maximizing

[19] We normalize the variance of the error term to one because the coefficients in the payoff function are only identified up to scale.

the following likelihood function,

$$\begin{aligned} L_M(\phi) &= \prod_{m=1}^{M}\prod_{t=1}^{T} L_m(n_{mt} \mid Z_{mt}, \phi) \\ &= \prod_{m=1}^{M}\prod_{t=1}^{T} l_m(n_{mt}^C \mid Z_{mt}, \phi)\, l_m(n_{mt}^F \mid Z_{mt}, \phi). \end{aligned}$$

Note here that this likelihood is derived using the fact that the shocks $(\varsigma_{1imt}^C, \xi_{1imt}^C)$ and $(\varsigma_{1imt}^F, \xi_{1imt}^F)$ are not correlated with each other, which holds under the i.i.d. assumption that we impose on the private information and optimization error shocks. We do, however, allow for the potential impact that N_{imt}^F may have on n_{imt}^C, and N_{imt}^C may have on n_{imt}^F.

4.2 Revenue Regressions

In a similar manner as Nishida and Yang (2015), our analysis makes use of the fact that we observe firm-specific revenues for corporate-run and franchisee-run outlets. Because of the potential selection bias in observed revenues that is induced by the underlying dynamic game of expansion, we employ a propensity-score method by Ellickson and Misra (2012). They point out that the private-information assumption helps us simplify the problem greatly, because this assumption allows us to decompose the joint selectivity problem into a collection of individual (firm-specific) selectivity problems. Thus, we run revenue regressions, with the inclusion of a control function $\Lambda(\hat{n}_{imt})$. Here, $\hat{n}_{imt} = (\hat{n}_{imt}^C, \hat{n}_{imt}^F)$ is the predicted number of opened/closed corporate-run and franchisee-run outlets as determined using the first stage policy approximation. For the control function, we make it a flexible function of $\hat{n}_{imt}$, which is approximated using high order polynomials. The set of revenue regressions for corporate-run and franchisee-run outlets are defined as:

$$R^k(\cdot) = N_{imt}^k r_{imt}^k(Z_{imt}, N_{imt}^C, N_{imt}^F, N_{-imt}) + \Lambda(\hat{n}_{imt}^k) + \tilde{\vartheta}_{imt}^k$$

where $\tilde{\vartheta}_{imt}^k = \tilde{\varsigma}_{1imt}^k + \tilde{\xi}_{1imt}^k$ is a homoskedastic, mean zero error term. To obtain $\hat{n}_{imt}$, we take the average number of outlets across simulations for a given market and time. Note that the private information assumption regarding ζ_{imt} helps simplify the problem, as this assumption allows us to decompose the joint selectivity problem into a collection of individual (firm-specific) selectivity problems.

As in Nishida and Yang (2015), we do not run revenue regressions for each possible alternative of n_{imt}, but instead use the predicted number $\hat{n}_{imt}$ via forward simulations as a sufficient statistic. Using $\hat{n}_{imt}$ reduces the dimensionality of our problem significantly. For example, if there are 10 expansion/contraction options a firm can make as to how many stores to subtract or add, and if we used a second order polynomial approximation for the control function, we would have to estimate 40 parameters alone for the selectivity correction component alone. This dimensionality problem in parameter space becomes worse if we wish to estimate firm-specific heterogeneity. To set up this selectivity correction term, we choose a simple third-order polynomial as suggested by Ellickson and Misra (2012), which is a flexible non-linear function of the predicted number of added or subtracted outlets $\hat{n}_{imt}$:

$$\Lambda(\hat{n}_{imt}) = \varphi_1 \hat{n}_{imt} + \varphi_1 \hat{n}_{imt}^2 + \varphi_3 \hat{n}_{imt}^3.$$

The selectivity correction term, $\Lambda(\hat{n}_{imt})$, is meant to control for the expectation of $\vartheta_{imt}^k = \varsigma_{1imt}^k + \xi_{1imt}^k$, conditional that $n_{imt} > 0$. In particular, Ellickson and Misra (2012) demonstrate that this conditional expectation can be expressed as a one-to-one correspondence of the equilibrium strategies (as reflected by $\hat{n}_{imt}$ in our application), hence $\Lambda(\hat{n}_{imt})$.

4.3 Forward Simulations

The final stage of our estimation implements Bajari, Benkard, and Levin's (2007) forward simulation approach, which is used to recover the structural parameters given the estimated first stage parameters ϕ. The estimated first stage parameters are used to forward simulate the policies, and exogenous state variables. To forward simulate the exogenous state variables, we employ a seemingly unrelated regression (SUR) model to capture the dynamics of our exogenous demand-side (e.g., population, income) and cost-side (e.g., minimum wage, land price) variables. Such an approach permits potential correlation between the exogenous variables. For example, income and property value often move along similar trends. The SUR specification we use can be described as

$$\begin{bmatrix} Z_{1mt} \\ Z_{2mt} \\ \ldots \\ Z_{kmt} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ \ldots \\ c_k \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} & \ldots & A_{1k} \\ A_{21} & A_{22} & \ldots & A_{2k} \\ \ldots & & & \\ A_{k1} & A_{k2} & \ldots & A_{kk} \end{bmatrix} \cdot \begin{bmatrix} Z_{1mt-1} \\ Z_{2mt-1} \\ \ldots \\ Z_{kmt-1} \end{bmatrix} + \begin{bmatrix} e_{1mt-1} \\ e_{2mt-1} \\ \ldots \\ e_{kmt-1} \end{bmatrix},$$

where $E[e_{mt}e'_{mt}] = \Omega$ and where $c = (c_1, \ldots, c_k)$, $A = (a_{ij})$, and Ω are parameters to be estimated.

To proceed with the inference, we assume that the data is generated by a single MPE strategy, which is a typical assumption in applications that employ such two-step estimation methods (e.g., Jeziorski, 2014). Unlike nested fixed-point estimation methods, this assumption does not require us to say anything about the particular equilibrium selection; we are only assuming that the equilibrium selection is the same across markets. For any given initial state $S_1 = (N_0, Z_1)$, we can then forward simulate the following:

$$\bar{V}_{i,m}(S_1; \sigma^C, \sigma^F, \theta) = \mathbb{E}\left[\sum_{\tau=1}^{\infty} \rho^{\tau-1} \Pi_{i,m}(\sigma^C(S_\tau, \varsigma_\tau), \sigma^F(S_\tau, \varsigma_\tau), S_\tau, \varsigma_{i\tau}; \alpha) \mid S_1, \sigma\right]$$
$$\simeq \frac{1}{\bar{S}} \sum_{s=1}^{\bar{S}} \sum_{\tau=1}^{T} \rho^{\tau-1} \Pi_{i,m}(\sigma^C(S_\tau^s, \varsigma_\tau^s), \sigma^F(S_\tau^s, \varsigma_\tau^s), S_\tau^s, \varsigma_{i\tau}^s; \theta).$$

Subscript s represents each simulation, where $\bar{S}$ paths of length T are simulated in the second stage. The term $\sigma(S_\tau^s, \varsigma_\tau^s)$ denotes a vector of simulated actions based on the policy profile σ. With this construction of forward simulated actions and payoffs, we can then consider perturbations of the policy function to generate B alternative policies. With each alternative policy, we can obtain the forward simulated profit stream using the previous two steps. We let b index the individual inequalities, with each inequality consisting of an initial market structure and state $S_1^b = (N_0^b, Z_1^b)$, an index for the deviating firm i, and an alternative policy $\tilde{\sigma}_i$ for firm i. The difference in valuations for firm i in market m using inequality b is denoted by

$$g_{i,b,m}(\hat{\sigma}, \theta) = \bar{V}_{i,m}(S_1^b; \hat{\sigma}, \theta) - \bar{V}_{i,m}(S_1^b; \tilde{\sigma}_i, \hat{\sigma}_{-i}, \theta),$$

where $\hat{\sigma} = (\hat{\sigma}^C, \hat{\sigma}^F)$. This difference should be positive in equilibrium, since off-equilibrium values has to be lower than discounted profits under equilibrium play. Therefore, this criterion listed below identifies a $\hat{\theta}$ to minimize the violations of the equilibrium requirement:

$$Q(\theta) = \frac{1}{B} \sum_m \sum_i \sum_b (\min\{g_{i,b,m}(\hat{\sigma}, \theta), 0\})^2.$$

4.4 Identification

In order to assess the roles of revenue-based and cost-based factors, the model we estimate needs to be identified. We outline key sources of variation in our data that help identify the key model primitives.

The first components that we need to identify are the revenue functions for corporate-run outlets and franchisee-run outlets. We are especially interested in the ownership-specific fixed effects in the revenue regressions (i.e., intercepts). Identification of the revenue function follows from the fact that we observe the exact revenues (across markets) for corporate-run outlets as well as franchisee-run outlets. Furthermore, as we can control for market specific heterogeneity via observed controls and market fixed effects, the intercept terms will be identified through the regression. There are of course issues related to selection, in that we only observe revenues for cases in which a chain has at least one outlet. For this reason, we use the selectivity corrections based on propensity scores, as proposed by Ellickson and Misra (2012).

There may potentially be omitted variables in the profitability of corporate-run and franchisee-run stores. To address such concerns, we ensure that our flexible policy function approximations incorporate market heterogeneity in the form of market fixed effects, as also done in Suzuki (2013). Furthermore, we allow these market fixed effects to vary depending on whether the policy function approximation is for corporate-run or franchisee-run expansion strategies. Because the policy functions are used to address selection biases in revenue, market specific unobserved heterogeneity is also controlled for in the revenue regressions.

For identification of the strategic interactions, we rely on a few exclusion restrictions (Bajari, Chernozhukov, Hong, and Nekipelov, 2007). First, we make use of last period size that ultimately enter through entry, expansion, and contraction costs. This exclusion restriction is valid as the sunk costs are a function of a chain's past presence in the market, but not a function of its rivals' past presence. Therefore, a component of the profits is not universally relevant for all of the players. Another exclusion restriction we exploit is the physical distance to headquarters, which provides us an additional source of unique chain-specific variation.

Finally, we need to identify the costs of entry, expansion, and contraction. In general, these costs are identified by variation in entry, expansion, and contraction that cannot already be explained by the fitted revenues. As an additional identification argument, we note that our specification includes market characteristics that are included in costs (i.e., land rent, minimum wage), but not revenue. Unlike past work that studies retail expansion, we wish to further dichotomize these costs based on ownership type. To separately identify corporate-specific and franchisee-specific costs, we rely on variation in the relative number of corporate-run and franchisee-run outlets. In particular, we need this variation to be at the market and time level. Our earlier descriptive analysis confirms that such variation is present in our data.

5 Main Findings

This section describes the main estimates, along with counterfactual analysis we conduct using the estimated model. For the second-stage estimation, we generate $B = 1000$ random inequalities, where each inequality compares the forward-simulated value functions in equilibrium with alternative strategies that are generated via perturbations of the approximated policy function (from the first-stage estimation). The standard errors in the second-stage are obtained with bootstrapping, where we use 100 replications with replacement from a sample of 47 markets. Finally, we assume a discount factor of $\rho = 0.95$.

5.1 Summary of Estimates

Table 4 shows the estimation results for the policy function. In our specification, we allow the policy functions to be heterogeneous across ownership type. The estimated policy functions reveal that expansion strategies are noticeably different across ownership type. First, the cross-ownership effects appear to be different across corporate-run and franchisee-run outlets, as corporate-run outlets react differently to the number of existing franchisee-run outlets, and vice versa. Furthermore, sensitivity to competition varies between corporate-run and franchisee-run outlets, as franchisee-run outlets appear to be especially deterred by the number of existing rival outlets; the fact that competitive conditions have an impact on corporate-run and franchisee-run expansion decisions further motivates the notion that these decisions are strategic in nature.

We see also see that some of the observable market characteristics have differential effects on the expansion of corporate-run and franchisee-run outlets. First, minimum wage has a negative effect on corporate-based expansion, but a positive effect on franchisee-based expansion. This result contrasts that of Michael (1996), who shows that average wage increases the share of franchisee-run outlets. Second, income and land price have larger effects on franchisee-based expansion. The differential effects are consistent with the intuition from Fan, Kuhn, and Lafontaine (2013), where they show that rising (housing) wealth provides franchisees collateral to banks in order to finance the franchise fees, and thus, helps further align the incentives of franchisees with the franchisors thereby making franchisee-based expansion especially attractive. Third, the differential impact of distance to headquarters fits with the notion of monitoring costs as a motivator for franchising (e.g., Kalnins and Lafontaine, 2013); that is, corporate-run outlets need to be placed closer to headquarters because of revenue-based monitoring concerns, while franchisee-run outlets can be placed further away as the chain faces less pressure to monitor franchisees, whose incentives should be aligned with the firm.

More generally, the first-stage policy function approximation confirms that the expansion decisions depend largely on local market conditions, such as observable market characteristics and market structure. As the number of corporate-run and franchisee-run outlets are used to construct the often used franchising mix measures, we demonstrate here the importance of such granular data when studying drivers behind franchising decisions.

Table 5 reports the estimation results from the selectivity-corrected revenue regressions.

Table 4: First-Stage Policy Function Approximation

	Corporate-run		Franchisee-run	
	Estimate	Std.Error	Estimate	Std.Error
Number of corporate-run outlets	-0.0837	0.0068	0.1068	0.0118
Number of franchisee-run outlets	0.0093	0.0005	0.0238	0.0011
Number of rival outlets	0.0011	0.0002	-0.0022	0.0005
Number of corporate-run outlets (squared)	2.9769	1.1652	-19.3281	2.8906
Number of franchisee-run outlets (squared)	-0.1640	0.0128	-0.6030	0.0343
Number of rival outlets (squared)	-0.0064	0.0011	0.0089	0.0041
Number of corporate-run outlets (cubed)	0.1130	0.5673	7.4144	1.2999
Number of franchisee-run outlets (cubed)	0.0118	0.0012	0.0409	0.0029
Number of rival outlets (cubed)	0.0001	0.0000	-0.0002	0.0001
Income	0.0281	0.0117	0.0970	0.0273
Population density	-2.0180	0.0940	-4.5577	0.9803
Minimum wage	-0.0004	0.0001	0.0009	0.0002
Land price	0.0018	0.0003	0.0042	0.0012
Distance to headquarters	-0.5203	0.1728	0.7515	0.2394

As in the first-stage policy function estimation step, we allow for heterogeneity based on ownership type. The regression results highlight some key differences between corporate-run and franchisee-run outlets. First, the intercept term is markedly higher for franchise-run outlets (i.e., nearly double in size) as compared with corporate-run outlets. This result suggests that franchisee-run outlets are capable of generating more revenue than corporate-run outlets, which is consistent with the notion that franchising helps mitigate revenue-based issues in chain store management. Second, revenues at franchisee-run outlets are negatively impacted by the number of corporate-run outlets; this finding is consistent with what past work has uncovered under different industry settings (e.g., Kalnins, 2004). The negative own-brand effects are indicative of cannibalization or encroachment, and in fact, total revenues exhibit concavity as they begin to decrease once the number of corporate-run outlets reaches 217. In contrast, the presence of other corporate-run and franchisee-run outlets has a positive effect on sales at corporate-run outlets; one may conjecture that the presence of other outlets belonging to the same chain increases brand awareness through quality investments and advertising efforts made by the company and franchisees, and that corporate-run stores are better able to internalize any chain-level improvements in customer goodwill (e.g., Bai and Tao, 2000; Blair and Lafontaine, 2005; Lafontaine and Slade, 2002).[20] Finally, revenues at franchisee-run outlets are negatively impacted by the number of rival outlets.

[20] A positive spillover from past size or experience is also consistent with Blevins, Khwaja, and Yang (2015), and Darr, Argote, and Epple (1995).

Table 5: Revenue Function Estimates

	Corporate-run		Franchisee-run	
	Estimate	Std.Error	Estimate	Std.Error
Intercept	126.7851	9.1781	173.1091	12.9051
Population density	-7.6864	1.2037	-7.4843	1.1254
Income	-0.0082	0.0039	0.0050	0.0048
Number of corporate-run outlets	0.0470	0.0249	-0.3946	0.0368
Number of franchisee-run outlets	0.0724	0.0048	0.1325	0.0069
Number of rival outlets	0.0249	0.0028	-0.0096	0.0031
n	-0.7499	0.7853	-490.8373	161.7552
n^2	4.8517	5.2339	25.1188	17.7087
n^3	-0.2107	0.2395	-0.3233	0.3534

Table 6: Cost Function Estimates

	Estimate	Std.Error
Entry cost	-76.4968	34.2883
Expansion cost (Corporate-run)	-0.3798	0.2952
Contraction cost (Corporate-run)	0.1283	0.1010
Expansion cost (Franchisee-run)	-0.8689	7.2951
Contraction cost (Franchisee-run)	-0.2557	7.4375
Operation cost (Corporate-run)	-0.2764	0.2713
Operation cost (Franchise-run)	-0.3180	0.4770
Minimum wage	0.1491	0.0543
Land price	0.0578	0.0769
Distance to HQ	0.0129	0.1008

Table 6 reports the cost function estimates. Among the costs, entry costs are the largest, as compared with expansion, contraction, and variable costs. As in the first-stage policy functions, and revenue estimates, there is considerable heterogeneity between corporate-run and franchisee-run outlets. In particular, the expansion cost for franchisee-run outlets is noticeably higher than the expansion cost for corporate-run outlets; also, we see similar patterns when we compare the contraction costs across ownership types. The variable cost estimates reveal that it is also cheaper to operate a corporate-run outlet.

Because the model we estimate simultaneously captures all of these components, we can provide further insight into the *relative roles* of revenue-based and cost-based factors. For example, one can compare the corporate-run and franchisee-run intercept terms from the revenue equation. By comparing these intercepts, we see that all else held equal, franchisee-run outlets generate more revenue than corporate-run outlets. On the other hand, the comparison of expansion costs reveal that each franchisee-run outlet is more expensive to open (and operate) relative to a corporate-run outlet; we see similar patterns with respect to variable costs. In summary, these results suggest an interesting short-run trade-off between sales efficiencies of franchisee-run outlets (in the form of higher revenues), versus cost efficiencies associated with corporate-run outlets. Our findings about the short-run trade-offs reconcile some of the past work in organizational economics about the merits of franchising.

The sales efficiency benefits of franchisee-based expansion could potentially be explained by agency problems, unit managers in corporate-run outlets may have an incentive to shirk in their efforts to maintain an acceptable level of quality and performance (e.g., Carney and Gedajlovic, 1991; Combs and Ketchen, 2003; Fan, Kuhn, and Lafontaine, 2013; Gal-Or, 1995; Lafontaine and Slade, 1996; Shane, 1996). Related to moral hazard is the notion that notion that monitoring costs may be higher for outlets supervised by unit managers, as opposed to outlets run by franchisees (e.g., Kalnins and Lafontaine, 2013; Lafontaine and Slade, 1996, Scott, 1995). Furthermore, there could be informational advantages of franchisee-based expansion, as franchisors can learn from franchisees about the local market conditions (e.g., Minkler, 1990). Related to informational advantages, franchisees may be more responsive and adaptive to changes in market conditions than unit managers that work under layers of corporate bureaucracy (e.g., Srinivasan, 2006; Yin and Zajac, 2004).

Offsetting the potential benefits of sales efficiency, franchisee-run outlets appear to have higher costs attached to them. Higher contraction costs for franchisee-run outlets may be driven by legal costs associated with early termination of a franchisor-franchisee agreement, such as regulation that franchisors may need to provide "good cause for termination" when ending relationships with their franchisees (e.g., Antia, Zheng, and Frazier, 2013; Blair, 1988). Furthermore, the positive sign for the contraction costs for corporate-run outlets may reflect the fact that these costs may also incorporate scrap values, which is particularly relevant as many corporate-run outlets are housed on land owned by the franchisor (e.g., Love, 1995). The higher operational costs of franchisee-run outlets may reflect the fact that the franchisee has the right to a sufficiently large share of the sales or profits such that incentives between the franchisee and franchisor are aligned (e.g., Michael and Moore, 1995; Rubin, 1985), and the costs of *ex post* monitoring franchisees (e.g., Agrawal and Lal, 1995; Kashyap, Antia, and Frazier, 2012). Finally, expansion costs may be higher for franchisee-run outlets as identifying high quality franchisees likely requires extra resources on the part of the franchisor; for example, it is an entrepreneur's decision about whether or not to be a franchisee (e.g., Hollenbeck, 2013) and even if there are minimal frictions in identifying prospective franchisees, there is likely heterogeneity in their quality and capabilities (e.g., Kalnins and Mayer, 2004; Shane, 1998).

Table 7: Decomposition of Annual Sales in Scenario with Franchisee-run (Corporate-run) Outlets Being Switched to Corporate-run (Franchisee-run) Outlets

	Equilibrium	$\uparrow$ corporate	Δ	$\uparrow$ franchisee	Δ
Corporate sales	3692454.64	3856257.79	163803.15	3690943.79	-1510.85
Franchisee sales	14396323.39	14389613.86	-6709.53	14609394.92	213071.54
Total sales	18088778.03	18245871.65	157093.62	18300338.71	211560.68
Spillovers net cannibalization	6981667.32	7531614.52	549947.20	7084984.18	103316.86

5.2 Evaluation of Franchising Performance

In this section, we explore further the underlying drivers behind franchising. The estimates themselves suggest that both revenue-based and cost-based considerations may play important roles in favor of franchising, while cannibalization concerns may dissuade chains from relying solely on franchisee-based expansion. To proceed, we use the estimated model to perform counterfactual analysis. The first hypothetical scenario we consider is one in which all the chains suddenly switch 10 of their franchisee-run outlets into corporate-run outlets in the initial period. Analogously, the second scenario considers a case when all of the chains switch 10 of their corporate-run outlets into franchisee-run outlets. We then forward simulate the industry dynamics as in Benkard, Bodoh-Creed, and Lazarev (2010) and evaluate how key performance measures, such as industry-wide sales, are affected by this hypothetical change in initial conditions.

Table 7 presents our findings from the counterfactual simulations. The simulations confirm that if the chains initially switch some of their franchisee-run outlets into corporate-run outlets in the first year, the average revenue per year from corporate-run outlets does indeed increase, as one would expect. At the same time, we see that revenues from franchisee-run outlets drop. Furthermore, we see converse effects when there are 10 additional franchisee-run outlets.

There are some differences in the effect that an influx of corporate-run or franchisee-run outlets has on revenues. Total sales appear to increase the most in the hypothetical scenario with additional corporate-run outlets in the initial period, as opposed to additional franchisee-run outlets. That is, despite the potential benefits of franchising as a way to mitigate revenue-based issues (i.e., higher intercept in revenue function for franchisee-run outlets), expansion via corporate-run outlets may actually leave the chain better off in terms of sales than the case in which expansion is relying solely on franchisee-run outlets. A larger portfolio of corporate-run outlets allows the chain to avoid additional legal or internalized costs associated with encroachment of pre-existing franchisees. Recall that it is only franchisee-run outlets that experience strong cannibalization effects from the presence of corporate-run outlets. To build on this conjecture, we compare the spillovers (from existing stores of the same brand) net of the negative cannibalization costs across the scenarios. This comparison demonstrates that the monetary value of spillovers net cannibalization is largest when corporate-run outlets are added as opposed to when franchisee-run outlets are added. Furthermore, these net positive spillovers explain a larger percentage of the increase in total sales (i.e., 20% when corporate-run outlets added versus 5% when franchisee-run outlets added).

5.3 Rationalizing Corporate-based Expansion

Our findings thus far have uncovered revenue and cost-based advantages of expansion via franchisee-run outlets. However, despite the benefits of franchisee-run expansion, we still see a sizeable proportion of outlets being run by the corporation. This section will propose one mechanism that may explain the presence of corporate-run outlets, despite the clear benefits of franchisee-based expansion.

One aspect of the organizational form decision that we have not fully explored is the potential trade-off between encroachment and preemption. That is, one source of friction that may prevent a chain from expanding without bounds may come from attrition in sales experienced by franchisee-run outlets when they are exposed to other stores of the same brand. Despite this potential friction, recall that it has been suggested by Blair and Lafontaine (2005) that franchisors have a strong incentive to expand quickly into markets as a means to deter competing brands from entering. Uncovering this preemptive motive along is difficult, let alone demonstrating that such incentives explain the existence of corporate-run outlets.

To proceed, we adapt a recent strategy for quantifying preemptive motives, originally developed by Igami and Yang (2015). In their analysis of fast food chain expansion, they first estimate a fully dynamic game of retail expansion and contraction. With the estimated model, they then highlight preemptive motives by considering a hypothetical scenario in which the incentive to preempt is shut down. To implement this hypothetical scenario, they consider a case in which the focal chain competes against rivals who form their strategies conditional only on their own size, and exogenous states, such as market size and own-brand presence; in other words, the rivals become *non-strategic* (from the perspective of the focal chain) as the number of focal chain's outlets are integrated out to form the conditional distribution of rival outlets. For our simulation analysis, we follow a similar approach, except our focus will be on how the mix of corporate and franchisee-run outlets changes when preemptive motives are eliminated. Another way to describe this counterfactual would be to draw on the conceptual framework from the literature about cognitive hierarchy (e.g., Camerer, 2003; Camerer, Ho, and Chong, 2004; Goldfarb and Xiao, 2011; Goldfarb and Yang, 2009; Ho, Park, and Su, 2013), in which firms would be described as being type-0, type-1, type-2, and so on. A type-0 firm would act as though it is the only player in the market, a type-1 firm believes that its competitors act as though they are the only players in the market, and a type-2 firm acts as if its competitors are either type-0 or type-1. Specific to our counterfactual setting, one could interpret the focal chain as being type-1, while its non-strategic rival would be type-0.

5.3.1 Simulation Results

For the simulation analysis, we use a calibrated version of the model presented. We consider a scenario in which there are two firms, who make decisions about how many corporate-run and franchisee-run outlets will be added or subtracted. In our data, such a setting would accurately depict a few actual markets, such as Niigata and Yamaguchi. Furthermore, we assume that the private information shocks are i.i.d. and follow a Type I Extreme Value distribution. Finally, we calibrate the parameters using the estimates obtained from structural estimation.

To find an equilibrium, we adopt the Pakes and McGuire (1994) iterative approach that stops once the conditional choice probabilities and value functions have converged. That is, we begin with an initial guess $x^0 = (V^0, P^0)$, and then apply the following iteration b for all states S,

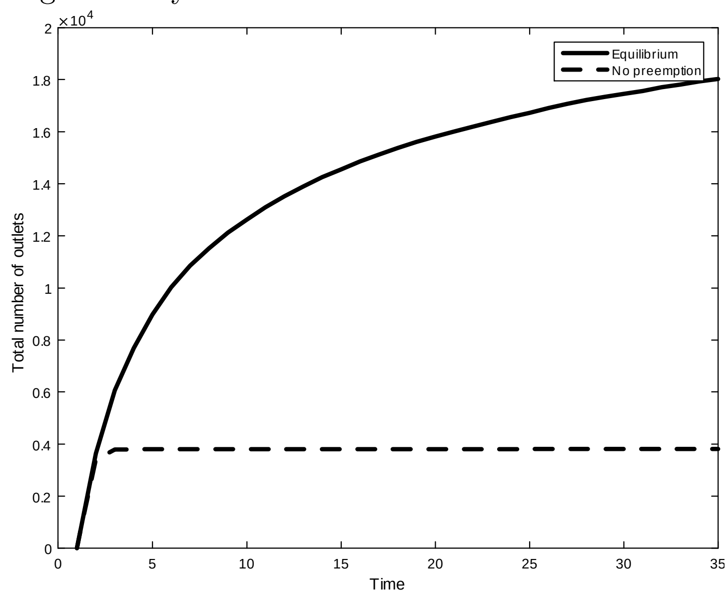
$$x^{b+1} = G(x^b),$$

where $G(x^b)$ is a collection of best responses by firm 1 and 2 against strategies P^{b-1} and simulated value functions V^{b-1} based on those strategies. Other information we need to simulate the value functions include the transition probabilities for market characteristics. In this numerical example, we use population and income that follow a similar Markovian process as in the Niigata and Yamaguchi prefectures. We then interpret convergence of this algorithm as suggestive evidence of equilibrium existence under the parametric assumptions we make about the model.[21]

Our iterative algorithm converges in fewer than 4 iterations. The fact that our algorithm converges suggests that we are able to locate one *ex ante* maximizer (i.e., strategies in probability space) of the Bellman equation for a given set of value functions generated

[21] We use a tight convergence criterion of 10^{-8}.

Figure 9: Dynamics of the Total Number of Outlets



based on our calibrated model. We first demonstrate the evidence of preemptive motives by comparing the trajectory of total outlets for the focal chain. Figure 9 plots this trajectory, and it is clear in this picture that eliminating the preemptive motive leads to considerably dampened retail outlet growth.

Figure 10 highlights a key finding from this counterfactual analysis. Here, we plot the proportion of outlets that are run by franchisees over time. In general, corporate-run outlets constitute a greater proportion of the total store count throughout the industry's evolution. The main pattern we see from the figure is that the proportion of corporate-run outlets to decline over time, which is consistent with the dynamics we see in other industries (e.g., Shane, Shankar, and Aravindakshan, 2006; Thompson, 1994). We attribute this pattern to the fact that corporate-run outlets face higher expansion costs. Furthermore, franchisee-run outlets can achieve higher revenues (as reflected through the higher intercept term). Most importantly, the comparison between the equilibrium and counterfactual proportion of corporate-run outlets suggests preemption as one plausible driver of corporate-based expansion, as there are markedly fewer corporate-run outlets (relative to franchisee-run outlets) when preemptive motives are muted.

We now look more closely at the implications for the timing of corporate-based expansion under the presence of preemptive motives. To explore these implications, we simulate and compare three different scenarios. As in our previous exercise, we have a focal chain, which we leave unchanged in terms of its underlying model primitives. In contrast, the rival chain may feasibly be a potential entrant after 5 or 10 years. By varying the timing when the

Figure 10: Dynamics of the Proportion of Corporate-run Outlets

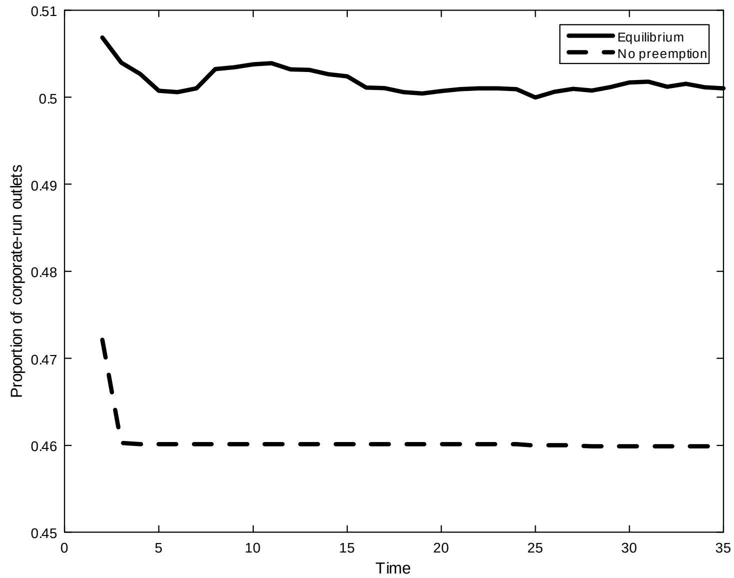
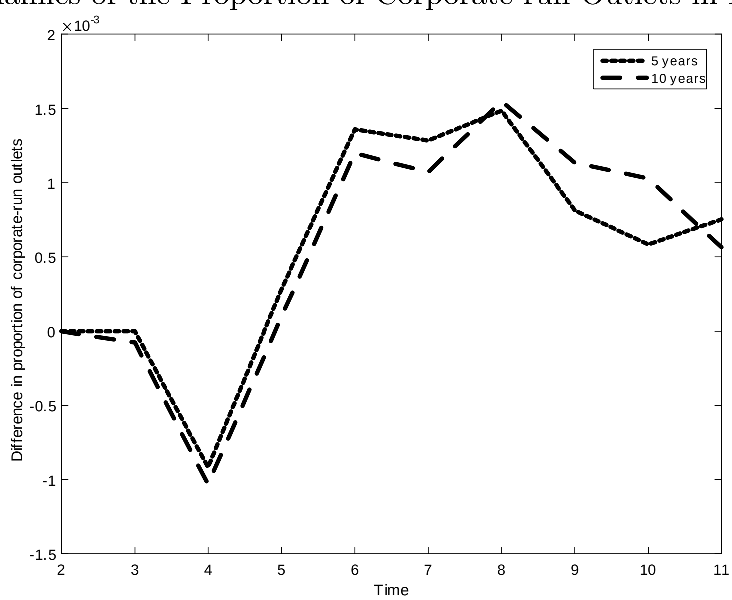


Figure 11: Dynamics of the Proportion of Corporate-run Outlets in First Ten Years



threat of entry materializes, we will also be changing the focal chain's underlying incentive to preempt the markets, as past theoretical and empirical work have demonstrated that firms may react preemptively under such threats (e.g., Bonanno, 1987; Goolsbee and Syverson, 2008; Seamans, 2012; West, 1981). Figure 11 summarizes the trajectory for the difference in proportion of corporate-run outlets (relative to the equilibrium scenario) for each of these counterfactual scenarios. A few insights emerge. First, we note that in year 4, there is a noticeably greater share of corporate-run stores for the focal chain when the threat of entry occurs after 5 years than when the threat of entry occurs after 10 years. Second, it appears that the proportion of corporate-run outlets is relatively largest in year 8 and 9 when the rival chain is a potential entrant after 10 years than when the rival chain is a potential entrant after 5 years. In summary, these results suggest that corporate outlets may be used disproportionately in years leading up to the expectation of a new potential entrant.

The stronger incentive to preempt markets via corporate-run outlets is consistent with the underlying estimated parameters. Namely, a key difference is that the cannibalization effects affect only franchisee-run outlets. Therefore, the potential long-run benefits of preemptive strategies are outweighed by the encroachment costs associated with cannibalization for franchisee outlets. In contrast, because of negligible costs associated with cannibalization for corporate-run outlets, any benefit from preemption is likely to outweigh the encroachment costs. It is interesting to note that even though franchisee outlets would suffer the most from encroachment related to preemptive entry, they may also benefit from keeping rival out of the market as their revenues are more sensitive to inter-brand competition.

6 Conclusion

This paper is the first to provide detailed analysis about retail chain expansion that incorporates both *strategic* and *forward-looking* ownership structure decisions. By linking ownership structure with industry dynamics, our estimable model is capable of incorporating various short-run and long-run trade-offs that have emerged from the franchising literature. We estimate this new model using data from the convenience store industry in Japan, which contains information about the number of outlets and total sales for all of the chains across isolated geographic markets. The estimates reveal a number of key patterns. First, we demonstrate that corporate-run and franchisee-run outlets expand in different ways. Second, we show that revenues are generally larger for franchisee-run outlets, all else held equal. Finally, our cost estimates reveal that it is more costly to expand via franchisee-run outlets, as well as to operate them. In summary, our results point to interesting trade-offs in both costs and revenue between corporate-based and franchisee-based expansion. In addition to noticeable differences in the revenue and cost primitives, we show that franchisee-run outlets face stronger cannibalization effects relative to corporate-run outlets as evidenced in both policy function and revenue function estimates, which helps rationalize the fact that many retailers still or increasingly rely on corporate-run outlets for expansion despite the well-known revenue-based and cost-based concerns. Our counterfactual analysis based on the estimated model illustrates that preemptive motives may help rationalize corporate-based expansion, even when there are clear revenue and cost-based benefits of expansion via franchisee-run outlets. We also show that the preemptive motives may materialize via disproportionately faster growth among corporate-run outlets leading up to a threat of entry, which provides further evidence in favor of a link between corporate-based expansion and preemption. In summary, our paper's findings provide a compelling reason to study both ownership structure and retail expansion dynamics in tandem.

If corporate-based stores serve as a key instrument for preemptive entry, then an immediate implication would be on pre-expansion announcement strategies. Retail chains typically announce the total number of outlets that will be opened (in a given market), but do not share information about the targeted franchising mix. Pre-announcing such strategies may help reinforce the deterring effects, as Caruana and Einav (2008) have shown that production targets serve as partial commitment devices. A pre-announced target with respect to the franchising mix seems credible as contracts with franchisees are legally binding and land purchased to house the stores is expensive, thus making the pre-announcement a credible signal about the intent of preemption.

Methodologically, we see our work as being one of the first to partially bridge the gap between static retail network (e.g., Jia, 2008; Nishida, 2013b) and dynamic retail entry/expansion models. We see a few qualitative similarities between the decisions behind franchise system configurations, and retail network configurations. First, analogous the retail network literature, the chain makes a joint decision regarding the optimal configuration of stores based on ownership-type. Second, the chain optimizes based on the configurations that lead to the highest profits in the system (i.e., maximizing profits from the corporate-run and franchisee-run outlets). Finally, stores of one ownership-type have externalities on neighboring stores of the same (or different) ownership-types.

Other benefits of rapid expansion may include efficiency gains from organizational learning (e.g., Sorenson and Sørensen, 2001) or development of brand capital (e.g., Meyer and Brown, 1979). We have abstracted away from such size spillovers in the current analysis, but see this aspect as a promising research direction. A key challenge of incorporating such aspects into the model is that size spillovers, or more generally, retail chain productivity, are not directly observable in the data, and thus likely enter the payoffs as a serially correlated and partially observed state. In light of such challenges, future research could make use of the framework put forth by Blevins, Khwaja, and Yang (2015), and recently adopted by Nishida and Yang (2015), that allows for size spillovers in dynamic retail expansion.

Our analysis abstracts away from the two-sided nature of franchising. That is, to some extent, franchisees have to agree to the terms and conditions of the franchising agreement (i.e., fees, royalty rates, operating requirements). Consequently, potential franchisees themselves may decide to join the chain depending on their access to housing wealth that can be used for collateral (e.g., Fan, Kuhn, and Lafontaine, 2013), the extent to which they can gain knowledge via chain affiliation (e.g., Ingram and Baum, 1997), their trust level with the franchisor (e.g., Croonen and Brand, 2013), or the demand-based quality premium that chain brands command via informed customers (e.g., Hollenbeck, 2013). However, for future research, we see potential in incorporating recent insights about dynamic network formation by Lee and Fong (2013) to accommodate the decisions both at the franchisor and franchisee level. In particular, it would be interesting to investigate how much the cost of network formation explains the differences in expansion costs we find across ownership types.

Future work could explore more granular geographic patterns in franchising over time. For example, do we see franchisee-run outlets in close proximity other franchisee-run outlets, and how do these spatial patterns change over time? One reason that we may see clusters of franchisee-run outlets is when they share the same franchisees; to manage concerns about encroachment, the chain may give incumbent franchisees first rights for newly opened outlets in close proximity (Blair and Lafontaine, 2005). While our current setting and data limits us from exploring such patterns, we see opportunities in merging our empirical framework with the dynamic spatial oligopoly model proposed in Aguirregabiria and Vicentini (2014).

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