Firm Survival and Growth in Retail and Service Industries: Evidence from Franchised Chains*

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Abstract

This paper analyzes the survival and growth of franchised chains using an unbalanced panel data set that covers about 1000 franchised chains each year from 1980 to 2001. The empirical literature on firm survival and growth has focused almost exclusively on manufacturing – our analyses allow us to explore whether chain age and size have the same effect on the survival and growth of retail and service chains as firm and establishment age and size have been found to have on survival and growth in manufacturing. In addition, while we focus on the effect of age and size as the prior literature has done, our large and long panel data set allows us to control for the first time for chain-specific effects as well as other chain characteristics that might affect chain survival and growth. We find that controlling for chain-level unobserved heterogeneity is statistically warranted, and affects the conclusions we reach on the effect of chain age and size in our regressions. We also find that other chain characteristics affect the survival and growth of individual chains. Finally, our long panel allows us to examine a subsample of mature chains, for which we find that age and size no longer affects exit. However, consistent with Evans (1987a,b)'s results for manufacturing, we find that chain size continues to have a negative effect on chain growth, a result that implies that chains converge in size to chain-specific levels.

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1. INTRODUCTION

The "new" empirical literature on firm survival and growth, as Sutton (1997) calls the more recent micro-level literature, has flourished since Evans (1987a, b) and Dunne, Roberts and Samuelson's (1988, 1989) early work. This literature has established a number of stylized facts, including a tendency for large and older firms to grow less rapidly, but fail less frequently, than new small firms. As noted by Audretsch et al. (2004), however, this new micro-level literature, like its earlier counterpart, has been almost entirely about manufacturing firms. Exceptions have included some studies of large-scale services, namely the finance, insurance and real estate sectors (e.g. Troske, 1996), as well as Pakes and Ericson (1998), who contrast retailing and manufacturing in their analysis of active versus passive learning models, and Audretsch et al. (2004) who consider whether Gibrat's law holds for firms in small-scale service industries.

Our goal in this paper is to examine generally whether there are important differences in industry dynamics between small-scale services, specifically those that can be organized as networks of outlets, and manufacturing. We analyze factors that affect both the survival and growth of franchised chains in these sectors, and determine in particular whether chain age and size affect chain growth and survival in the same way as firm or establishment size affects growth and survival in manufacturing. We do this for a number of reasons. First, the retail and service sectors represent a large and growing component of the economy of developed countries, employing many more workers than manufacturing does in these economies. For example, 15 of the 110 million employees in the U.S. worked in manufacturing in 2004, while 89 million workers were involved in private service industries, including 15 million in retailing and another

13 million in the leisure and hospitality sector.[1] An understanding of what contributes to the survival and growth of firms in these sectors is central to understanding job creation and destruction in these economies. But why, then, focus on franchising? For one thing, franchising is an important phenomenon in these industries: In 2001, the revenues of franchised chains in the U.S. were estimated at 1.37 trillion dollars (Price Waterhouse Coopers, 2004), or 13.6 percent of nominal GDP. In retailing, at least one third of each dollar of sales are achieved via franchised chains in the U.S.[2]

Second, and perhaps most relevant, is that franchising is particularly important as a way to organize the types of networks of outlets that arise in these small-scale retail and service sectors. Our interest in these networks, in turn, stems from the observation that significant "firm" growth in small-scale retail and service sectors mostly takes place via the addition of new outlets. In other words, while a manufacturing plant or firm can grow locally and distribute its product over an increasingly large geographical market, firms in small-scale retail and service industries must establish new outlets to service customers in further away locations and thereby grow beyond the limits of their own local market. Moreover, as noted by Audretsch et al. (2004), the small size of most retail and service establishment suggests a fairly limited role for economies of scale in production which, in turn, might imply different industry dynamics in these sectors. Pakes and Ericson (1998)'s results that current size was positively related to initial size in retailing, and that the "stable" firm size distribution was achieved much more rapidly in retailing

[1] See Bureau of Labor Statistics, Table B-3: Employees on nonfarm payrolls by major industry sector and selected industry detail.

[2] Three quarters of these sales occur in traditional franchise outlets, especially car dealership and gasoline stations. Business-format franchising, where franchisors provide a "way of doing business" in exchange for royalties on sales typically, accounts for the majority of jobs and outlets, however: of the more than 750,000 franchised establishments in the U.S. in 2001, 620,000 were associated with the 2500 to 3000 business-format franchisors in the economy. In fact, business-format franchising accounted for 4.3 times as many establishments, and employed 4 times as many workers, as traditional franchising did in 2001.

than in manufacturing, both imply that firm size is in some sense more stable over time in retailing than in manufacturing. But these results refer to individual retail and service firms rather than the types of networks we focus on. Yet the fact that many firms choose to operate as large networks of outlets[3] suggests that such organization allows them to garner certain benefits, such as possibly economies of scale in brand building or the type of information advantages emphasized by Jovanovic and Rob (1987) in their analysis of firm dynamics in differentiated-goods markets. It is this effect that we can explore empirically by examining whether a franchised chain's size (measured by number of outlets) and age affects its survival and growth in a way that is consistent with what has been found for manufacturing entities.

Third, Evans (1987a, b) suggests that theories of firm growth should be expanded to consider how other factors beside age and size might affect growth. And indeed, Dunne, Roberts and Samuelson (1989) introduced ownership type, industry and year effects, as well as the effect of initial plant size in their analyses of plant survival and growth. By 2003, however, Geroski et al. still point to the lack of firm fixed effects and other firm characteristics as a major deficiency of the current empirical literature on industry dynamics. At the same time, in the franchising literature, authors have tried to assess how different aspects of the franchise relationship affect the likelihood of success in franchising, where success is typically captured by chain growth or survival.[4] While one might worry about the endogeneity of contracting choices in the latter type of analyses, an issue we address empirically below, our data allow us at least to assess how the introduction of chain effects and other chain characteristics affects results pertaining to chain age and size. Importantly, we find that controlling for chain-level unobserved heterogeneity is statistically warranted, and affects the conclusions we reach on the effect of chain age and size in

[3] See Williams (1998) and Mazzeo (2004) on the decision of individual owners to "affiliate".
[4] See Shane (1996), Lafontaine and Shaw (1998) and Azoulay and Shane (2001).

our regressions. Moreover, we find that contracting practices indeed affect chain growth and survival in our data.

Fourth, and finally, we have access to panel data on these chains that is much longer than most of the data used in the empirical firm dynamics literature, and so are able to investigate how the effect of age and size varies as chains become established. We find that age and size no longer affect exit rates for more mature chains, but chain size continues to have a negative effect on growth rates for all samples. In other words, chains converge in size to chain-specific levels.

The paper is organized as follows. In the next section, we briefly review some of the related literature and provide a framework for subsequent analyses. In section 3 we describe our data on franchise chains and address a number of issues that arise in defining growth and exit in this particular empirical context. In Section 4, we develop our empirical model and present and interpret our results. Section 5 concludes.

2. Context and Conceptual Framework

The early literature on firm growth emphasized the predictions of Gibrat's law, which in turn implicitly focused on the growth of surviving firms.[5] Since then, many different types of models have been proposed as authors have tried to explain the stylized facts arising from a new set of empirical analyses of firm entry, exit and growth. In particular, Jovanovic (1982) proposed a model based on self-selection, where firms are endowed at birth with an unknown efficiency parameter that they learn about only over time as they operate within their perfectly competitive industry. Based mostly on this type of theoretical framework, Evans (1987a, b) and Dunne, Samuelson and Roberts (1988, 1989) derived a series of testable implications that they

[5] Gibrat's law amounts to an assumption that firm growth each period is proportional to the current size of the firm. This, in turn, implies that the firm growth rate is random and the size distribution of firms will be lognormal in the limit. See Sutton (1997), Geroski et al. (2003), and Audretsch et al. (2004) for more on this.

took to data. In particular, Dunne et al. (1988, 1989) argued that the hazard of firm exit should be decreasing in both firm age and size.[6] As for firm growth, predictions were less clear: for non-failing firms, holding age fixed, mean growth should at some point decrease with size. The net effect of age and size on firm growth, however, would depend on the importance of the reduction in failure rate compared to the reduction in the growth rate of non-failing firms. Evans (1987a), on the other hand, noted that the effect of firm age on growth should be negative in Jovanovic's model if output is convex in managerial inefficiency.

The Jovanovic (1982) model assumes that firms compete within homogeneous product markets. Jovanovic and Rob (1987) considered the effect of firm size on survival and growth in heterogeneous-product markets. They assumed that in the course of doing business, firms gather information about their customers and about new products they can develop in the future. The larger a firm is, the more it learns, and thus the better it does in the market – in other words, success feeds on itself, and firm size should be positively correlated over time. This model – which one might assume would likely apply to retail sector firms given the spatial and product mix differentiation that is inherent to these sectors - implies that firm size would be unbounded.

Pakes and Ericson (1998) contrast Jovanovic's passive learning model and its implications with those derived from a model where firms engage in active research and exploration. In particular, they assume that firms invest to improve the distribution of their expected future profits. The authors show that in this case, the effect of a firm's initial size on its growth and survival are dampened over time, whereas if firms are engaged in passive learning, initial size always affects a firm's future size. Using data on firms operating in Wisconsin, the authors find evidence suggesting that passive learning describes retailing firms well while the

[6] However see Pakes and Ericson (1998) for an example of functional form that results in an exit hazard function that is initially increasing in age.

active learning model better characterizes manufacturing firms. In large part, this conclusion arises because the firm size distribution changes much less, and gets closer to the cross-sectional size distribution much faster, in the retail than in the manufacturing sector. Most importantly for our purposes, the results in Pakes and Ericson (1998) imply that there are important differences between retailing and manufacturing, which in turn means that it is worth considering whether the same factors affect firm dynamics in retailing as in manufacturing.

In most models of firm /industry dynamics, including those above, firm age and size enter the empirical specifications because they reflect some type of firm learning process, or are related to early discussions about whether firm growth follows Gibrat's law. For example, in Jovanovic (1982)'s model, firms are endowed with a certain level of "production efficiency" and learn about it while operating in their industry. The effect of this learning process on survival and growth is captured empirically by the effect of firm age. But growth over time via the addition of outlets in different markets, as it tends to occur in the type of retail and service chains we focus on, may not generate the same "learning" as would growth over time within a plant or a manufacturing concern. Thus chain age (and size) may not have the same positive effect on survival in our data as in studies of manufacturing firms. Similarly, if the efficiency endowment implies an optimal outlet rather than chain size, the chains may grow unboundedly rather than converge in size even in Jovanovic-type learning models. On the other hand, if the externality or cross-outlet efficiency benefits of belonging to a chain are important, as suggested by the mere existence of large networks of outlets in these industries, then we can expect large and old chains to have received positive efficiency signals over time, as in Jovanovic (1982), and we should find the type of positive age and size effects on firm survival, and negative effect on growth, that have been observed for manufacturing concerns.

Beside plant age and size, Dunne, Roberts and Samuelson (1989) introduced other factors, such as ownership type, and industry and year dummy variables, in their empirical analyses of manufacturing plant survival and growth. They found that ownership type had a large effect in particular on the relationship between size and growth, noting: "In summary, the most striking characteristic of the results for all plants is the effect of ownership status." (p. 693). Due most likely to data limitations, few authors, if any, have followed suit and pursued analyses of how other firm characteristics, including potential unobserved (by the econometrician) heterogeneity, might affect survival and growth, or even how these might affect how a firm's age and size relate to its survival and growth. In fact, Geroski et al. (2003) point to the lack of such other variables and firm effects as a major deficiency of the current literature on industry dynamics. Our panel data set allows us to introduce chain fixed effects and other controls in our exit and growth equations and thus verify how robust our results are to their inclusion. This is important not only because it addresses a deficiency in the empirical literature, but also because in the context of franchising chains, a completely different stream of literature on the organization of the firm has examined how contracting practices might affect firm performance, with the latter often measured in terms of firm growth and survival.[7] In particular, the extent to which a chain relies on company ownership versus franchising, the size of outlets, and the terms of franchise contracts, including royalty rates and franchise fees, may affect a franchisor's performance. While such factors are intrinsically decisions that managers make based on fundamental characteristics of the chain and its market, and are thus endogenous, it is important to consider how their presence might affect the conclusions we reach with respect to the age and size effect. Also, as we explain further below, in a Jovanovic-type learning model, these contract

[7] See notably Shane (1996), Lafontaine and Shaw (1998) and Azoulay and Shane (2001).

terms, measured at time t, would be predetermined when decisions about output and exit at the beginning of period t+1 are made. In that context, it is possible to evaluate their effect on survival and growth as well.

3. THE DATA, BASIC DATA PATTERNS, AND MEASUREMENT ISSUES

Our longitudinal data set contains information on about 1000 franchised chains each year from 1980 through 2001 except for 1999, resulting in a total sample size of 22,216 observations. The data contain information on, in particular, 1) the number of company-owned and franchised outlets in each chain, 2) the year when the franchisor started the business and the year they started franchising, 3) their royalty rates, advertising fees and franchise fees, and 4) a set of variables describing the franchisor, including the amount of capital required to open an outlet, and the type of business it is involved in. Largely due to entry into and exit from franchising, but also to non-responses, our data set is very unbalanced: the number of franchised chains included each year is rather stable, but the identity of included chains varies from year to year. Thus despite estimates that there has been only about 2500 to 3000 franchised chains in the U.S. at any point in time since the early 1990s, we have 5044 different franchised chains in our data set, and so only about 4 observations per chain on average. (See the data appendix for more details.)

To identify the year in which chains in our data exit franchising, we find the last year in which each appears in our main sources. We then establish whether it appears in the *Franchise Annual* in subsequent years.[8] When a firm is no longer found in the *Entrepreneur* surveys, *Bond's Franchise Guide,* or the *Franchise Annual* in any subsequent year, it is deemed to have

[8] We relied on the various internet sites, including individual franchisor and franchisee sites, to resolve a number of ambiguous cases, especially towards the end of our sample period.

exited franchising the year after it disappeared from all these listings.[9] Note that a small portion of the exits observed here may reflect cases where a chain is bought by another firm that then consolidates all its holdings in a single listing. If this is done while continuing to support and develop the original chain separately, it should not count as an exit. Fortunately, most of the time, chains that are purchased but continue to be developed separately also continue to be listed separately in these surveys. In a few other cases, the buyer decides to discontinue the use of the trade name. The latter cases should be counted as exits: franchisees are unlikely to receive much support for their old brand from the new owner in such cases, making this type of exit quite similar to a failure at least from the franchisee's perspective.[10]

Given our methodology to identify exits, an exit may mean that the chain has ceased to franchise (departures in the USDOC nomenclature) or ceased to exist altogether (failures per the USDOC). According to the USDOC (1988: 12-13), among chains that exit franchising, roughly half simply leave franchising while the other half fail as businesses. Thus, we expect at least half of the exits in our data to be failures altogether while the other half at most would represent cases where firms decided that franchising was not right for them.[11] Note that in their study, commissioned by the U.S. Small Business Administration, Trutko, Trutko and Kostecka (1993),

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[9] See Shane (1996) and Lafontaine and Shaw (1998, 1999) who also used this approach. We, like these authors, believe that these sources are comprehensive enough when combined over time to provide an accurate assessment of whether a firm is still franchising. In fact, from conversations with the author of the *Franchise Annual* this listing had a systematic bias pre-1996 toward including firms that may no longer have been franchising. The result is that we may systematically overestimate the duration or longevity of firms in franchising. This bias would make it harder to find the result that many firms leave franchising shortly after becoming involved in it.

[10] Shane (1996) contacted the founders of the 138 firms in his sample and verified that none had been acquired or had changed names, confirming that such events are quite rare.

[11] To our knowledge, only two studies have examined why franchisors that continue to operate choose to stop franchising. These studies were based on fairly small samples, one conducted in the UK construction industry (Kirby and Watson, 1999) and the other in Australia with a convenience subsample of franchisors (Frazer, 2001). These studies suggest that firms mainly discontinue franchising due to difficulties in recruiting and monitoring franchisees to ensure performance. Frazer (2001) also finds that the economic climate affected firms' decisions.

estimated that initial franchise development costs could exceed $500,000.[12] This amount includes expenses incurred to develop clear and complete operating manuals, contracts, disclosure documents and so on, as well as franchise sales staff development and training. Of course, how much a franchisor spends depends on the type of business and on the amount of care a franchisor puts into developing its franchise program. The point remains that these amounts are substantial for the type of small businesses that tend to become involved in franchising. Thus we do not expect the decision to begin and stop franchising to be made lightly.

3.1 Chain Size, Age and Survival

As little is known about the size distribution of franchised chains, their growth, and their survival patterns, we begin our analyses by showing, in Table 1, the size distribution of the chains in our data, per age group, where we treat each chain/year as a separate observation.[13]

This table confirms a number of facts about these chains, including the existence of a positive correlation between age and size (0.25 for years in business and total outlets; 0.33 for franchising equivalents). Yet this correlation is not so large as to raise collinearity concerns in our regressions below. More importantly, this table shows the relatively small number of established chains in the data, whether one defines this in terms of size or years in business. This is important given the tendency to associate franchising with only large chains. The reality is that the majority of franchised chains are quite small, and that small chains are well represented in our data: more than half of our observations are from chains of 50 or less outlets.

[12] See Stanworth et al. (1998) for further data and discussion.
[13] The data in this table refer to size in total outlets, whether franchised or not, and age since the chain started in business, but the size distribution was very similar for the number of franchised units as a function of years in franchising.

TABLE 1: THE SIZE DISTRIBUTION OF FRANCHISE CHAINS, PER AGE GROUP
(SIZE IN TOTAL OUTLETS, FRANCHISED OR NOT, AND AGE SINCE THE START OF BUSINESS)

obs. % from col. % from row	**Age** **1** 1-2 yrs	 **2** 3-5 yrs	 **3** 6-10 yrs	 **4** 11-20 yrs	 **5** 20-29 yrs	 **6** 30-49 yrs	 **7** 50+ yrs	 **total** % from total
1	**418**	**808**	**705**	**596**	**111**	**93**	**42**	**2,773**
1-5 outlets	59.63	30	14.88	8.23	3.53	3.44	4.12	12.48
	15.07	29.14	25.42	21.49	4.00	3.35	1.51	
2	**118**	**503**	**658**	**646**	**191**	**106**	**25**	**2,247**
6-10 outlets	16.83	19	13.89	8.92	6.07	3.92	2.45	10.11
	5.25	22.39	29.28	28.75	8.5	4.72	1.11	
3	**64**	**463**	**858**	**1,023**	**267**	**195**	**53**	**2,923**
11-20 outlets	9.13	17.4	18.11	14.13	8.48	7.21	5.2	13.16
	2.19	15.84	29.35	35	9.13	6.67	1.81	
4	**74**	**471**	**1,198**	**1,673**	**652**	**424**	**120**	**4,612**
21-50 outlets	10.56	17.7	25.28	23.1	20.71	15.67	11.76	20.76
	1.6	10.21	25.98	36.27	14.14	9.19	2.60	
5	**16**	**229**	**604**	**1,262**	**517**	**447**	**125**	**3,200**
51-100 outlets	2.28	8.61	12.75	17.43	16.42	16.52	12.25	14.40
	0.5	7.16	18.88	39.44	16.16	13.97	3.91	
6	**11**	**168**	**631**	**1,596**	**968**	**896**	**339**	**4,609**
101-500 outlets	1.57	6.31	13.32	22.04	30.75	33.11	33.24	20.75
	0.24	3.65	13.69	34.63	21	19.44	7.36	
7	**NA**	**19**	**84**	**446**	**442**	**545**	**316**	**1,852**
501+ outlets		0.71	1.77	6.16	14.04	20.14	30.98	8.34
		1.03	4.54	24.08	23.87	29.43	17.06	
total	**701**	**2,661**	**4,738**	**7,242**	**3148**	**2,706**	**1020**	**22,216**
(% from total)	3.16	11.98	21.33	32.60	14.17	12.18	4.58	100%

In addition, the majority of new franchise chains do not "survive" 10 years. This is shown in Table 2, where we make use of the fact that although our data are very unbalanced, most of the firms that enter franchising after 1980 (the first year of our data) appear at some point in our sample as they try to make themselves visible to potential franchisees (see the data appendix for more details). The first column of this table shows the number of franchisors that begin franchising each year between 1980 and 1994 and, of these, the number that are still franchising at the beginning of the following year, and so on through 2000.[14]

[14] We only track franchisors that started before 1995 because there are only a few more surveys after that year, and so the likelihood that we capture the total number of new franchisors from that point on is not high.

TABLE 2: NUMBER OF FRANCHISORS STARTING TO FRANCHISE EACH YEAR (N) AND PERCENTAGE STILL FRANCHISING THE NEXT YEAR

Year	N	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1980	288	88.9	84.4	78.1	67.0	61.1	55.6	51.4	44.8	44.1	41.0
1981	240		95.8	88.3	78.3	71.3	62.9	57.9	51.2	50.8	49.2
1982	249			94.4	87.1	79.5	73.9	69.1	61.0	59.4	56.2
1983	216				92.1	86.6	83.8	75.0	67.1	65.3	62.0
1984	219					95.9	92.2	88.6	82.6	82.2	78.5
1985	226						95.1	93.8	88.9	87.6	84.1
1986	270							98.5	95.9	93.3	87.0
1987	253								94.9	92.1	87.4
1988	218									97.7	93.6
1989	221										97.3

Year	N	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1980	288	36.8	33.7	32.3	29.9	23.6	21.2	19.1	18.8	18.8	18.8
1981	240	39.2	38.3	37.1	35.8	28.3	27.1	24.6	22.9	22.9	22.1
1982	249	50.2	47.4	44.6	44.2	35.7	32.1	28.9	27.3	27.3	26.9
1983	216	51.4	46.8	45.4	44.4	35.6	33.3	30.1	30.1	30.1	30.1
1984	219	68.5	61.6	59.4	57.1	42.9	39.3	35.6	34.2	34.2	34.2
1985	226	71.2	61.5	61.1	59.7	43.8	41.2	37.6	37.2	37.2	37.2
1986	270	75.6	70.4	66.7	65.2	46.7	40.0	36.7	34.8	34.1	33.7
1987	253	76.3	70	66.8	62.8	46.6	41.5	38.3	36.0	35.2	34.4
1988	218	86.2	77.1	73.4	70.6	54.6	49.5	44.0	42.7	42.7	42.7
1989	221	92.8	85.5	79.2	75.1	56.1	48.4	43.4	42.5	42.1	42.1
1990	199	95.0	89.9	85.9	79.9	61.8	55.8	49.2	46.7	46.2	46.2
1991	176		92.6	88.1	81.8	61.4	54.5	48.3	47.2	46.0	45.5
1992	173			96.5	92.5	79.8	71.7	65.3	63.6	61.8	61.8
1993	147				93.2	85	76.2	66.7	61.2	61.2	60.5
1994	134					94.8	79.1	70.9	69.4	68.7	67.9

The data show that a large number of franchisors enter franchising each year. But franchisor exits are also sizable: of the firms that begin franchising in a given year, only 40 percent on average are still franchising after 10 years; after 15 years, only about 30 to 35 percent of them are.[15] In a context where contracts last an average of 15 years (see e.g. Lafontaine,

[15] This occurs despite the fact that our reliance on franchise directories to assess survival implies that we tend to overestimate the time that firms stay in franchising. See the data appendix on this. Note that our data patterns on franchisor exits are consistent with those of Shane (1996), who examined the rate of exit of 138 franchisors that started franchising in 1983, and with Stanworth's (1996) survey results in the UK. The latter asked eight industry experts to assess the success of 74 UK franchisors known to be in existence in 1984. The interviewees evaluated the

1992), the data in Table 2 imply that franchisees who join new franchise systems are likely to see their franchisor stop franchising or go out of business within the time of their contract. Of course, the majority of franchisees joins or belongs to an established franchise chain. The data in Table 2 suggests these may have better survival records. We explore this further below, after describing how we measure growth and survival in the next section.

3.2 Measuring Survival and Growth

Because franchised chains usually begin their business a few years before they start franchising, and they typically operate both franchised and company units, we need to be precise about what we mean by franchising survival and growth. In fact, we adopt three definitions of growth and two corresponding definitions of exit in what follows.

The first set of definitions is the simplest, but also most restrictive, in that it focuses on the franchising component of the chains only. Specifically, we begin by defining $\mathbf{FExit_t}$ as a chain's exit from franchising. We assess the latter using directories as described earlier and set $FExit_t = 1$ for the year when the chain disappears from all our franchising directories, and 0 otherwise. We correspondingly define franchising growth as the proportional change in the number of franchised units in the chain, namely

$$\mathbf{FGrowth_t} = (Funits_{t+1} - Funits_t) / Funits_t$$

Note that this variable, like our other measures of growth and exit below, is forward looking. This is because in theory, firms decide on their output (and thus growth) and whether or not they

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firms on a scale from A to E, with A meaning that the company was still franchising and growing and B that it had reached maturity - either way it was a success; C indicated that a firm was still franchising but not considered a success; D meant the company still existed but was no longer franchising for lack of success at it; and E indicated that the firm had ceased to exist. Stanworth concludes: "At best, one franchise company in four could be described as an unqualified success story (categories A and B) over a ten-year period.... Around half the sample was judged to have failed completely and utterly (category E)" (p. 27).

want to exit at the beginning of period t+1, based on all the information available to them at time t, including their size and age at time t. Also, we set FGrowth equal to -100% in the year when there is an exit from franchising, i.e. when $FExit_t = 1$. In total there are 1409 exits from franchising in our data.[16]

Second, we measure overall chain growth and exit, that is we measure chain growth as the change in total outlets, whether they be franchised or company operated. Specifically,

$\textbf{Growth}_t = (TotalUnits_{t+1} - TotalUnits_t) / TotalUnits_t$

We then create $CGrowth_t = Growth_t$, except that we set $CGrowth_t = -100\%$ when there is an exit from franchising, i.e. when $FExit_t = 1$.[17] In other words, there are still 1409 cases where $CGrowth_t = -100$ due to franchisor exit. The implicit assumption in this measurement approach is that the chain as a whole ceases to exist when it stops franchising. As noted earlier, although this is likely to be a valid assumption for at least half our observations, some chains stop franchising but continue to develop as corporate chains. While we believe that the Dept. of Commerce overestimates the number of chains that continue to operate after they stop franchising - because they do not track chains to see how many cease to operate a short time after they stop franchising - we want to address the issue this raises for our measure of exit. Unfortunately, we do not have direct information on whether the chain continued to exist after it stopped franchising.[18] We can ascertain, however, whether chains have any company units at the

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[16] In the analyses below, there are 1454 cases where FGrowth= -100 but only 1409 cases when FExit = 1, because the firm has not exited franchising according to our definition. In other words, these firms close down or convert all their franchised units, so their franchise growth is minus 100, but they still appear in franchise directories. These observations are treated as being censored at the value -100 in the growth analyses, but not as exits in the exit regressions.

[17] Because we use total units instead of only franchised units in the denominator, this growth rate is defined for a few more observations than FGrowth, namely all those cases where the firm operates no franchised units at time t but has company units. Since our sample is restricted to firms interested in franchising, only a few such cases arise in the data.

[18] We could use national Yellow Pages to determine if we can still find outlets operating under the trade name today,

time they leave franchising. In those cases where they have none, we set a new variable that we refer to as "total exit" equal to 1 (**TExit**$_t$ = 1). We have only 341 such exits in our data, mostly reflecting the fact that about one quarter of franchisors are fully franchised (i.e. have no company units) in our as in most samples of franchised chains. Given the small number of exits we obtain with this definition, we interpret this measure as a lower bound on chains' actual business failure whereas we view FExit, or exit from franchising, as an upper bound measure of the same.

Our third, and last, measure of growth then simply combines the total outlet Growth variable above with this more restrictive measure of exit, that is we define total growth as **TGrowth**$_t$ = Growth$_t$ except that for the 1068 franchisors that have FExit$_t$ =1 but TExit$_t$ = 0, TGrowth$_t$ is treated as missing and the observation is treated as censored in the survival analyses.

Finally, because we suspect these are due to coding errors or overly optimistic forecasts by new franchisors, we exclude from our sample the few observations with measured growth above 500%.[19] Because of this and the differences in definition, we obtain different samples for each of the measures described above, as shown in Table 3 below.[20] Table 3 further shows descriptive statistics for chain age and size, and other variables of interest, including contract terms – royalty rates and advertising fees, in percentage of sales, franchise fees and fixed ongoing payments, in thousands of nominal U.S. dollars, the number of years that the chain was

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for example, but we have not found a data source that would allow us to go back to 1980 and track them over time to determine when exactly all outlets cease to exist if they do.

[19] For FGrowth, this constraint leaves out 131 observations while only 59 are excluded for the other two growth measures. Most of these are for very small franchisors. Franchisors often expect or project unrealistically high rates of growth in their first few years (see InfoPress, 1988). Since some of the data in the surveys is not verified by the publication, we suspect that the few very high growth rates we found in the data were based on such projections rather than the type of data the franchisors are really supposed to report.

[20] Of course, the bulk of the reduction in sample size from our initial 22,216 is due to the requirement that we observe at least two consecutive data points per firm to measure either growth or survival at any given time period, but missing values for various explanatory variables also lead to some reduction in sample size. See the data appendix for details.

in operation by the time it started franchising (Business Experience), the amount of capital needed to open an outlet, and a dummy variable set equal to one if the chain is Canadian.

TABLE 3: DESCRIPTIVE STATISTICS

Variable Name (Definition)	Obs.	Mean	Standard Deviation	Minimum	Maximum
Exit from Franchising (FExit)	15404	0.09	0.29	0	1
Exit from Business (TExit)	14445	0.02	0.15	0	1
Growth in Franchised Outlets, in % (FGrowth)	15404	10.30	68.67	-100	500
Growth in Outlets, = -100 if FExit (CGrowth)	15513	6.64	58.09	-100	500
Growth in Outlets, = -100 if TExit (TGrowth)	14445	14.52	52.16	-100	500
Survivor FGrowth	13995	21.41	61.98	-100*	500
Survivor CGrowth (= Survivor TGrowth)	14104	17.29	49.61	-94.03	500
Size - Franchised Units (000's)	15404	0.18	0.66	0	20.531
Size - Total Units (000's)	15513	0.21	0.78	0.001	26.59
Age - Years in Franchising	15404	10.99	9.92	1	76
Age - Years in Business	15513	17.60	15.11	1	174
Business Experience Before Franchising	15513	6.68	11.22	0	165
Percent Company Owned Outlets	15513	20.66	27.11	0	100
Canadian	15513	0.11	0.32	0	1
Franchise fee ($100K)	15513	0.20	0.13	0	3
Capital Required ($100K)	15513	1.89	6.55	0	290
Royalty Rate (% of sales)	15513	4.97	2.70	0	30
Advertising Fee (% of sales)	15513	1.58	1.78	0	15
Monthly Ongoing Fixed Fees ($000)	15513	0.04	0.23	0	6.25

* -100% occurs for those chains that cancelled all franchised units, but are not considered exitors, so FGrowth = -100%, even though FExit =0.

Most importantly, the data in Table 3 indicate that the different ways to measure exit and growth have a large impact not only on exit rates as per the above discussion, but also on measured growth rates. In particular, treating as missing the growth of the large number of firms that have FExit = 1 but TExit = 0 leads to a much higher average growth rate in total outlets (14.52%) compared to when we set growth rate equal to -100% for all these chains (average growth rate in total outlets of only 6.64%). Though more variable, the rate of growth in franchised units averages somewhere between those two extremes. For survivors, however, the growth rates are quite high on average, at 17 and 21% for the chain and franchise component of the chain respectively. This is because we have many small chains in our data that can easily double or triple their number of outlets in a single year.

4. Methodology and Results

4.1. Cross Sectional Data Patterns

We begin our analyses of the relationship between chain age and size and their growth and survival by showing cross-sectional means in Figures 1 through 4. Specifically, Figures 1 and 2 show the relationship between exit rates and chain age and size respectively, where we have grouped the chains among cohorts.[21] The first panel in each figure considers exit from business (TExit) as a function of total years in business and total outlets, while the second shows exit from Franchising (FExit) as a function of years in franchising and number of franchised outlets. Both of these figures show a decreasing proportion of chains exiting as they become better established along either the age (negative duration dependence) or size dimension. Similarly, Figures 3 and 4 show the relationship between average growth rates and chain size and age. Here again, when referring only to the franchising component of the chain, or FGrowth in the right-hand side panel of the figures, we measure chain size and age as the number of franchised outlets and the number of years since the chain started franchising. When we refer to chain growth, that is either CGrowth or TGrowth, we measure chain size and age based on total outlets and total years in business for the chain. Figures 3 and 4 show a systematic negative

[21] Age cohorts are defined as 1: 1 year, 2: 2-3 years, 3: 4-6 years, 4: 7-10 years, 5: 11-15 years, 6: 16-20 years, 7: 21-30 years, 8: 31-40 years, 9: 41-50 years, 10: 51-70, 11: 71+ years. As for size, we use 1: 1-2 outlets, 2: 3-5 outlets, 3: 6-10 outlets, 4: 11-20 outlets, 5: 21-30 outlets, 6: 31-50 outlets, 7: 51-100 outlets, 8: 101-200 outlets, 9: 201-300 outlets, 10:301-500, 11: 501-1000, 12: 1001+ outlets.

relationship between growth rates and both age and size, no matter which measure we use. The effects of age and size, however, are much smaller after the chains have achieved some level of maturity or size. We now turn to duration and regression analyses with additional chain-level controls to explore these data patterns in more detail.

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Insert Figures 1-4 about here

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4.2 Exit

In this section, we explore factors that affect chain exit using duration models. Since Figure 1 shows evidence of negative duration dependence, we rely on a Weibull specification mostly. However, since the Cox model has the advantage of not relying on any distributional assumption, we also present results based on it below as a useful robustness check. The main drawback of the Cox model for our purposes is that it is not possible to test the negative duration dependence suggested by Jovanovic (1982) using this model. Also, if the Weibull distribution fits the data well, the estimates from the Weibull will be more efficient.

In a Weibull model, the firm survival time S (let's denote its particular value s), measured by age, follows the distribution

$$f(s) = p \cdot s^{p-1} e^{(X\beta - s^p e^{X\beta})},$$

where *f* denotes the extreme value density function, X is the vector of regressors (with subscripts i for chain and t for year omitted for simplicity) and *p* represents the duration parameter in the baseline hazard. If p<1 (or ln(p) <0), we have negative duration dependence, meaning that older chains have lower exit rates, whereas p=1 or p>1 indicate no or positive duration dependence, respectively. The Weibull model has the "proportional hazard rate" property, i.e. its hazard function, which is the rate at which a chain exits given it has survived until time s, can be written as $h(s) = h_0(s)e^{X\beta}$. Consequently, changes in regressors shift the baseline hazard, $h_0(s)$, and the exponentiated coefficients capture the effect of a unit increase in a particular variable on the exit hazard ratio.[22] The Cox proportional hazard model (Cox, 1972) also satisfies this property.[23] For that reason, we report exponentiated coefficients in the tables below, so that a reported coefficient that is greater than one indicates that the variable increases the exit hazard rate, while a variable with a coefficient below one reduces it. The reported standard errors are calculated by the delta method and are adjusted for heteroscedasticity and firm-level clusters.[24] However, because of the skewed distribution of the exponentiated coefficients, levels of significance – as indicated by stars in the table – are assessed based on original coefficients and standard errors.

Two further data issues affect our exit estimations. In our sample there are 1409 exits from franchising (FExit) and 341 total exits (TExit). For the chains that we see exiting during our sample period, we observe complete duration spells. For non-exiting chains, however, the duration spells are incomplete and their observations are right censored. In addition, there are chains that operated for several years before entering our sample. For example, chains that began franchising before 1980 necessarily enter our sample after a number of years in operation. But a chain can only enter our sample for example at age=6 if it has survived at least this long. If the chain exited before that we would not even know it ever existed. In other words, for these chains,

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[22] Suppose that we have only one covariate, X, that we increase by 1 unit. The ratio of exit hazards after and before this change can be expressed as a function of the coefficient of X, namely: $\frac{h(s \mid X+1)}{h(s \mid X)} = \frac{h_0(s)e^{(X+1)\beta^*}}{h_0(s)e^{X\beta^*}} = e^{\beta^*}$.

[23] We use Effron's approximation to handle tied exits in the Cox model (see Hosmer and Lemeshow, 1999, p.107, for the partial likelihood function adjusted for this approximation).

[24] Besides controlling for chain correlated unobserved heterogeneity using the chain-level means of time-varying regressors, we allow for "uncorrelated" heterogeneity in the error terms (random effects) and adjust the standard errors for firm-level clusters.

there is an issue of survivorship bias in the data. In our exit estimations, we control for both the survivorship bias (or left truncation) and data censoring by conditioning the maximum-likelihood function on the age at which a chain enters our sample and by using an indicator variable to identify whether an observation is right censored or not.

Table 4 shows results obtained under both models for each of our two measures of exit. In all regressions we include sector (see the Data Appendix), state of headquarter, and survey year dummy variables. We first report results obtained when we do not correct for chain-level unobserved (by the econometrician) heterogeneity, followed in the next two columns by results when we correct for such heterogeneity via modeling it as a function of chain-level means of time-varying regressors as suggested by Mundlak (1978).[25] We correct for chain unobserved heterogeneity in our exit models because in our growth estimations below, we find that Hausman tests systematically reject the random-effects model, implying that the unobserved chain heterogeneity is correlated with our regressors in the growth equation. Since we include the same regressors in both our growth and exit equations, the unobserved correlated heterogeneity problem is very likely to affect also the exit regressions.

The results are very consistent across the two duration models we estimate (Weibull and Cox), that is regardless of whether we assume a particular distribution. Moreover, since our data are grouped – that is the data are collected at discrete time intervals, namely years – we also estimated our model by standard probit. Both specifications, “with” and “without” chain-level means, gave results consistent with the Cox and Weibull results reported here. The results are

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[25] See Wooldridge (1995, 2002) who describes this approach for probit and tobit models. Since we are modeling “chain–level” unobserved heterogeneity, the means of the dummy variables cannot be included, nor can the mean of business experience prior to starting franchising, as these variables do not vary over time so their effect would not be identifiable together with that of their chain-level means.

also quite similar across our two measures of exit. Several of the results differ importantly, however, depending on whether or not we correct for chain unobserved heterogeneity.

TABLE 4: CHAIN EXIT, WEIBULL AND COX

	FExit: Exit from Franchising				TExit: Exit from Business			
			W/ Chain-level Means				W/ Chain-level Means	
	WEIBULL	COX	WEIBULL	COX	WEIBULL	COX	WEIBULL	COX
Size (000)†	0.003***	0.05***	29.20***	48.30***	0.16	0.29	16.45***	18.92***
	(0.005)	(0.05)	(25.32)	(37.91)	(0.21)	(0.31)	(14.16)	(14.80)
Squared Size†	1.33***	1.16***	0.84***	0.77***	1.08*	1.05	0.88**	0.86***
	(0.09)	(0.06)	(0.05)	(0.08)	(0.05)	(0.04)	(0.04)	(0.04)
Bus. Exp.	0.99***	0.98***	0.98***	0.99***				
	(0.004)	(0.004)	(0.004)	(0.004)				
Percent Co-own	1.01***	1.01***	0.99***	0.99***				
	(0.001)	(0.001)	(0.002)	(0.002)				
Capital Required	0.97**	0.98	1.13***	1.17***	0.86***	0.87***	1.23***	1.29***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.04)	(0.05)	(0.06)
Franchise Fee	0.78	0.75	1.91	2.85	1.17	1.27	6.64**	10.76***
	(0.22)	(0.22)	(1.04)	(1.87)	(0.58)	(0.58)	(5.24)	(9.41)
Advertising Fee	1.00	0.99	0.95*	0.93**	0.88***	0.87***	0.86***	0.85***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
Royalty Rate	0.96***	0.96***	0.97	0.96	0.93***	0.93***	0.98	0.98
	(0.01)	(0.01)	(0.02)	(0.03)	(0.02)	(0.02)	(0.04)	(0.05)
Ongoing Fixed	1.01	0.92	0.93	0.96	1.04	0.98	0.60*	0.56*
	(0.13)	(0.13)	(0.15)	(0.22)	(0.25)	(0.26)	(0.17)	(0.18)
Canadian	0.70	0.92	0.78	1.02	0.66	0.51	0.69	0.91
	(0.38)	(0.56)	(0.42)	(0.62)	(0.59)	(0.46)	(0.73)	(0.95)
Obs.	15404	15404	15404	15404	14445	14445	14445	14445
Firms	3870	3870	3870	3870	3421	3421	3421	3421
Exits	1409	1409	1409	1409	341	341	341	341
log(p)	-0.07**		-0.05**		-0.68***		-0.65***	
	(0.028)		(0.03)		(0.08)		(0.08)	
Log-likelihood	-2542.9	-9286.6	-2436.8	-9166.7	-822.7	-1948.6	-793.5	-1918.1

†: Size refers to thousands of franchised outlets in columns 1 to 4, and thousands of outlets (franchised and company owned) in columns 5 to 8.
Notes: Exponentiated coefficients reported (so for example if the coefficient is higher than 1, the variable is increasing the exit hazard rate). Robust standard errors calculated by the delta method and adjusted for heteroscedasticity and firm-level clusters in parentheses. Levels of significance are assessed based on original coefficients and standard errors:
* significant at 10%; ** significant at 5%; *** significant at 1%.

Starting with the effect of "age," we find that the duration parameter for the Weibull (log p) is negative, which implies that age has a negative effect on the exit hazard rate, or a positive effect on chain survival. This is true whether age and exit are measured in terms of franchising only or in terms of business operations generally, although the effect is much stronger for exit from business as a function of total years in business than it is for the franchised side of the business. We also find – consistent with Lafontaine and Shaw (1998) – that franchisors that spend more time in business prior to starting a franchise (higher Bus. Exp.) stay in franchising longer than those who start franchising soon after starting their businesses. Specifically, each extra year in business prior to franchising decreases the exit hazard of a chain by 1 to 2 percent in all our regressions.

Results for firm size differ importantly depending on whether or not we control for chain heterogeneity. Consistent with prior literature, where authors have not controlled for unobserved firm effects, chain size reduces the likelihood of exit when we also do not control for such effects. Once we control for them (columns 3-4 and 7-8), however, we get the opposite result: chain size now has a positive effect on the likelihood of exit. The coefficient of squared size is significant in the opposite direction in almost all cases, but the linear effects overwhelm the non-linear effects in all our regressions. For example, in Columns 3 and 4, the coefficients on the linear term imply that increasing the number of outlets by 10 – a reasonable change in number of outlets in any given year for most of the chains in our data - increases the hazard rate of a chain by 3.4 to 4%, whereas increasing squared size correspondingly (by 100) results in only a .002 to .003% decrease in hazard. [26]

What these results imply is that, conditional on age, larger chains are less likely to fail overall in a sample of chains of diverse sizes, as per the previous literature, but when chains become large *relative to their own time-series "average" size*, they are more likely to fail. This result could arise, for example, if chains stress available resources including managerial

[26] Since our chain size variables are measured in thousands of outlets, the change due to an increase of 10 outlets is calculated as exp{ln(29.20)*0.01}-1=0.0343 e.g. in column 3, which gives an increase in exit rate of 3.43%.

capabilities as Penrose (1959) suggests, when they become large relative to their average size. But this result is also consistent conceptually with Jovanovic's (1982) framework if we interpret the chain's time-series average size as a measure of its "optimal or efficient" size, namely the one associated with the chain's unobserved efficiency endowment. Note that while these are not reported here, we obtained similar results when we examined the effect of a chain's "proportional size deviation" - the difference between the chain's size at time t and its "average" size, divided by its "average" size - rather than simply chain size on exit. Specifically, chains that grow larger in proportion to their time-series average size are more likely to fail.

Turning to our control variables, we note first that though this is not shown in Table 4, their inclusion or exclusion from the set of regressors does not affect the impact of age and size discussed above. Second, in interpreting their effects, it is important to recognize that control variables such as the proportion of company units and the terms of franchise contracts reflect decisions made by company managers that take into account a number of chain characteristics. In our empirical implementation, following the sequence of events in Jovanovic's (1982) and other selection models, contracting practices measured at time t are predetermined at the beginning of period t+1 when the firm chooses its output (growth) or makes its exit decision, in which case the regression coefficients for our control variables are consistent. Of course, one might still be concerned that the observed correlations between contracting variables and survival and growth might be due to underlying factors that affect both contract terms and survival or growth and that are not controlled for in our regressions. For example, high quality franchisors may choose high fees (franchise fees and royalty rates) or require high levels of investments, and at the same time these high-quality chains will tend to survive longer and grow faster. If we do not control for firm quality in our growth equation, its effect will bias the coefficients of the fees upward. Assuming that firm quality is constant over time, however, as it would be if it represented say the appeal of the chain's concept or product, then the use of firm-level means to control for firm heterogeneity alleviates this concern as well.[27]

With these caveats, results in Table 4 imply that the extent to which the chain chooses to operate outlets corporately is positively related to the likelihood that it exits franchising when we do not control for chain heterogeneity, but this effect becomes negative when we do.[28] Both effects are quite small, with a one percent change in exit rate for each percentage point increase in company ownership. The first effect probably reflects the fact that underlying chain characteristics make franchising less desirable for some chains, and this biases the coefficient of percent company owned upward when we do not control for chain heterogeneity. We expect that the positive effect of company ownership within chains arises because firms tend to grow the franchise side of their businesses, not exit franchising, whenever it becomes "too" small relative to their company ownership. Specifically, Lafontaine and Shaw (2005) find that firms target certain level of company ownership. Thus, when this proportion becomes high relative to its time-series mean, the chain opens more franchised outlets and brings this proportion down in the following period. The fact that the effect of high company ownership is particularly high for the growth of the franchised side of the chains relative to their total growth (see Table 5) further supports this interpretation.

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[27] It is because we found evidence that firm heterogeneity was correlated with our regressors that we adopted the firm-level means approach to control for firm effects. Note that this correlation between the error term and regressors was present, however, whether or not contract terms and other controls were included among the regressors. Of course, if the "omitted" variables such as firm quality varied across firm and time, it would not be possible to control for them using chain effects. In fact, there is no viable empirical solution to "chain-fixed and chain-time varying effects" short of directly measuring the "unobserved" effects. On the other hand, Lafontaine and Shaw (1999, 2005) have shown that contracting practices are quite stable over time within chains. This suggests that chain-specific time invariant factors are the main determinants of these contracting practices, and these are not omitted, but rather are "controlled" for via chain-level means, in our regressions.

[28] Of course, since our measure of total exit implies that the proportion of company units equals 0, any positive value determines survival perfectly so we cannot include this variable in our analyses of Total Exit (TExit).

The amount of capital required to open an outlet also has a different effect across and within chains. In our cross-sectional data (i.e. without including chain-level means, col. 1-2 and 5-6), higher levels of capital required reduce exit rates whereas within chains (i.e. when we control for chain unobserved heterogeneity via means col. 3-4 and 7-8), they increase the likelihood of chain exit. One interpretation for the cross sectional effects is that higher levels of capital required reduce the likelihood that franchisees start their business undercapitalized and also serve to discourage less talented potential franchisees generally (a screening effect; see e.g. Norton (1995) on this issue). On the other hand, the reverse effect within chains most likely reflects the fact that franchisors have more difficulty finding franchisees when the amount of investment they require of franchisees is high relative to their own historical mean. This, in turn, increases the likelihood that they exit franchising altogether.

Finally, when they have a significant effect, most fees tend to reduce the likelihood of exit, whether we control for chain effects or not. The one exception is the franchise fee, which, as in the case of capital requirements, increases the likelihood that the chain goes out of business when it is high relative to the historical mean for the same chain. This suggests again that relatively high upfront investments or fees discourage new franchisees from joining a chain, but relatively high royalty rates and advertising fees do not have the same adverse effect on chain survival. We explore this and other effects further below in our growth analyses.

4.2 Chain Growth

Our measures of growth have a lower bound at –100% when chains exit. For that reason, we want to estimate the growth equation using a tobit estimator. However, like exit, chain growth may also depend on various characteristics of managers or other idiosyncrasies at the chain level that we need to control for. If the unobserved heterogeneity were uncorrelated with the regressors, a random-effects tobit model would provide consistent estimates. However, when we compared estimates obtained from linear fixed and random effects models using the standard Hausman tests, we rejected the random effects specification in all cases, leading us to conclude that the firm unobserved heterogeneity in our data indeed was correlated with the regressors. We therefore again follow Wooldridge's (1995, 2002) suggestion to use the Mundlak's (1978) idea to model chain unobserved heterogeneity by including a vector of chain-level means for all the time-varying regressors in our tobit specifications.[29]

In addition, the tobit estimates will be inconsistent in the presence of heteroscedasticity, a problem that may well arise in our data given the dispersion in our dependent variable. As noted by Evans (1987 a) and others, chain age and size are likely to have highly non-linear effects on chain growth. For that reason, we include the quadratic terms of firm age, size and their cross effect into the empirical model and, as noted earlier, we exclude the outliers with growth rates >500%. This has the added advantage of reducing the likelihood that heteroscedasticity is a problem in our regressions given that the variance in the error term is particularly likely to relate to chain size and age.[30]

Table 5 shows results from estimating our tobit model with chain-level means for time-varying variables, for each of our three measures of chain growth. In all of these regressions, we control for potential industry, State of headquarter, and survey-year effects with corresponding sets of dummy variables. In addition, although in general the linear models (OLS, fixed and

[29] We also estimated Random Effects tobit models to correct for potential uncorrelated chain-level unobserved heterogeneity in the error term in addition to the correlated chain-level unobserved heterogeneity. The coefficients from the Random Effects tobits were very similar to those from the Pooled tobits that we report.

[30] Before outliers were excluded, standard errors from fixed effects with and without correction for heteroscedasticity were different, suggesting that heteroscedasticity was a problem in our data. After the outliers were excluded, standard errors between these two specifications were similar. Moreover, after the outliers were excluded the results from fixed effects without robust standard errors were similar to unreported OLS results (again including the vector of chain-level means to model chain unobserved correlated heterogeneity) with standard errors adjusted for heteroscedasticity and chain-level clusters. This implies that excluding the outliers reliably helped to solve the heteroscedasticity problem that would bias the tobit estimations.

random effects) provide inconsistent estimates when the dependent variable is censored as is the case here, they still provide a useful benchmark for the marginal effects near the population means without imposing the distributional assumption that the tobit model requires (e.g. see Wooldridge, 2002). Moreover, when censoring is low, the bias in linear models is negligible. For these reasons, we also present results obtained under fixed effects estimation for each of our growth measures. The latter still also contain survey year dummy variables, but no industry or state of headquarter dummies as these are constant within firms. To highlight the similarity between our Tobit and the fixed effects results, we report estimated coefficients from the Tobit regressions in Table 5. The marginal effects in Tobit (at sample means), were almost identical to the reported coefficients.

Looking across columns, the results are quite consistent in sign and significance levels across the different definitions of chain growth (and the different corresponding definitions of chain age and size). As per the literature on manufacturing, firm age and size have sizable, and statistically significant, negative effects on growth, even when we control for unobserved chain heterogeneity.[31] As in the exit regressions, the negative linear effect dominates the quadratic effects: holding all variables at their mean values, the net effect of increasing chain age by a single year in our fixed effect regression in column 4 for example is to reduce the growth rate by 3.4 percentage points. Increasing size by 10 outlets, on the other hand, reduces the growth rate in the net by 0.12 percentage points in the same regression.[32] This finding that chain size (controlling for chain fixed effects) has a negative effect on growth implies that there is

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[31] Size and age both had a negative impact on the growth rate in usual random effects (without chain-level means) as well, but this specification was rejected by the Hausman tests so we do not report these results.

[32] The net Age effect is calculated as $\partial Growth/\partial Age = b_{Age} + 2b_{sq.Age} * mean(Age) + b_{Age*Size} * mean(Size)$, where mean(Size) = .21 and mean(Age)=17.6. The net size effect is $\partial Growth/\partial Size = 0.01*[b_{Size} + 2b_{Sq.Size} * mean(Size) + b_{Age*Size} * mean(Age)]$, since increasing the size of the chain by 10 units corresponds to increasing Size (as measured in our regressions) by 0.01.

convergence in size to some chain-specific (or optimal) size.[33] So, our results on growth reinforce what we found in our exit analyses, that when firms become large relative to their own average size, they grow less in the next period or even choose to exit (as per Table 4).

Also consistent with our results for chain exit, we find that the number of years that the firm spends developing its franchise concept before starting to franchise (Business Experience) has a strong positive effect on franchising growth.[34] As for the chain's contracting practices, we find first that larger proportions of company units in the chain are always positively related to growth.[35] As noted earlier, this effect is particularly strong for franchising growth, a result we believe reflects the fact that franchisors whose proportion of company units is "unusually" high one period tend to grow the franchised side of their businesses the following period to get back to their target level of company ownership (see Lafontaine and Shaw, 2005 on these targets). The total growth in the chain then represents mostly the effect that this increase in the number of franchised units has on the total size of the chain. Though these effects are not always measured with enough precision to be statistically different from zero, we also find, consistent with our results concerning exit, that higher capital requirements and higher franchise fees are negatively correlated with growth. Other fees, on the other hand, relate positively to growth, though again the effects are not always statistically different from zero. These results together suggest that strong ongoing revenue streams for franchisors, in the form of royalties or other ongoing fees,

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[33] See Geroski et al. (2003) for more on this topic. He notes in particular the importance of distinguishing between firm-specific and overall convergence in firm size. Our results support the former, not the latter.

[34] Note that this variable does not appear in columns 3 through 6 where we are examining total chain growth as a function of "total chain age" because the time spent developing the franchise is included in the Age variable (i.e. Age = BusExp + years of franchising) in these columns. Moreover, its effect is subsumed in the chain-specific effects in the fixed-effects regression in column 2.

[35] As mentioned earlier, one could argue that these variables are determined jointly with the firm growth rate based on the underlying chain characteristics, including industry and other factors. However we control for the potential impact of industry, state, and year fixed effects via dummy variables in our Tobit regressions, and for unobserved chain characteristics via the chain-level means.

and low upfront requirements for franchisees, are most conducive to franchise chain growth and survival (per Table 4).

TABLE 5: CHAIN % GROWTH, TOBIT AND FIXED EFFECTS

	Franch. Growth (FGrowth)		Chain Growth (CGrowth)		Total Growth (TGrowth)	
	Tobit with Chain-level Means	Fixed Effects	Tobit with Chain-level Means	Fixed Effects	Tobit with Chain-level Means	Fixed Effects
Age†	-9.48***	-7.26***	-7.77***	-5.92***	-5.10***	-4.42***
	(0.38)	(0.30)	(0.32)	(0.26)	(0.27)	(0.23)
Age Squared	0.14***	0.13***	0.07***	0.07***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.004)	(0.005)	(0.00)
Size (000)†	-7.04	-9.15**	-17.17***	-18.60***	-21.12***	-21.27***
	(4.74)	(3.71)	(4.36)	(3.43)	(3.68)	(3.05)
Size Squared	0.25	0.36	0.05	0.09	0.16	0.17
	(0.32)	(0.25)	(0.17)	(0.13)	(0.14)	(0.12)
Age * Size	0.04	0.04	0.35***	0.36***	0.37***	0.37***
	(0.17)	(0.13)	(0.13)	(0.10)	(0.11)	(0.09)
Business Experience	0.11**					
	(0.05)					
Percent Co-own	1.74***	1.72***	0.55***	0.55***	0.56***	0.56***
	(0.07)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)
Capital Required	-0.27	-0.34	-0.02	-0.07	-0.09	-0.12
	(0.28)	(0.22)	(0.24)	(0.19)	(0.20)	(0.17)
Franchise Fee	-17.43*	-15.14*	-7.63	-7.55	-18.00**	-16.72***
	(10.22)	(8.00)	(8.80)	(6.94)	(7.75)	(6.43)
Advertising Fee	0.13	0.21	0.72	0.73	0.57	0.59
	(0.76)	(0.59)	(0.65)	(0.51)	(0.56)	(0.46)
Royalty Rate	0.86	0.84*	0.67	0.65	0.37	0.38
	(0.59)	(0.46)	(0.51)	(0.40)	(0.45)	(0.37)
Ongoing Fixed Fee	8.65*	8.13**	7.49*	6.70*	7.05*	6.65**
	(5.06)	(3.93)	(4.36)	(3.42)	(3.79)	(3.14)
Canadian	-28.97		-23.36		-25.63	
	(32.12)		(27.78)		(23.53)	
Constant	9.75	36.77***	10.59	71.11***	33.26	60.17***
	(33.07)	(4.18)	(28.57)	(4.31)	(24.22)	(3.98)
Observations	15404	15404	15513	15513	14445	14445
# of Firms	3870	3870	3888	3888	3421	3421
# of Exits	1409	1409	1409	1409	341	341
R2	0.01	0.19	0.01	0.10	0.01	0.09
Log-likelihood	-80683.3		-79532.5		-75888.3	
sigma_e	69.41		60.05		50.72	
	(0.43)		(0.37)		(0.30)	

†: Age refers to years since the chain began franchising in columns 1 and 2, but it refers to the number of years since the firm started operating in columns 3 to 6. Similarly, size refers to the number of franchised outlets in columns 1 and 2, and it refers to the total number of outlets (franchised and company owned) in columns 3 to 6.
Notes: Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%.

Finally, though not shown, we have examined how the determinants of firm growth might differ across sectors in our data. We found that the results within sectors were qualitatively equivalent to those discussed above. [36] In the next section, we present results for another set of subsample analyses, namely those we obtained for the established chains in our data.

4.3 Established Chains

In this section, we explore how age and size effects might differ for mature chains compared to our overall sample. This is worth doing for a number of reasons. First, from Figures 1 through 4 above, the effect of age and size is much more pronounced – and perhaps important only - for young and small firms. This is an empirical question that we should address. Second, as noted by Evans (1987 a), some versions of industry dynamic models have implications for mature firms only. For example, he notes that under a Cobb-Douglas production function, the Jovanovic (1982) model implies that the effect of size on growth should go to zero for mature firms, while under an evolutionary model (Nelson and Winter, 1982) size is expected to have a positive, but decreasing, effect on growth for mature firms only. Second, Geroski et al. (2003) deplore the lack of longer panel data in the empirical firm growth literature, and raise a number of issues with the conclusions reached in the literature given this. Our analyses address their concerns. Finally, from a franchising perspective, Lafontaine and Shaw (2005) show that the proportion of company ownership adjusts rapidly during the first seven or eight years of franchising, and remains fairly stable from that point on. They suggest that franchisors target a certain proportion of company ownership that they attain after an initial adjustment period. In examining the effect of this choice on growth and survival, it is important, therefore, that we focus on firms that have attained their target.

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[36] There were too few exits within sectors to make sectoral analyses of exit meaningful.

We explore these issues using a number of different subsamples, starting with all observations where the chain has been franchising for 8 years or more. This criterion is similar to the one used by Evans (1987a,b), and it satisfies the constraint suggested by Lafontaine and Shaw (2005) for a stable proportion of company units. Table 6 reproduces Table 4 above for FExit except that we use a Regulation State dummy variable, set equal to one for franchisors headquartered in states that regulate the termination and other aspects of the franchise relationship, because we do not have enough exits to include the full set of headquarter state dummies in the analyses.[37] Unfortunately, the number of total chain exits is too small for mature chains in our data to allow us to reproduce the TExit analyses for this subsample.

Table 6 shows that, for matured chains, there is no longer any evidence of negative duration dependence, that is mature chains do not become less likely to exit with age. Moreover, when we control for chain unobserved heterogeneity, the effect of size and business experience prior to starting to franchise all become insignificant. These results are all consistent with Jovanovic's (1982) model, where mature (and large) firms have relatively precise expectations about their production efficiency and thus are quite far from the exit threshold. However, even for mature chains we find that high amounts of capital required to open an outlet and high franchise fees, controlling for their mean values, increase the likelihood that the chain will stop franchising. While the capital required variable had this effect also in the overall sample, the franchise fee typically did not (see Table 4, col. 1-4). In fact, for mature chains, even high ongoing fixed fees – again relative to the chain's mean for such fees – have a positive effect on

[37] See especially Brickley, Dark and Weisbach (1991) on this. The dummy variable equals one if the chain is headquartered in one of the fifteen "good cause" states, namely: Arkansas, California, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, New Jersey, Virginia, Washington, Wisconsin. When we included the Regulation State dummy into our pooled sample regressions in Tables 4-5, the estimates were basically identical to those we reported.

the likelihood of exit. This was not the case in our overall sample, and suggests that mature chains that increase their reliance on fixed as opposed to variable payments are less likely to remain in franchising. The effect of royalty rates and advertising fees, on the other hand, becomes statistically insignificant for mature chains once we control for unobserved heterogeneity. Finally, mature Canadian chains are much more likely to remain in franchising, and being headquartered in a regulation state tends to increase the likelihood that a chain stops franchising, as expected, although this last effect is never statistically significant.

We explore how age and size and other variables affect the growth of mature chains in Table 7, which reproduces Table 5 for our subsample of chains franchising for at least 8 years. We find that age and size still have a statistically significant negative effect on growth, but except for size in the franchising growth equation, these effects are much smaller for mature chains than they were in our overall sample. Moreover, business experience is no longer statistically significant after the chains have been franchising for a number of years. In that sense we find evidence of depreciation in the effect of initial chain experience, so that even if longer experience before the start of franchising brings some competitive advantages to new franchisors in the form of increased growth, this early experience does not imply long run success. The effect of the proportion of company units is also much smaller for the set of mature chains than in our overall sample.[38] As for fees and capital requirements, we see that franchise fees, which were negatively related to growth in our overall sample, do not affect the growth of mature chains. By contrast, ongoing royalty rates and advertising fees have a positive and more

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[38] Re-estimating the Tobit with only means for age, size and their squared terms (to control for unobserved heterogeneity) in order to verify whether we can better assess the cross sectional effect of this and other contract-related variables gave similar results. Hence the positive impact of the proportion of company units is not caused by the inclusion of chain-level means. On the other hand, Hausman test rejected Random Effects model with only size and age means, suggesting that these variables do not completely capture the chain-level unobserved heterogeneity and that the relevant part of it is correlated just with the chain contract-term variables.

significant effect on chain growth, suggesting that a strong financial position for the franchisor ensures growth in the long term.

TABLE 6: CHAIN EXIT FROM FRANCHISING, WEIBULL AND COX – YEARS IN FRANCHISING > 7

			With Chain-level Means	
	WEIBULL	COX	WEIBULL	COX
Size (000)†	0.034***	0.047***	0.103	0.202
	(0.036)	(0.048)	(0.161)	(0.311)
Squared Size	1.183***	1.161***	1.120	1.082
	(0.060)	(0.056)	(0.088)	(0.083)
Bus. Experience	0.990	0.990	0.990	0.990
	(0.007)	(0.007)	(0.007)	(0.007)
Percent Co-own	1.008***	1.009***	1.000	0.998
	(0.003)	(0.003)	(0.008)	(0.008)
Capital Required	0.984	0.987	1.123***	1.141***
	(0.031)	(0.029)	(0.037)	(0.044)
Franchise Fee	0.256**	0.210**	6.971**	8.979**
	(0.175)	(0.150)	(6.148)	(8.420)
Advertising Fee	0.955	0.953	0.976	0.978
	(0.039)	(0.041)	(0.055)	(0.061)
Royalty Rate	0.950**	0.946**	0.968	0.957
	(0.022)	(0.023)	(0.037)	(0.035)
Ongoing Fixed	1.126	1.126	2.546***	2.807***
	(0.344)	(0.367)	(0.881)	(1.116)
Canadian	0.641*	0.662*	0.632*	0.650*
	(0.151)	(0.156)	(0.149)	(0.153)
Regulation State	1.165	1.174	1.146	1.158
	(0.155)	(0.157)	(0.155)	(0.157)
Obs.	7998	7998	7998	7998
Firms	1640	1640	1640	1640
Exits	272	272	272	272
ln(p)	0.024		-0.062	
	(0.138)		(0.159)	
Log-likelihood	-429.12	-1560.26	-416.11	-1545.11

†: Size refers to thousands of franchised outlets.
Notes: Exponentiated coefficients reported (so for example if the coefficient is higher than 1, the variable is increasing the exit hazard rate). Robust standard errors calculated by the delta method and adjusted for heteroscedasticity and firm-level clusters in parentheses. Levels of significance are assessed based on original coefficients and standard errors:
* significant at 10%; ** significant at 5%; *** significant at 1%.

TABLE 7: MATURE CHAINS % GROWTH, TOBIT AND FIXED EFFECTS – YEARS IN FRANCHISING >7

	Franchising Growth (FGrowth)		Chain Growth (CGrowth)		Total Growth (TGrowth)	
	Tobit with Chain-level Means	Fixed Effects	Tobit with Chain-level Means	Fixed Effects	Tobit with Chain-level Means	Fixed Effects
Age†	-2.77***	-2.01***	-2.329***	-1.644***	-1.408***	-1.094***
	(0.27)	(0.220)	(0.231)	(0.202)	(0.191)	(0.158)
Age Squared	0.025***	0.024***	0.012***	0.012***	0.008***	0.008***
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)
Size (000)†	-10.84***	-11.130***	-12.423***	-12.688***	-12.928***	-13.044***
	(2.44)	(1.976)	(2.467)	(2.193)	(2.029)	(1.636)
Size Squared	0.28*	0.304**	0.177**	0.188***	0.230***	0.233***
	(0.15)	(0.119)	(0.085)	(0.072)	(0.070)	(0.057)
Age * Size	0.12	0.115*	0.163**	0.162***	0.141**	0.141***
	(0.08)	(0.063)	(0.067)	(0.046)	(0.055)	(0.044)
Business Exp.	0.05					
	(0.034)					
Percent Co-own	0.599***	0.610***	-0.055	-0.043	-0.008	-0.007
	(0.062)	(0.050)	(0.058)	(0.116)	(0.048)	(0.039)
Capital Required	-0.006	-0.032	0.024	0.002	-0.001	-0.009
	(0.132)	(0.107)	(0.125)	(0.062)	(0.103)	(0.083)
Franchise Fee	0.853	0.954	0.200	0.272	-0.942	-0.970
	(6.271)	(5.090)	(5.935)	(4.482)	(4.911)	(3.970)
Advertising Fee	0.458	0.548	0.598	0.656**	0.544	0.551*
	(0.457)	(0.370)	(0.433)	(0.334)	(0.358)	(0.289)
Royalty Rate	0.579	0.590*	0.629*	0.652**	0.446	0.462*
	(0.403)	(0.326)	(0.381)	(0.312)	(0.317)	(0.255)
Ongoing Fixed	0.276	0.425	-0.137	-0.040	2.295	2.263
	(3.001)	(2.424)	(2.842)	(3.130)	(2.423)	(1.953)
Canadian	-7.133		-10.727		-14.305	
	(31.714)		(30.034)		(24.721)	
Constant	-5.101	20.169***	1.555	32.813***	16.287	24.419***
	(32.067)	(3.440)	(30.334)	(3.937)	(24.976)	(3.089)
Observations	7998	7998	8002	8002	7794	7794
# of Firms	1640	1640	1641	1641	1560	1560
# of Exits	272	272	272	272	64	64
R2	0.01	0.07	0.01	0.52	0.01	0.05
Log-likelihood	-37957.66		-37586.05		-35728.10	
sigma_e	31.08		29.45		24.22	
	(0.25)		(0.240)		(0.195)	

Note: Fixed effects specifications with robust and non-robust standard errors gave the same results.

In further subsample analyses, we found that the effect of age on growth, however defined, disappears only when the chains have been franchising or in business for 30 years or more. The subsample of chains with 30 or more years of experience, of course, represents a relatively small portion of our overall sample. However, the negative effect of firm size remains even for firms with more than 30 years in franchising. Evans (1987 a,b) found similar results. This suggests again that chains converge to some chain-specific level, that is chain size is bounded, contrary to implications from Jovanovic and Rob (1987) and the empirical results of Geroski et al. (2003) for large and mature manufacturing firms in Britain.

5. CONCLUSION

In this paper, we have explored factors that contribute to the survival and growth of franchise chains in retail and service industries. In particular, we have examined whether chain age and size have the same type of effect on chain survival and growth as has been found in the previous empirical literature, where almost all analyses have concentrated on manufacturing firms or plants. In addition, we consider how various contracting practices and other characteristics of franchised chains affect their survival and growth.

With one important exception, our results with respect to the effect of chain age and size are consistent with those found in the literature on manufacturing firms. In particular, the negative effects of chain size and age on chain growth – whether we focus on the franchised component of the chain or total outlets and years in business – are in line with empirical findings for manufacturing, and with the predictions of learning models such as Jovanovic (1982). Moreover, unlike most studies in manufacturing that often did not have access to other firm characteristics, we can show that age and size have a significant and economically relevant impact on firm growth and survival even after controlling for various chain characteristics, including unobserved heterogeneity. We find, however, that when we control for such heterogeneity, larger chains are more, not less likely to exit franchising. We interpret this result as an indication that, controlling for age, chains are more likely to exit franchising or fail when they become large relative to their own time-series average size either because they stretch resources or management capabilities or simply go beyond their own optimal size.

More generally, since we control for chain-level unobserved heterogeneity in our estimations, contrary to much of the literature, our results concerning firm size and growth imply that chains converge in size but towards chain-specific sizes. This conclusion is supported not only by the results we obtain with our overall sample, but also when we examine the effect of chain size on the growth of mature chains, which remains negative and significant in all our subsamples, no matter how many years of experience we use to define "maturity." This result is consistent with Evans (1987a,b), who used a very similar approach to study manufacturing firms in the U.S., but different from those obtained in many other studies of manufacturing firms where authors have focused on samples of large manufacturing concerns (see Sutton, 1997, Caves, 1998, and Audretsch et al. 2004 and references therein for more on this).

In the context of franchised chains, and retail and service chains generally, the existence of a limit on size seems plausible. It would be likely, however, to arise more from differences in demand related to consumers' tastes and their desire for product diversity than from the type of cost efficiency parameters emphasized in models such as Jovanovic's.[39] In other words, some chains, like McDonald's and Subway, grow very large, as the data show, but in the end customers still value having different alternative products available to them. Thus, once they have diversified geographically, these firms find themselves looking to grow in other ways, including via new concepts. McDonald's, for example, has been doing this with Boston Market and Chipotle in the U.S., and with Pret-A-Manger in the UK. In our data, however, these

[39] See Jovanovic and Rob (1987) and Sutton (1997) for models that emphasize the demand side to some extent.

different chains appear as separate entities whose size, per our results, is bounded. Geroski et al. (2003), using a different methodology, found no sign of convergence in their data on very mature manufacturing firms in England. But most of these firms were likely highly diversified entities – to the extent that our chain-level analyses focused instead on a single product or brand, it is not surprising that we would find limits to growth that are not necessarily present for firms whose sets of product lines are likely to be much more flexible over time.

From a methodological perspective, our results, however, support Geroski et al.'s (2003) points about the importance of controlling for firm unobserved heterogeneity and considering the effect of other firm characteristics on survival and growth. In our analyses, we found that chain unobserved heterogeneity was indeed a problem, and that exit results in particular differed depending on whether we controlled for it or not. Moreover, we were able to show that a number of other factors, in particular years of experience in business prior to franchising, the amount of capital needed to open an outlet, the proportion of company units, the franchise contract terms such as franchise fees, royalty rates, and so on, have an impact on both growth and the likelihood of exit for these chains.

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Data Appendix

Our franchisor-level data come from two main sources. For the period from 1980 to 1992 inclusively, the main source of data is the *Entrepreneur* magazine's "Annual Franchise 500" surveys. The data for a given year are obtained from the following year's survey as these are published early in the year. But in the survey providing the 1993 data, the magazine covered fewer firms than usual, and in the following surveys, it stopped reporting advertising fees. For those reasons, starting with the 1993 data, we use the *Source Book of Franchise Opportunities*, now called *Bond's Franchise Guide*, which by then also had become a yearly publication, as our main source of data. This has the added advantage that there is more detailed information on each franchisor in our data from that point onward.

Our data set is a very unbalanced panel. Table A1 shows how many firms are observed only once, twice, and so on in the raw data. The change in the composition of the sample of franchisors over time is due first and foremost to entry and exit from franchising. As shown in Table 2 in the text, more than 200 new franchisors started franchising each year throughout the 1980's. Also, there is considerable exit from franchising: about 140 franchising firms stop operations each year according to the U.S. Commerce Department (1988). *The Franchise Annual* and the *Bond's Franchise Guide* report even higher exit rates. However, our panel is unbalanced also because we have been fairly conservative in matching firms across years. If we could not find an exact or very convincing match in terms of firm name (and address) over time, we kept the firms separate. Finally, the data are unbalanced also because firms that answer these surveys one year may decide not to respond the next year. Firms are more likely to respond to the surveys when they wish to grow and thus find value in the visibility that these listings provide. Thus, our data may be biased in favor of new or expanding firms. However, we do not have any explicit evidence on the extent of such bias.

TABLE A1: SAMPLE CHARACTERISTICS

Observed	Number of Firms	Number of Observations	Started in Business in (mean)	Started Franchising in (mean)
Only once	1,429	1,429	1977.8	1984.3
Twice	946	1,892	1978.5	1984.7
3 times	591	1,773	1976.8	1983.4
4 times	460	1,840	1974.4	1982.4
5 times	278	1,390	1976.8	1983.0
6 times	254	1,524	1974.5	1982.2
7 times	204	1,428	1974.8	1981.9
8 times	165	1,320	1971.8	1980.6
9 times	97	873	1971.6	1980.6
10 times	110	1,100	1971.2	1979.4
11 times	86	946	1973.2	1978.5
12 times	72	864	1972.7	1979.9
13 times	70	910	1969.4	1977.1
14 times	48	672	1970.6	1976.9
15 times	36	540	1971.1	1978.1
16 times	37	592	1966.1	1973.2
17 times	37	629	1966.2	1972.5
18 times	37	666	1968.5	1974.4
19 times	25	475	1965.0	1969.9
20 times	34	680	1964.3	1969.9
21 times	36	756	1961.8	1965.5
Total	5,052	22,299		

Note: Although our data covers a period of 22 years, from 1980 to 2001, we can observe a given chain a maximum of 21 times since we have no data for the year 1999.

Sample Definition

From an original 22299 observations, we excluded 83 because they reported a royalty rate above 30%, leading us to believe these were not royalties based on sales. This gave us our sample of 22216 observations. We then lost 6681 observations for FGrowth, 7712 for TGrowth, and 6644 for CGrowth because either the growth rate was missing (that is we did not have a subsequent observation to calculate growth), or we were missing data for various regressors in different years. Finally, we eliminated observations with growth rates above 500% on the presumption that these are measured incorrectly. Note that we ignore single year gaps in our data, calculating growth as (outlets at time t+2 – outlets at time t)/outlets at time t. Almost all these gaps arise because of the missing data for 1999. Also, it is possible to have zero outlets at time t when we calculate FGrowth. (This is not an issue for the other two measures of growth since there is always at least one outlet, franchised or not, in a chain in our data.) If there were still no franchised outlets the next year and the franchisor did not officially exit, we set FGrowth equal to zero. If a franchisor did officially exit we set FGrowth equal to -100%. If there were franchised outlets the next year, to avoid infinite growth rates, we replaced franchised outlets at time t by 1 and calculated the growth rates as usual.

Variable Definition: Sectors

We have classified all the franchisors in our data among the following 23 sectors: Automotive, Business Services, Business Supplies, Contractors, Cosmetic Products & Services, Fast-Food, Full-Service Restaurants, Education, Health & Fitness, Hotels and Motels, Maintenance, Personal Services, Real Estate, Recreation, Rental, Repair, Retail-Building Materials, Retail-Clothing, Retail-Food, Retail-Furnishing, Retail-Other, Retail-Used, Travel, and Miscellaneous.

Variable Definition: Exit

Once we identified the time of exit using our various sources, we allowed a 2-year prior to exit window to incorporate the delays in reporting and mismatch between the true time of exit from franchising and what we considered the time of exit for data matching purposes. Specifically, if the year of exit from franchising for chain A was 1999, but the last year that the chain-level data were available for the same chain was 1997, we assumed that the firm exited franchising in 1997 and ascribed the 1997 data to its exit year.

FIGURE 1: EXIT RATES AS A FUNCTION OF CHAIN AGE

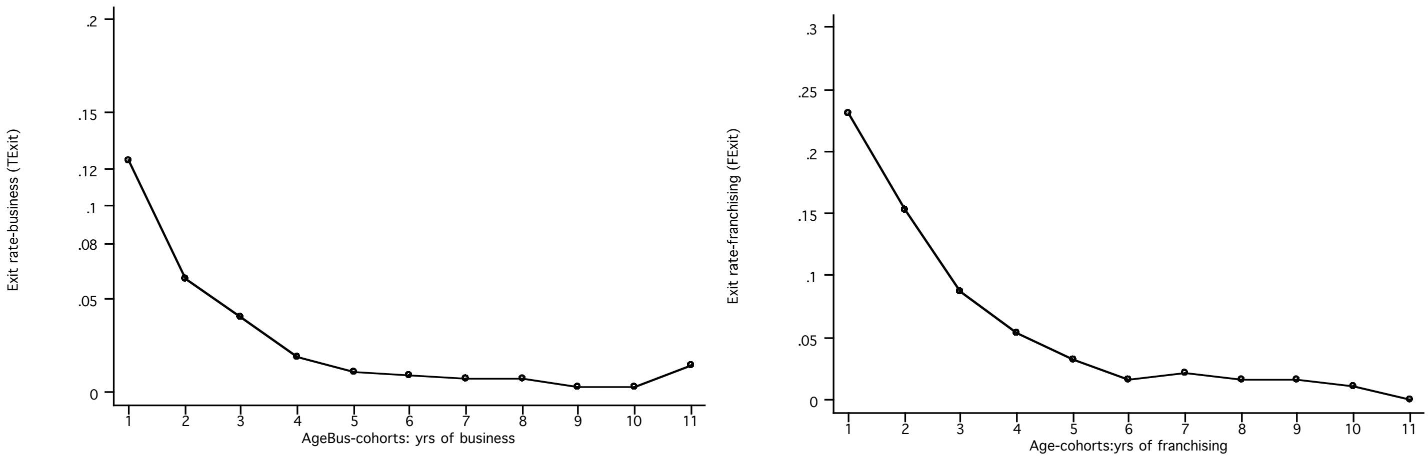

FIGURE 2: EXIT RATES AS A FUNCTION OF CHAIN SIZE

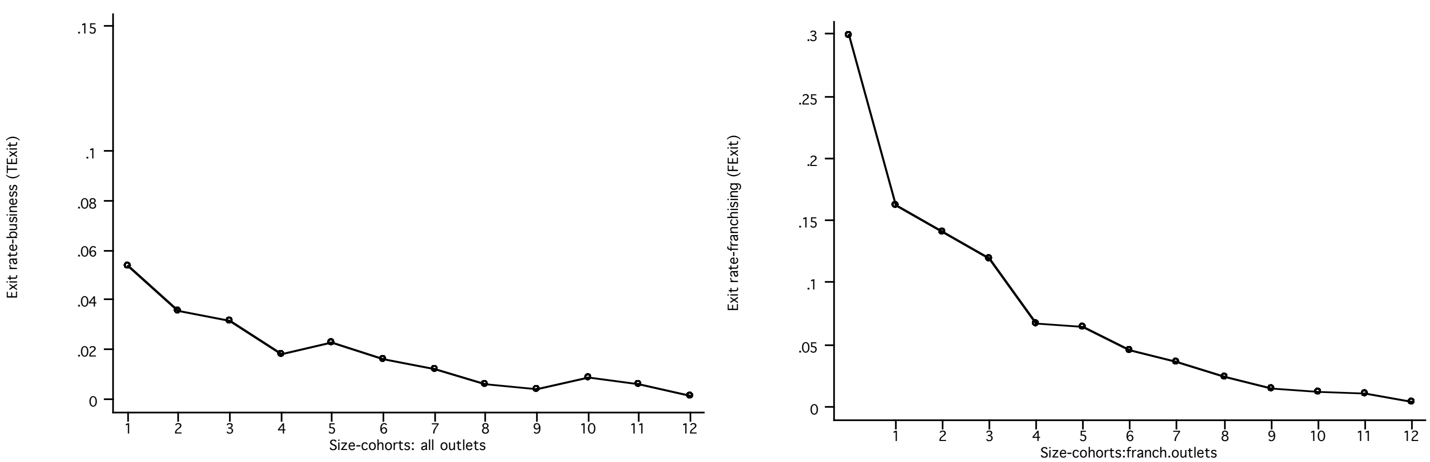

FIGURE 3: AVERAGE GROWTH RATE AS A FUNCTION OF CHAIN AGE

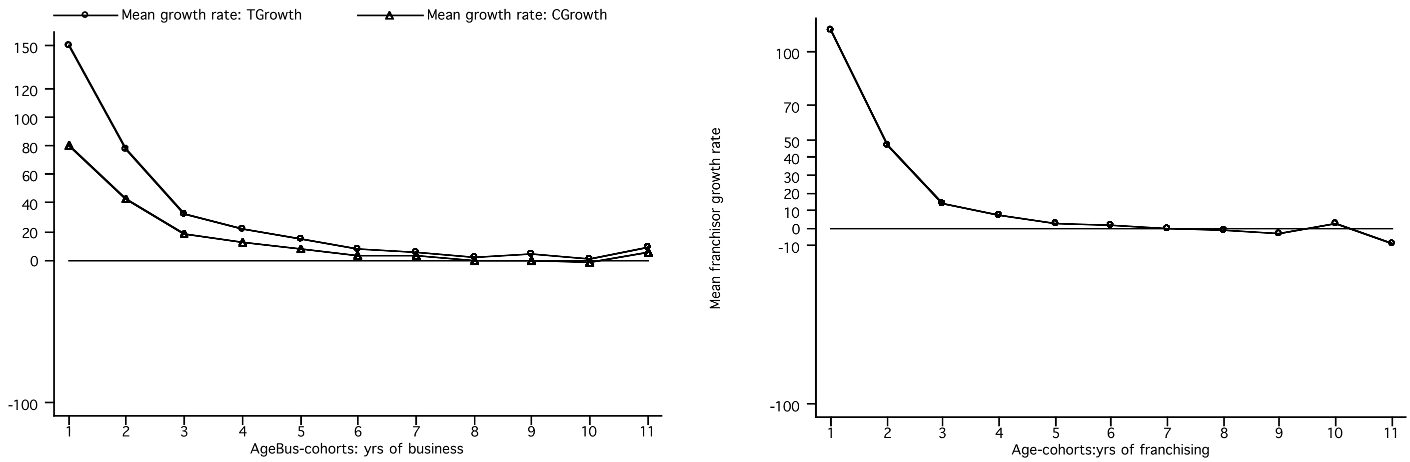

FIGURE 4: AVERAGE GROWTH RATE AS A FUNCTION OF CHAIN SIZE