Entry, Cannibalization and Bankruptcy in the U.S. Motion Picture Exhibition Market

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Comments and Suggestions Extremely Welcome

Abstract: I examine the process of movie theater entry and revenue cannibalization that resulted in many of the largest cinema chains in the US going into bankruptcy protection during 2000. Using a large and comprehensive theater level database, I document the extent and nature of entry, exit, revenue cannibalization and market expansion that resulted from the 50% increase in the number of active cinema screens during the 1990's.

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Introduction

During a period of unprecedented economic expansion in the US, a large part of one major industry managed to find its way into bankruptcy court. *Four* of the six largest movie theater circuits filed for bankruptcy during 2000 and 2001. In addition to Regal Cinemas, United Artists, Carmike and Sony's Loews-Cineplex, several smaller chains including Edwards Theaters, Silver Cinemas (owners of the art house chain Landmark Theaters) and General Cinemas also filed for bankruptcy protection. Between them, these bankrupt theater chains operated approximately 12,000 movie screens at 1,400 separate locations in 2001, about 30% of the screens in the country.

The basic reason for this unfortunate state of affairs is apparently clear, at least if you believe the industry press: growth in the number of theater screens during the 1990's far exceeded growth in industry revenues. Between 1990 and 2000, the National Association of Theater Owners estimate the number of theater screens grew 50% from 23,814 to 36,264. During the same period, real box office receipts grew by only 16% from $6.61 to $7.67 billion (measured in year 2000 US dollars.[2]) Comments by market participants also suggest that new entry is cannibalizing incumbent theaters revenues. To quote one of the more colorful examples:

> "Who heads these companies? Don't they have any foresight? It's like 'Just go ahead and do it anyway, even if it's not feasible.' Don't they bother to study these things? It's nuts! These people are crazy. If you're in the restaurant business, and you see a successful Mexican restaurant, you don't then go in and build three more Mexican restaurants around it, do you?"
>
> *Bill Irvine, owner of Parkway Theaters in Minneapolis.*[3]

In actuality, I do not find that the actual growth in first run movie screens is quite as dramatic as these 'headline' numbers suggest. The actual growth in first run screens is

[2] NATO (http://www.natoonline.org/) report that nominal box office receipts in 1990 were $5.02 billion. Using the CPI All Urban Consumers index to inflate this figure to year 2000 dollars provides the base $6.61 billion figure.

[3] Quoted in 'The Movie House Massacre' by Peter Ritter, http://www.citypages.com/databank/22/1051/article9317.asp.

16%, a growth that results in a net 19% growth in total industry revenues. Neither do I find any evidence that market participants' act irrationally when making entry or exit decisions. Instead the evidence I present is consistent with a new generation of theaters replacing the old cinemas in a process in which the industry almost entirely 'retools' with new high quality cinemas. However, I do document substantial cannibalization of incumbents' revenues by new *rival* entrants while I find very little revenue cannibalization of incumbents' old theaters by new theaters built by the same chain. Thus, the data do reveal that the recent expansion and subsequent bankruptcy in the US motion picture exhibition market is certainly a compelling real world example of substantive revenue cannibalization by rivals. I also find that the new high quality theaters result in substantial market expansion effects. Thus, ultimately, it is not possible to say that on net there was ultimately 'excess entry' even in this apparently extreme example of expansion followed ultimately by bankruptcies.

The richness of the dataset I use is largely without parallel in the entry literature and, by using a panel of revenue and entry data, I can simply and clearly examine the direct impact of entry on incumbent theaters revenues and also on the net effect of new entry on aggregate market revenues. I do so by examining the within market and within theater effect of new entry. That is, I directly observe the fall in incumbents revenues following new entry as well as the increase in aggregate market revenues. Doing so provides a direct measure of the business stealing and market expansion effects of introducing new products. As our industry observer Bill Irvine reports above, the data reveal the existence of a substantial business stealing effect. I find that revenue cannibalized from other theaters accounts for about 40% of a median theater's revenues. I also show that revenue cannibalization affects incumbents in a highly asymmetric fashion, according to the size of the new and old theaters and also its location relative to incumbents. Entrants that serve the same consumers as existing theaters steal greatly more business than those that enter in isolated locations. Empirically, then I find substantial evidence of business stealing by rival firms as a real and important feature of the data and also of the reality of being a movie theater owner during the 1990's.

The paper continues as follows: In section 2 I briefly review the relevant literature. In section 3 I outline some pertinent features of the exhibition market. Section 4 describes the data sources and develops some of the important patterns it reveals. In section 5 I report estimates of the within market and within theater regressions and use them to evaluate the extent of the market expansion and business stealing effects of entry. Finally I conclude and suggest some directions for future research.

2. The Literature

It is well known that it is theoretically possible that competition may lead to 'excess' entry when markets are characterized by substantial fixed or sunk entry costs *and* new products primarily cannibalize the revenues of existing products rather than expanding the market. See Chamberlin (1933,) Spence (1976a, 1976b,) Dixit and Stiglitz (1977,) Mankiw and Whinston (1986,) Sutton (1991,) Anderson, DePalma and Nesterov (1995) and Berry and Waldfogel(1999.) By ignoring the cannibalization effect on rivals' revenues when making entry decisions, an industry can incur an excessive number of fixed costs to the detriment of both industry profitability and even net social welfare.

To illustrate that 'excess entry' can easily occur in simple static models, consider the decision of a potential entrant into a market in which prices don't respond to entry, the marginal cost of production is zero and there are fixed costs, F. Suppose that prices do not change in response to entry. Then total quantity produced and consumed, and hence consumer welfare, will remain the same with or without the second firm. The only difference is that total expenditure on fixed costs is 2F. A social planner maximizing the sum of producer and consumer surplus would not introduce a second firm to the market while the entrant will enter iff she makes private profits. Thus it is well known that, at

least *in theory*, excess entry can occur easily as an equilibrium outcome in a game played by entirely rational individuals.

The only prior empirical evidence available in the literature on the empirical relevance of revenue cannibalization effects is provided in Berry and Waldfogel (1999.) In their pioneering study, those authors find evidence that excess entry *is* important in radio broadcasting: estimates from their structural model suggest that the welfare loss of free entry is as much as 45% of radio station revenue. Moreover, in a remarkable testament to their and the prior literatures ingenuity, Berry and Waldfogel(1999) like previous authors in the cross-sectional entry literature tradition (Bresnahan and Reiss (1987, 1990, 1991), Sutton(1991) and Berry(1992),) manage to reach their conclusions without actually observing the response of incumbents to new entrants or to exit.

The lack of panel data relating entry to product level revenues in interesting settings has forced the empirical industrial organization literature to date to learn about the nature of competition in an industry primarily by examining the observed *cross-market* relationships between the number of firms N, market size S and in Berry and Waldfogel's case, revenues R. By comparing the revenues from two markets of identical size but different numbers of products the authors can establish in principle whether additional products provide additional revenue or just steal business from incumbent firms. In practice, since there are few markets of exactly the same size conclusions are reached by effectively comparing pairs of markets with similar differences in an observable proxy for market size (say) population but different increases in the numbers of products. If the observed difference in revenue from two similar sized markets is small even when there is a big difference in the number of products this is taken as evidence that additional products primarily cannibalize existing products.

Evidently, such a cross sectional approach is necessary if that is the only data available. However, cross market comparisons are clearly fraught with opportunities for making misleading inferences, particularly in differentiated product markets, since it is

presumably actually a rare event to truly find even two markets that are appropriately identical except for the fact that one has more products in it than the other, let alone a sample sizable enough to perform inference.

In addition, the cross sectional data methods emphasized in the literature are unfortunately not sufficient to answer many of the most interesting policy questions relating to entry into differentiated product markets. The reason is that only homogeneous and symmetrically differentiated product models generate explicit predictions for the observed relationship between N and R or S. (See Bresnahan and Reiss(1990, 1991) Berry(1992) and Berry and Waldfogel(1999,) for the entry game and Davis(1999) for the generalization to the integer quantity game.)

To illustrate the limitations this imposes consider the fact that perhaps the most important question in retail markets during the last few decades is to determine the potentially huge welfare consequences of the entry of big-box retailers such as Walmart and the exit of the small, local, incumbent Mom and Pop stores. Evidently this issue is rather dramatically *not* a question about symmetrically differentiated products, but about an extreme form of *asymmetrically* differentiated products. The current generation of model based empirical methods lie unfortunately silent on any such important questions.[4]

[4] Recently several authors have attempted to allow for at least a limited amount of asymmetry in these cross sectional models. The basic problem is that even the homogeneous product games suffer from a multiplicity of equilibria that makes the mapping from the specification of profit functions to predicted equilibrium outcomes one to many. That means the inverse mapping we would like to exploit given data about the observed equilibrium outcomes in the world is not one to one. Mazzeo(1999) allows for two types of products by providing the firms with symmetric action sets and showing that provided there are only two types it is possible to establish sufficient conditions under which there will be a unique total number of each of the two product types. Seim(2001) suggests using a Bayesian game of imperfect information which moves the strategy set from being the discrete pure strategy enter/don't enter decision to the smoother probability of entry. This is perhaps the closest the literature has so far come to providing a practical solution, but since in general Bayesian games demonstrate at least as much non-uniqueness of equilibria as full information games a robust solution still eludes us. Tamer(1998) exploits the results in Jovanovich (1989) to suggest a possible general approach to the problem although it is not yet practical for any but the smallest discrete game problems. The limitations of the cross sectional entry literature have also been emphasized recently by Toivanen and Waterson(2001) who examine the diffusion of fast food retailers McDonalds and Burger King across the United Kingdom during the 1970's and 1980's.

In this paper I argue that it is possible to use panel data to directly document both the business stealing and market expansion effects of entry even in an asymmetrically differentiated product setting. Instead of using the cross-sectional between market comparisons, I propose using the *within market* and *within theater* experience following actual new movie theater entry to characterize the market expansion and business stealing effects of entry by new theaters. With the right data, as new products enter a given market it is possible to literally observe the quarter-to-quarter market revenue expansion that occurs as well as the business it steals from its local rival movie theaters.

3. The Motion Picture Exhibition Market

The most dramatic trend in the Motion Picture Exhibition Market (movie theaters) is the increasing size of the multiplex (multi-screened complex.) Until 1970, most theaters had only one screen. The first multiplex theatres were created by partitioning existing large auditoria into two smaller screened auditoria. However, by the mid-1970's exhibitors were purpose building new theaters with up to four screens. Today the largest theaters have *fourty* screens, while those with twenty or more are reasonably common. In 2000, the Motion Picture association of America (MPAA) report that 32% of theaters have a single screen, 43% are now known as "mini-plexes" with 2-7 screens, 20% have 8-16 screens and 5%, known as "mega-plexes" have more than 16 screens. While many of the typically older and much smaller theaters still operate in towns and niche locations, as we shall see, exiting theaters have typically been small while newly constructed theaters are larger. As a result, the average number of screens per theater rose from 3.6 to 4.9 between 1995 and 2000.[5]

The new "mega-plexes" are the latest part of a dramatic three decade long evolution in the industry's market structure. It is however, by no means an extraordinary trend within retail. In fact, the trend toward large often out of town stores is, of course, well

[5] See http://www.mpaa.org/useconomicreview/2000Economic/index.htm. Unfortunately, the results from these surveys are only reported every five years by MPAA.

documented across a range of retail markets and is also of considerable concern to policy makers. As I have already mentioned, perhaps the most controversial implication of this trend is the replacement of 'Mom and Pop' stores by big-box retailers such as Walmart.

The exhibition market has a long history of antitrust activity. Since cinema is a source of great public interest there are obvious political economy reasons for close scrutiny of the industry. Initially political interest in movie theaters arose because of the relationship between the democratic process and media markets. Today, despite the demise of the Newsreel, critiquing changes within the industry remains a pleasantly easy way for local politicians to get free publicity.[6] The most famous antitrust action resulted in the Paramount consent decrees in 1948, which still affect the structure of the industry today.[7]

In particular, the Paramount decrees resulted in the forced vertical disintegration of the industry after the five major studio-distributors (Paramount, Warner Brothers, 20th Century Fox, Loew's and Radio Keith Orpheum) were found guilty of restraint of trade including vertical and horizontal price fixing. The major studio-distributors owned the vast majority of the movie theaters before then, but subsequently the spun off theater chains have remained primarily solely retailers.[8] As a result of the decrees, films continue to be licensed from distributors on a film-by-film and theater-by-theater basis on the merits. This fact makes entry into the exhibition market appear to be relatively easy

[6] For a recent example, we need only go back to 1997 when Sony and Cineplex merged. Politicians in both New York and Chicago publicly critiqued the merger. Mark Green, who as democratic candidate recently lost the 2001 race to be New York's mayor, was particularly vocal in his role as New York City's public advocate. His office argued that admission prices in New York would increase to $15 if the merger were approved. Such, albeit quite legitimate, concerns do look rather quaintly dated now that, five years later, Sony's Loews-Cineplex is in bankruptcy.

[7] United States v. Paramount Pictures et al., U.S. 334 US 1 (1948.)

[8] There are of course some notable exceptions to this general rule. National Amusements with just 1,390 screens is a medium sized theater chain has unparalleled vertical connections; it is the parent company of the media giant Viacom which in turn controls Paramount Pictures as well as CBS, MTV, BET, UPN, Simon and Schuster, Blockbuster video and a number of other media companies. The only other exhibitor with substantive vertical relationships (until recently) was Loews-Cineplex (LCP.) LCP's major shareholder was Sony (who own Columbia Pictures) with Universal Pictures also holding a sizable equity stake. The latter recently sold its shares to Goldman Sachs for $1in order to realize the capital loss they suffered as the stock price fell from over $14 per share immediately after the much contested merger of Sony and Cineplex to a mere 13cents per share at the end of 2001. By doing so Universal could offset the tax due on capital gains from its more successful investments. Sony decided to forego its equity stake in LCP allowed its subsidiary to default on its bonds. As a result LCP sought Chapter 11 bankruptcy protection during 2001.

in principle. Moreover, since film-licensing contracts are not currently negotiated on a chain-wide basis there are no clear sources of economies of scope in exhibition that are available to national chains that are not available to regional ones.

4. The Data

The data used in this study come directly or indirectly from AC Neilson's Entertainment Data Inc, appropriately based in Beverly Hills California. Entertainment Data Inc. collect daily box office revenue data for films playing at theaters operating throughout North America, providing the information (in almost real time) to decision makers in the industry as well as the box office figures we read in the newspapers on Monday mornings.

Since the success of an individual motion picture is not assured, and post-opening marketing expenditures constitute one of the few components of the costs of a movie that are not sunk before it hits theater screens, the revenue data are primarily used to guide marketing expenditures after, or even during, a film's opening weekend. In addition to collecting revenue data, EDI tracks other aspects of the industry carefully. In particular, they perform regular price surveys of theaters and compile a theater atlas describing the locations, prices and scale of theaters.[9]

EDI kindly provided theater revenue data for a panel of 4274 theaters operating in 101 of Neilson's Designated Market Areas (DMA's) in the 20 quarters during 1993-1997 inclusive.[10] In total, theaters in the sample with at least some revenue observations operate a total of 25,435 screens and the dataset reports a total distribution of over $18 billion in revenues across the movie theaters during that five-year period.

[9] In addition to the US, EDI collect the same data in many countries in Europe including the UK and Germany.

[10] During that period, the NATO figures for the growth in US theater screens are from 24,789 to 31,050 while revenue growth in Nominal terms was from $5.15 to $6.37 billion ($6.11 to $6.77 in billions of 2000 US dollars – a 10.8% real growth in box office revenues.)

A total of 64,159 quarterly revenue observations are available for the analysis. Table 1 demonstrates the theater coverage of the data. Using theater counts as a measure of coverage, the revenue data covers approximately 96.7% of all theaters operating in the markets.[11] Using screens as the appropriate metric, the fraction of screens in these 101 markets for which we observe revenue data at least once is 98.3%. Since the coverage of the high quality theaters is likely better than the low quality theaters, coverage by revenue would be even higher.[12]

Overwhelmingly then, the data provides an unparalleled and extraordinary high quality lens through which to view the recent and dramatic changes in this small but culturally very important market.

As a first introduction to the data, Table 1 reports aggregate annual figures for the revenue observed in the sample and compares it to related benchmarks. Evidently, expenditure on admission to movie theaters accounts for only about 0.12% of total personal consumption expenditure, but around 30% of expenditure on admission to spectator amusements. The 101 markets in the dataset provide detail on the revenues achieved by approximately 62-66% of total industry revenue. While national box office revenues are purported up 11.1% in real terms over the period, the sample box office figures actually rise by 19.5% in real terms showing that revenue growth in the largest markets was larger than in smaller markets.

[11] In addition to collecting revenue data, EDI also collects price data from surveying theaters regularly. All theaters appearing in either the revenue or the price data were identified and their locations traced. The union of theaters in either dataset is taken as the population of theaters in the market. Obviously, EDI may miss a few theaters in their data collection effort and as such these coverage numbers would be slightly overstated. However, since theaters are well advertised, by design not too difficult to track down and EDI sold their theater Atlas for approximately $100,000 a copy in 1996, undercounting is likely to be fairly minimal.

[12] Note that 4274 theaters observed over 20 quarters would give 85,480 potential observations. While there are some missing observations, the majority of the difference between that and 64,159 observations arises because theaters enter and exit during the data period. For instance, there are only 3,738 theaters open in the sample during 1993.

	Year				
	1993	***1994***	***1995***	***1996***	***1997***
Personal Consumption Expenditure	4,391,790 (4,878078)	4,628,400 (5,012,538)	4,923,400 (5,185,077)	5,152,033 (5,270,244)	5,493,678
Admissions to Spectator Amusements	17,469 (19,403)	18,000 (19,494)	19,900 (20,958)	21,433 (21,925)	23,336
National Box office Revenue	5,154 (5,725)	5,396 (5,844)	5,493 (5,785)	5,911 (6,047)	6,365
Total Sample Revenue	3,206 (3,561)	3,367 (3,646)	3,595 (3,786)	3,847 (3,935)	4,256

Table 1: *Revenue Data Coverage.* Top figures in each cell are in Millions of nominal US dollars while those in brackets are in millions of 1997 US dollars deflated using the CPI All Urban index. Personal Consumption Expenditures, Admissions to Spectator Amusements and Total National Expenditures on Admissions to Movie Theaters are from the *Encyclopedia of Exhibition*, N.A.T.O., 1998. (Page 235) Original sources are Bureau of Economic Analysis, U.S. Department of Commerce and the Motion Picture Association of America.

Table 2 reports real 1993 and 1997 revenues, screen counts and the number of theater locations for the ten largest markets in the dataset, ranked by aggregate revenue in 1993. The largest market in the sample in each year is the New York DMA. New Yorkers spent an impressive $374.7 million going to the movies in 1993 ($416.2 million in real 1997 dollars,) rising 12.2% in real terms to $466.9 million in 1997. Over the same period, 27 net new theaters were built and the number of screens serving the market grew by a massive 237.

Ten Largest Markets	*1993, 1997*			*% Growth during 1993-1997*		
	Revenues (millions)	Screens	Theaters	Revenues	Screens	Theaters
New York, NY	416.2, 466.9	1454, 1693	301, 327	12.2	16.4	8.6
Los Angeles, CA	394.4, 451.9	1211, 1691	201, 235	14.6	39.6	16.9
Chicago, IL	173.9, 204.1	620, 884	118, 136	17.4	42.6	15.2
San Francisco, CA	158.2, 175.8	439, 538	100, 104	11.1	22.5	4.0
Philadelphia, PA	116.2, 142.6	575,718	112, 112	22.7	24.9	0.0
Boston, MA	114.1, 122.7	503, 602	94, 99	7.5	19.7	5.3
Washington, D.C.	111.5, 120.2	543, 552	89, 87	7.8	1.6	-2.2
Dallas-Fort Worth, TX	92.1, 119.7	497, 708	74, 88	30.0	42.5	18.9
Miami-Fort Lauderdale, TX	87.5, 88.6	449, 495	55, 55	1.2	10.2	0.0
Detroit, MI	85.1, 100.4	422, 465	68, 69	17.9	10.2	1.5

Table 2: *Revenues, Screens and Theaters at the largest markets in the sample measured by revenues in 1993.* Revenues in this table are in real 1997 US dollars. In 1997, Detroit moves up one place to be the 9th largest market (by revenue) while, Miami-Fort Lauderdale becomes ranked 13th as Seattle, Houston and Atlanta become 10,11, and 12 respectively. Screen and theater counts are based on the presence in either the revenue or price file.

All of the markets show revenue and screen growth over the period, while eight of the ten largest markets show screen growth that is substantially greater than revenue growth. The overall picture appears broadly consistent with the conclusion that revenues increase by an amount that is less than proportionate to the increase in the number of new screens.

4.1 Net and Gross Theater Flows

Table 3 shows the number of first and second run theaters active in each quarter as well as theater gross and net entry and exit patterns into each type of market. The first three columns report estimates of the number of first and second run screens. A distinction between first and second run theaters is possible since only theaters playing at least one

first-run film will appear in the revenue data at a particular point in time. Since EDI attempt to collect revenue data from any theater playing any film distributed by any of the major distributors[13], a theater's disappearance from the revenue data for a number of subsequent periods provides a strong indication that the theater has either closed or else has begun to show only second run films. Consequently, I define a theater as 'second run' at date *t* if the last observed revenue data is from date *t-1 and* revenue data is missing for all subsequent periods and we 'observe' at least four missing quarters of data following date t. The latter condition is necessary since obviously revenue data can be missing for other (typically electronic or human reporting failure) reasons for shorter periods of time.

Doing so reveals some interesting patterns in the data. First, while the total number of theater locations is increasing over the period (as NATO reports,) the number of *theaters* showing *first-run* films is actually falling. Since screen counts at newer theaters are dramatically higher than at existing theaters, it is not at all surprising that the number of locations are falling. However, it demonstrates that the revenue cannibalization situation may not be quite as dire as the 50% screen growth chasing 16% revenue growth first suggests. In fact, in the sample, revenue growth is 19.5% (see Table 1, above) while first run screen growth is actually *lower* at 16.3% (see Table 4, below.)

Measures of entry and exit were constructed using two pieces of information. First, EDI data were obtained providing theater opening and closing dates. Counts of theater opening and closing dates are reported in columns (4) and (5). In addition, as I have already argued, we can distinguish between first and second run theaters by assuming a theater exits to become a second run theater at the date of its last revenue observation if no further revenue figures are observed. Thus the third panel reports the entry and exit of first and second run theaters. First run theaters may exit either by closing directly, or by

[13] EDI collect revenue data from all theaters playing films distributed by Buena Vista, Columbia (Sony,) MGM/UA, Orion, Paramount (Viacom,) Miramax, New Line, TriStar, 20th Century Fox, Universal and Warner Brothers (Time Warner.) These distributors account for about 95% of box office revenues in each year (see NATO, 1998.). In addition, in the film level dataset used in Davis(1999,) revenue data for 18 independent distributors appeared in the sample and are collected on a film by film basis.

becoming second run theaters. Hence column (8) documents the substantial amount of exit by formerly first run theaters into second run exhibition.

Columns (4) and (5) show that many more theaters have opened than closed during the data period, 1993-1997, but do show that a very large number of closures are recorded during 1998-2001. Comparing columns (4) and (6) suggests that only a couple of theaters in the sample are recorded to have entered by virtue of revenue data appearing. The rest are recorded in the theater opening date file. This suggests the opening dates data are of equally high quality to the other EDI data. Similarly, comparing columns (5) and (7) shows that the closing dates data appear to record all exits by first run theaters and a considerable number of closures of second run theaters.

As has been commonly found in other studies of entry and exit, the gross entry and exit rates are somewhat higher than the net change since, unsurprisingly, some theaters are entering while others are exiting. Another interesting pattern is the systematic tendency to open new first run theaters in the fourth quarter of the year, a peak demand quarter.

Overall, the table shows an incredibly dynamic industry. A great deal of the process of change is occurring as new large theaters displace smaller first run theaters. The small theaters largely become second run locations, for many as a prelude to closing their doors after the sample ends.[14]

[14] Exit can involve very substantial costs. Exit costs in the industry are particularly high where a theater chain has signed a long-term contract with a shopping mall operator, rather than owning the theater directly. Many theater lessees have found themselves tied into a long-term contract that specifies they will provide a movie theater at that location. Since long-term contracts with distributors are not possible, these theaters can find themselves no longer able to acquire first run films when a new theater enters nearby. Ownership provides an option to sell the theater, while the lease arrangements often did not. The bankrupt theater chains each report that one major impact of the current bankruptcy proceedings is that they will be able to break their long-term leases on those theaters that are no longer attracting first run films.

	Number of Theaters			EDI Data		Gross Entry and Exit				Net Change		
Date	**1st Run**	**2nd Run**	**Total**	**Opening dates**	**Closing Dates**	**Entry (New FR Data)**	**Exit (Last FR data last period)**	**Exit FR / Entry to 2nd Run)**	**Exit (Last SR Data last period)**	**Change in First Run theaters**	**Change in Second Run Theaters**	**Net Change in All Theaters**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(6) - (7) - (8)**	**(8) - (9)**	**Δ(3)**
1993Q1	3,650	-	3,650	5	3	3650*				-		-
Q2	3,657	24	3,681	32	2	34	3	24		7	24	31
Q3	3,643	63	3,706	27	3	27	2	39		-14	39	25
Q4	3,647	81	3,728	27	3	27	5	18		4	18	22
1994Q1	3,646	97	3,743	19	8	19	4	16		-1	16	15
Q2	3,642	121	3,763	30	10	30	10	24		-4	24	20
Q3	3,623	143	3,766	31	25	31	20	30	8	-19	22	3
Q4	3,648	189	3,837	76	10	78	6	47	1	25	46	71
1995Q1	3,615	227	3,842	14	9	14	9	38		-33	38	5
Q2	3,611	239	3,850	27	18	27	14	15	3	-4	12	8
Q3	3,563	292	3,855	16	13	16	11	53		-48	53	5
Q4	3,536	348	3,884	41	10	42	13	56		-27	56	29
1996Q1	3,510	384	3,894	18	12	18	7	37	1	-26	36	10
Q2	3,493	423	3,916	37	15	37	13	41	2	-17	39	22
Q3	3,423	497	3,920	16	8	16	12	74		-70	74	4
Q4	3,405	560	3,965	54	11	55	10	63		-18	63	45
1997Q1	3,395	583	3,978	23	10	23	10	23		-10	23	13
Q2	3,422	582	4,004	37	10	38	11	*	1	27	*	26
Q3	3,444	581	4,025	30	15	30	8	*	1	22	*	21
Q4	3,464	545	4,009	54	78	54	34	*	36	20	*	-14
1998					120✞				545			
1999					168✞							
2000					308✞							
2001					137✞							

Table 3: Entry and Exit patterns are constructed using two pieces of information. First, the EDI data file on theater opening and closings by date, reported in columns (4) & (5). Second, I use the fact that EDI collects revenue data from all theaters playing films from any of the major studios. Theaters are defined to become 'second run' theaters at date t if the last observed revenue data is from date t-1 *and* revenue data is missing for at least four quarters following date t. It is necessary to use some number greater than one since obviously revenue data can be missing for other reasons for short periods of time.

*The 1993 and 1997 figures for first and last first run data respectively are distorted by missing revenue observations. For instance, any theater which was active but which did not report revenue data in 1993Q1 would be counted in the first revenue observation in that quarter. Theaters that become second run in 1997 will also be undercounted.

✞The closing data for 1998 – 2001 only report the exits of theaters that are alive during 1993-1997 and 2001 figure is based on only the first three quarters.

4.2 Changes in the size Distribution of movie theaters

Table 4 reports changes in the number of theaters of each screen size across the 101 markets in the data.

	Year					*%Δ*
Screens	**1993**	**1994**	**1995**	**1996**	**1997**	**1993-1997**
1	478 (478)	492 (462)	483 (407)	479 (370)	473 (321)	-1.0 (-32.8)
2	579 (579)	596 (567)	583 (472)	570 (419)	557 (393)	-3.8 (-32.1)
3	388 (388)	399 (386)	387 (339)	375 (313)	368 (287)	-5.2 (-26.0)
4	478 (478)	483 (470)	480 (434)	478 (422)	470 (398)	-1.7 (-16.7)
5	255 (255)	262 (259)	265 (241)	268 (241)	266 (233)	4.3 (-8.6)
6	494 (494)	507 (503)	507 (475)	511 (476)	515 (477)	4.3 (-3.4)
7	148 (148)	156 (156)	156 (144)	160 (148)	161 (150)	8.8 (1.0)
8	348 (348)	364 (363)	376 (365)	384 (371)	394 (381)	13.2 (9.5)
9	78 (78)	87 (87)	97 (95)	105 (102)	110 (108)	41.0 (38.5)
10	213 (213)	223 (223)	237 (228)	256 (246)	276 (264)	29.6 (23.9)
11-15	212 (212)	234 (232)	259 (256)	283 (275)	324 (306)	52.8 (44.3)
16-20	60 (60)	71 (69)	87 (85)	117 (115)	155 (153)	158.3 (155.0)
21-25	7 (7)	7 (7)	9 (9)	14 (14)	26 (26)	271.4 (271.4)
26-30	0 (0)	0 (0)	0 (0)	1 (1)	5 (5)	N/a
Total Locations	**3738 (3738)**	**3881 (3784)**	**3926 (3699)**	**4001 (3617)**	**4100 (3517)**	**9.7 (-5.9)**
Total Screens	**19,481 (19,481)**	**20,540 (20,255)**	**21,440 (20,808)**	**22,738 (21,581)**	**24,615 (22,663)**	**26.4 (16.3)**

Table 4: *The dynamics of movie theater scale.* Each element reports the number of theaters of the corresponding screen size and year. The first entry in each cell is calculated using all theaters for which revenue or price data appear in the EDI dataset, correcting for missing observations using Entry and Exit dates from EDI rather than presence in the revenue or price data-files for any given quarter (as in Table 3.) The second, bracketed, entry in each cell is based only on theaters classified as first run. In both cases, a theater is counted as active in a given year if it is active during any part of that year and as qualifies as a first run theater if it operates as a first run during any part of that year.

Each cell in the table reports two numbers. The first is a raw count of the number of theaters operating in the 101 markets with the corresponding number of screens. This element is computed using data from all the available sources to indicate whether a theater is active using the methodology developed above. The second (bracketed) element reports counts of first run theaters by year.

Both sets of count data document the dramatic rise in the number of theaters with a large number of screens. The largest theater in the data has a massive thirty screens and opened in 1997, while the largest theater in 1993 had a 'mere' 24 screens by comparison.

On the other hand, there are also marked differences between the two sets of screen counts. In particular, the number of first run theaters with small screen counts has dropped precipitously over the period. A massive 33% decline is recorded in the number of one-screen theaters showing first run films and those with two and three screens fare little better. The differences between the two counts reveals that the set of theaters that have stopped showing first run films in response to the growth in large multiplex theaters are hundreds of small cinemas with between one and six screens.[15]

As a final observation from Table 4, notice that the total number of locations has risen by about 10% and the aggregate number of screens has grown by a massive 26%. However, the number of first run locations has actually fallen by almost 6% although the total number of first run screens has increased by a still large 16%.

In Table 5 I report the unconditional distribution of revenues by screen size. Two features are particularly worthy of note. First, large theaters produce a more than proportionate increase in revenues suggesting that they are also of high quality or in popular locations. For instance the median one screen theater produces $29,159 in revenue which suggests a 24 screen theater would provide $699,816 in revenues, if they increased proportionately with screens. In fact, the median 24-screen theater provides more than $1.2 million in revenues.

[15] There is one notable shortcoming of the theater screen count data reported in Table 4: The screen counts for a given theater are reported to be constant across time. No growth at existing locations is documented and on inspection, the data appear to report the final screen counts for each theater. Thus, the numbers in Table 4 may (I believe fairly marginally) *under*-state the growth in total screens. To the extent that this results in an over estimate of the market expansion effect and an understated business stealing effect, the bias will operate in a desirably conservative direction since I shall find below that the market expansion effect of new products is small, and the business stealing effect large.

Screens	The distribution of Theater Quarterly Revenues		
	Lower Quartile	**Median**	**Upper Quartile**
1	9,597	29,159	88,813
2	22,649	43,942	90,144
3	47,010	85,203	155,834
4	77,265	132,823	218,289
5	109,164	183,786	311,559
6	168,089	260,364	386,679
7	152,751	302,111	535,129
8	229,741	348,582	524,446
9	287,410	456,101	681,593
10	292,007	453,172	689,209
15	388,454	721,356	1,079,674
20	664,381	891,667	1,407,961
24	1,160,296	1,249,908	1,339,520

Table 5: The table reports the distribution of movie theater quarterly revenues for each screen size in real 1997 Q4 dollars over the period.

Second, notice the large amount of variance in quarterly revenues across theater locations. In the regressions I report below, I show that a substantial fraction of the observed variance in theater revenue can be explained by the distribution of rival screens around a theater.

4.3 Changes in the Geographic Isolation of Cinemas

Table 6 reports the average number and growth in screens at other local theaters, broken down by whether those local theaters are operated by the same or a rival theater circuit (chain.) As before, each cell reports two numbers – the first is calculated using all screens while the second is calculated using only theaters that are first run screens that year.

Year	*Distance from theater (miles)*					
	All Screens					
	0-5	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**
1993	10.2 (10.2)	17.0 (17.0)	20.0 (20.0)	14.5 (14.4)	19.2 (19.1)	19.5 (19.4)
1994	10.9 (10.9)	17.2 (17.1)	20.6 (20.6)	16.1 (16.1)	19.8 (19.7)	20.4 (20.1)
1995	11.6 (11.7)	17.3 (17.5)	21.9 (22.1)	17.4 (17.7)	21.7 (21.7)	20.6 (20.4)
1996	12.3 (12.5)	17.6 (17.8)	24.3 (24.5)	18.1 (18.4)	23.7 (23.8)	21.6 (21.6)
1997	13.2 (13.5)	19.5 (20.1)	26.4 (26.9)	20.3 (20.8)	25.7 (26.0)	22.7 (23.0)
% Growth	***29.4 (32.4)***	***14.7 (18.2)***	***32.0 (34.5)***	***40.0 (44.4)***	***33.8 (36.1)***	***16.4 (18.6)***
	Screens operated by same circuits					
1993	2.0 (2.0)	3.3 (3.3)	3.2 (3.2)	2.6 (2.6)	3.5 (3.4)	3.1 (3.1)
1994	2.1 (2.1)	3.3 (3.3)	3.3 (3.3)	2.7 (2.8)	3.5 (3.5)	3.4 (3.3)
1995	2.1 (2.2)	3.2 (3.3)	3.4 (3.5)	2.8 (3.0)	3.8 (3.8)	3.3 (3.3)
1996	2.3 (2.4)	3.2 (3.4)	3.7 (3.9)	3.0 (3.2)	4.0 (4.1)	3.4 (3.5)
1997	2.4 (2.7)	3.6 (4.0)	4.2 (4.6)	3.4 (3.8)	4.3 (4.6)	3.6 (3.9)
%Growth	**20.0 (35.0)**	**12.5 (21.2)**	**31.2 (43.8)**	**30.8 (46.2)**	**22.9 (35.2)**	**16.1 (25.8)**
	Screens operated by rival circuits					
1993	8.2 (8.2)	13.7 (13.7)	16.8 (16.8)	11.9 (11.9)	15.7 (15.7)	16.4 (16.3)
1994	8.8 (8.8)	13.9 (13.8)	17.4 (17.2)	13.4 (13.4)	16.3 (16.2)	17.0 (16.8)
1995	9.5 (9.5)	14.1 (14.2)	18.5 (18.6)	14.6 (14.7)	17.9 (17.9)	17.2 (17.1)
1996	10.0 (10.1)	14.4 (14.4)	20.6 (20.6)	15.1 (15.2)	19.7 (19.7)	18.2 (18.0)
1997	10.7 (10.8)	16.0 (16.0)	22.2 (22.3)	16.9 (16.9)	21.4 (21.5)	19.1 (19.2)
%Growth	***30.5 (31.7)***	***16.7 (16.7)***	***32.1 (32.7)***	***42.0 (42.0)***	***36.3 (36.9)***	***16.4 (17.8)***
% Screen growth from Own circuit	***13.3 (26.9)***	***12.0 (30.4)***	***15.6 (25.5)***	***13.8 (24.0)***	***12.3 (20.6)***	***15.6 (27.6)***

Table 6: *Growth in screens at other local theaters operated by the same and rival circuits.* The columns show the number of screens at various distances from a theater, averaged across all theaters in the sample. Each cell contains two elements, the first based on screen counts for all theaters, the second on screen counts for all first run theaters. For example, the first column shows that the average theater in the sample in 1993 has 10.2 screens at other theaters within five miles of its own location while this number grows by 29% to 13.2 by 1997. The percentage screen growth from own circuit is calculated from the upper rows by dividing the difference in average own screen growth by the difference in total screen growth. Thus, for screens within 0-5 miles own screen growth accounts for (2.4-2.0)/(13.2-10.2) = 0.4/3 = 13.3% of the total growth in screens.

The top panel demonstrates the dramatic growth in the number of competing screens at all distances from theaters. For instance, in 1993 theaters faced an average of 10.2 rival screens within 0-5 miles. By 1997, that had increased to 13.2 - almost a 30% increase in the number of local screens! In fact, there are substantial increases in the number of screens operating at every distance in each of the years in the five year period for which there is data. The overall growth rates are similar by either screen count measure, but show a slightly faster growth in competing first run theaters.

The second and third panels of Table 6, break the level and growth in screens by locality down to show the part which is due to screens operated by rivals and the part which is due to new theaters operated by the same chain. Two main patterns emerge. First, the

bulk of local theaters are operated by rivals with around just 20% of screens within five miles operated by the same theater chain. In these large markets, there are clearly typically a substantial number of nearby screens operated by rival circuits. In contrast, many smaller local markets are very highly concentrated (see Davis (1999) for instance,) and thus this pattern may well not be representative of the status quo in those smaller markets.

Remarkably, growth in the number of screens operated by the same circuit is actually higher than the growth in the number of screens at rivals at each distance. Moreover, the growth in the average number of first run theaters operated by the same circuit is substantially higher than for the sample as a whole. However, as the final row of the table shows, even if we only count first run theaters it remains the case that less than one third of the growth in local screens is from growth at other theaters operated by the same chain. Cannibalization of incumbent theaters revenues therefore is primarily a result of theater chains opening new screens close to existing theaters that are operated by rival circuits.

5. Estimation and Results

In this section I estimate within market and within theater regressions and document the magnitude of the business stealing and market expansion effects experienced in the industry from 1993-1997.

5.1 New Screens and the Market Expansion Effect

In Table 7 I report regressions relating the level of revenues coming from each market to the number of screens operating in that market. In each equation, market level fixed effects are included so the estimates are equivalent to a within market specification; the parameters are identified using the variation in revenues and number of screens within market.

Two geographic market definitions are used. The first three columns report the results for revenue data aggregated to the DMA level. The second three columns use EDI's 'Theater Area' variable. This variable is constructed by EDI to approximate the 'zones' used by film distributors to allocate films to theaters. Frequently, a single theater within each zone will be allocated an individual film,[16] so it is plausibly a closer approximation to the actual geographic market definition than the DMA; a DMA can be hundreds of miles across. On average, the 'Theater Area' variable splits theaters into 3-4 sub DMA market areas.

If continued growth in the number of screens available within each market were attracting an ever-decreasing number of consumers (the market expansion effect of new products was diminishing with each additional new one) then the estimated relationship between market revenue and number of screens in the market should show a markedly concave relationship; quadratic coefficients would be negative.

For instance, in the regression reported in column (3), the coefficient on quadratic term $(\text{first run screens})^2$ is negative and could be interpreted as evidence of such a concavity, were it not statistically insignificant. The point estimate suggests that the marginal first run screen increases market revenues by \$36,658 – 2*3.25*(First Run Screens) per quarter, in 1997Q4 dollars. The \$7.5 dollar figure per screen is small, but economically non-negligible in markets with more than a few hundred screens.

Column (6) shows a positive quadratic coefficient, suggesting that the marginal first run screen increases market revenues by \$31,713 + 26.4*(First Run Screens) per quarter in 1997Q4 dollars. On average in the data, there are 56 first run screens in a Theater Area market, thus at the mean of the data an additional first run screen increases market

[16] The use of zones within each DMA to allocate films was more common during the data period than it is today according to industry sources. Today the practice is reportedly still broadly used but is certainly not universal. In practice zones also vary by distributor and EDI's variable is therefore best thought of as a reasonable approximation to a market area somewhat smaller than a DMA.

revenues to $33,191. This direct quadratic term captures an effect that is both statistically insignificant and economically small.

Before dismissing concavity in the revenue screens relationship however, I note that the second run screen variables in these regressions require rather careful interpretation. Recall the dependent variable is *revenue from first run theaters within the market area.* Thus, a positive coefficient on Second Run Screens indicates that as the small theaters drop out of the first run exhibition market, and start showing second run films, revenue to the continuing first run theaters *increases.* This regression obviously does not document a structural relationship and the marginal calculation demonstrated by the direct coefficients does not do justice to the pattern in the data that the regression is picking up. In fact, the regression is capturing the clear pattern in the data for low revenue-low quality screens to be replaced with high quality, high marginal revenue, screens.

For each new first run screen that displaces an existing first run screen into a second run screen, the net effect on the number of first run screens is zero while the number of second run screens has increased by one. Thus the correct market expansion effect for an additional first run screen that displaces an existing screen is the marginal effect of adding a second run screen. The coefficient in Column (6) on the number of second run screens in the market, which does have a statistically significantly negative coefficient, indicates that the marginal impact of one additional first run screen that *replaces* a single - lower quality- first run screen – has a marginal impact of

$$42{,}101 - 2 * 494.7 * \text{SecondRunScreens}.$$

This relationship thereby suggests that screens that displace existing first run theaters achieve greater market revenue expansion than screens that enter against rivals who remain first run screens. One, probably appropriate, interpretation is that the entrants who displace are of higher average quality than those that do not.

	DMA Level Regressions			Theater Area Level Regressions		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Screens	29767 (5.0)	-	-	31023 (5.7)		
Screens^2	3.12 (1.3)	-	-	12.8 (1.3)		
First Run Screens		30875 (5.1)	36658 (6.0)		27,805 (5.3)	31,713 (6.1)
First Run Screens^2		1.49 (0.3)	-3.25 (0.8)		22.6 (2.7)	13.2 (1.4)
Second Run Screens			44299 (3.0)			42,101 (5.0)
Second Run Screens^2			69.1 (1.1)			-494.7 (2.9)
R^2	0.98	0.98	0.99	0.98	0.98	0.98
Observations	2020	2020	2020	7520	7520	7520
Fixed Effects included	Time, Market	Time, Market	Time, Market	Time, Theater Area	Time, Theater Area	Time, Theater Area
F Tests (degrees of freedom)						
Market/Theater Area	44.02 (100)	38.23 (100)	42.17 (100)	141.2 (375)	132.3 (375)	136.7 (375)
Time Fixed	31.22 (19)	31.73 (19)	31.10 (19)	116.4 (19)	124.9 (19)	115.9 (19)

Table 7: *The Market Expansion Effect of New Theater Screens.* Each regression uses 2020 (20 quarterly observations for 101 markets) and the dependent variable is quarterly market level revenue expressed in fourth quarter 1997 US dollars. |t| statistics are reported in brackets and are calculated using standard errors that allow for arbitrary correlation across time within market and are robust to heteroskedasticity. The explanatory variables are polynomials in screens and in each case, third and higher order terms were insignificant. Column (1) reports the regression using the count of all screens active in market m at time t, while Columns (2) and (3) use first run and second run screen counts. Similar results were also obtained using four quarter growth in revenues regressed on four quarter growth in screens.

I conclude that the direct market expansion effect of an additional first run screen is approximately constant over the data range, at approximately $32,000 per first run screen per quarter. However, the marginal impact of each *replacement* first run screen is estimated to be higher at about $42,101 and declining by approximately $963.5 with every additional second run screen.

5.2 New Local Rivals and the Business Stealing Effect

In Table 8 I document the distribution of real revenues across theaters. Strikingly, in each year after 1994, the median theater's revenue actually *declines* in real terms compared to the corresponding quarter one year earlier. The mean theater's revenue declines even in 1994. On the other hand, there remain a substantial number of theaters enjoying large box office revenue growth.

Year	Lower Quartile	Median	Mean	Upper Quartile	Observations
Annual Theater Revenue					
1993	223,563	678,977	1,085,353	1,467,307	3,284
1994	215,004	670,637	1,075,793	1,466,097	3,390
1995	215,327	674,144	1,091,695	1,466,144	3,472
1996	238,050	697,147	1,137,491	1,540,186	3,468
1997	258,483	731,179	1,229,011	1,588,071	3,472
Annual Theater Revenue Growth					
1993	-	-	-	-	-
1994	-32,754	704	-3,254	28,599	11,651
1995	-36,220	-2,159	-1,554	27,810	11,888
1996	-37,105	-2,231	-5,401	23,744	11,986
1997	-39,004	-2,758	-2,225	24,473	11,937

Table 8: *The distribution of first run theater revenue and revenue growth by year*. The figures in the top panel show the distribution of annual revenues across theaters while the bottom panel show the average change in theater quarterly revenues compared to one year earlier. The first panel increases in mean revenue *across* theaters reflecting the fact that average theater size is growing. The second panel examines *within* theater revenue 'growth' and demonstrates that the mean theater is suffering from annual revenue shrinkage in each year during the sample. All numbers are expressed in 1997 4th quarter US dollars. 1993 has no observations in the second panel because 1992 revenues are not observed.

In this section, I examine the way observed theater revenue growth is related to the observed growth in screens at various distances from a theater. *Ceteris paribus*, if competition is primarily local in nature, we would expect growth in the number of local screens to result in larger reductions in revenue than if new entry occurs further away. In addition, one might expect that local theaters operated by the same chain would tend to cannibalize incumbent theater revenues by less than those operated by rival chains since rivals have no incentive to take actions to reduce the cannibalization effect of entry. Alternatively, theaters in the same circuit may provide better substitutes for one another than theaters in rival circuits. In that case, theaters operated by the same chain would tend to cannibalize incumbent theater revenues more than those operated by rival chains.

First, I construct counts of the number of new screens in a variety of distance bands from each theater, indexed by h. That is, given the location of each theater, $Locations_{mt} = \{L_{gmt}\}_{g=1}^{G_{mt}}$, it is easy to count the number of screens within any distance ring of theater h. Define $\Gamma_{hmt}(a,b;Locations_{mt}) \equiv \{g \mid a \le d(L_h, L_g) < b\}$ to be the set

of theaters greater than '*a*' and less than '*b*' miles away from theater h. Further, define $J_{c(h)mt}$ to be the set of theaters in market *m* at date *t* that are owned by the same theater circuit as theater *h* and $\overline{J}_{c(h)mt}$ to be the set of theaters that are owned by rival circuits and then construct

$$own_{hmt}(a,b) = \sum_{\Gamma_{hmt}(a,b)\cap J_{c(h)mt}} screens_{gmt}$$

$$rival_{hmt}(a,b) = \sum_{\Gamma_{hmt}(a,b)\cap \overline{J}_{c(h)mt}} screens_{gmt}$$

and

$$own_{hmt} = (own_{hmt}(0,0.5), own_{hmt}(0.5,1),,....., own_{hmt}(25,30))$$
$$rival_{hmt} = (rival_{hmt}(0,0.5), rival_{hmt}(0.5,1),....., rival_{hmt}(25,30)),$$

vectors of counts of own and rival theaters in the various distance rings. The estimated equation is either linear in these variables, or then interacts them with a count of the number of screens at this theater. More precisely, the final estimating equations are:

$$R_{hmt} = \alpha_1' own_{hmt} + \alpha_2' rival_{hmt} + x_{hmt}\beta + \mu_h + \varepsilon_{hmt} \quad (1)$$

$$R_{hmt} = \alpha_1'(screens_{hmt} * own_{hmt}) + \alpha_2'(screens_{hmt} * rival_{hmt}) + x_{hmt}\beta + \mu_h + \varepsilon \quad (2)$$

where $screens_{hmt}$ denotes the number of screens at theater h, x_{hmt} denotes a vector of additional control variables and μ_h is a theater fixed or random effect. In each case, the results reported are estimated by taking a within transformation to difference out the theater level fixed effects.

While the former of the two alternative specification might appear most natural at first glance, that specification does have the disadvantage that (say) the impact of a new ten screen theater is predicted to be the same on a single screen incumbent and a ten screen incumbent. In actuality, one might expect that since the level of revenue at a large multiplex theater is substantially greater than at any single screen theater the impact of having a new multiplex built next door on revenue growth will be at least approximately proportionate to the size of the incumbent theater. If so, then the second specification would provide the preferred results.

Two patterns are striking from the estimates reported in Table 9. First, within theater changes in revenues over time are strongly and robustly negatively related to changes in the number of own *and* rival theaters operating in the vicinity. For instance, the results in column (1) report that the expected *decline* in revenue at an incumbent theater for each new screen built within 0-0.5 miles is a substantial $6,449 if built by the same theater and an even less modest $8,495 if built by a rival. The results in column (2) allow the magnitude of the effect to vary across theaters of different scales. Thus, a one-screen cinema is estimated to suffer a loss of only $975 for each new screen built in 0-0.5 miles by the same chain and a $1,229 loss for each screen built by a rival. On the other hand, a ten-screen incumbent would suffer a loss of $9,750 and $12,290 respectively per *new screen per quarter*. These are indeed substantial cannibalization effects.

It is worth noting that these results implicitly condition on the set of theaters that continue to show first run films. The revenue implications for those theaters that stop showing first run films, and therefore drop out of the revenue sample, are likely to be substantially worse. Thus the estimated effects should probably be considered an upper bound on the true magnitude of the Business stealing effects.

The second feature evident in the table is the impact of new entry on incumbent revenues is certainly localized. Intuitively, if competition is local, theaters that are very close to new entrants should see greater revenue declines following new entry than those located further away, and this is indeed the case.

The only somewhat surprising reported estimates in column (2), are the positive coefficients estimated on the impact of theaters that are over fifteen miles away. These are economically small estimated effects, but why the data and regression exercise would report they exist is not immediately apparent. In fact, they appear to be picking up trend growth in demand at theaters that are along way from the central population districts and are therefore along way away from the growth in theater screens. The trend may, for

instance, be picking up growth in the number, or income of, the non-urban population during the period. Anything that is fueling increased attendance at isolated theaters would result in estimated small but positive coefficients at far distances from the majority of screens. This kind of local growth in fundamentals will not be sufficiently adjusted for using a theater fixed effect. However, this pattern provides only a minor nuisance in reading the table. It is clearly not the dominant pattern in the data. The dramatic cannibalization effect is.

The results reported in Column (3) break up the effects into first and second run theaters. Unsurprisingly, since there are six times as many first run theaters as second run theaters, the first run theater results show essentially the same effects as those reported in column (2.) The second run theater pattern however is less clear-cut with both positive and negative coefficients estimated, although those estimated with precision are primarily negative. The reported increase in both the within and between theater R^2's are small in return for this doubling of the number of parameters while the results appear to only muddy. For that reason, and because the results would not differ substantially because there are so many fewer second run theaters in the data, I use the results reported in column (2) for the predictive exercises reported below.

		(1)	(2)	(3)	
				First Run	*Second Run*
	Distance (miles)	*X=1*	*X = Screens*	*X= Screens*	
X* ***Screens at other theaters in locality owned by same chain (own)***	**0-0.5**	-6449 (8.4)	-975 (7.5)	-947 (7.3)	-2750 (9.7)
	0.5-1	-9297 (11.4)	-1451 (10.1)	-1552 (10.8)	778 (1.8)
	1 - 2	-7775 (16.4)	-1623 (20.7)	-1668 (21.3)	-2200 (6.3)
	2-3	-5675 (10.8)	-964 (12.0)	-1005 (12.4)	-157 (0.7)
	3-4	-5054 (10.0)	-825 (10.9)	-916 (12.0)	182 (1.0)
	4-5	-3426 (8.4)	-562 (9.3)	-597 (9.9)	-1248 (4.1)
	5-6	-2595 (6.5)	-166 (3.6)	-216 (4.6)	852 (4.2)
	6-7	-4198 (10.7)	-521 (9.7)	-551 (10.3)	-207 (0.7)
	7-8	-3578 (10.2)	-537 (10.8)	-512 (10.3)	-46 (0.2)
	8-9	-2998 (8.7)	-486 (11.5)	-512 (12.1)	-78 (0.4)
	9-10	-1218 (3.4)	-28 (0.8)	-36 (1.0)	1024 (4.2)
	10-15	-302 (1.9)	-27 (1.5)	-40 (2.3)	-10 (0.1)
	15-20	239 (1.6)	90 (4.8)	68 (3.6)	494 (5.5)
	20-25	11 (0.1)	63 (3.7)	33 (1.9)	-244 (2.4)
	25-30	59 (0.3)	81 (3.7)	76 (3.4)	-125 (1.3)
X* ***Screens in locality owned by rival chains (rival)***	**0-0.5**	-8495 (15.2)	-1229 (15.1)	-1341 (15.9)	-774 (5.1)
	0.5-1	-6451 (12.3)	-1178 (13.9)	-1180 (14.0)	1659 (5.9)
	1-2	-3744 (12.4)	-652 (13.1)	-703 (14.0)	-953 (7.7)
	2-3	-3721 (12.9)	-607 (14.1)	-639 (14.8)	-301 (2.8)
	3-4	-4108 (16.6)	-551 (17.2)	-556 (17.4)	-378 (4.0)
	4-5	-3398 (16.6)	-409 (14.5)	-442 (15.6)	306 (3.3)
	5-6	-2961 (15.0)	-391 (15.0)	-348 (14.6)	-311 (4.6)
	6-7	-2706 (13.8)	-361 (14.1)	-375 (14.7)	-134 (1.7)
	7-8	-2686 (14.4)	-392 (15.7)	-416 (16.7)	-187 (2.5)
	8-9	-2076 (11.2)	-294 (11.5)	-315 (12.2)	-143 (2.1)
	9-10	-799 (4.4)	-98 (4.0)	-119 (4.9)	-177 (2.4)
	10-15	-615 (8.3)	-83 (8.6)	-98 (10.1)	-31 (1.2)
	15-20	-286 (4.1)	-24 (2.6)	-30 (3.1)	-30 (1.2)
	20-25	243 (3.3)	51 (5.0)	25 (2.4)	115 (4.6)
	25-30	81 (1.1)	33 (3.6)	19 (2.1)	87 (3.6)
Observations		63,077	63,077	63,077	
Theaters		4,158	4,158	4,158	
R^2 (within)		0.19	0.19	0.20	
R^2 (between)		0.06	0.39	0.42	
R^2 (overall)		0.05	0.30	0.33	

Table 9: *The cannibalization of Incumbent theater revenues by new entrants.* The dependent variable for all regressions is real 1997Q4 theater revenues, R_{jt}. The first set of regressors use counts of the raw numbers of screens at other theaters that are operated by the same circuit at various distances form the theater. The second set use counts of the raw numbers of screens operated by rival circuits within distance bands from this theater. In each case the actual explanatory variable differs by column. For instance, in column (1) the raw numbers are used while in column (2) a specification in which the raw counts are interacted with the number of screens operating at this theater. In column (3), screen counts are divided into first and second run screens with the initial column of numbers reporting coefficients on the count of first run screens in the locality while the second column reports the coefficients on the number of second run screens in the locality.

In each case, the distance between a pair of theaters is measured as the straight-line distance using the latitudes and longitudes of each theater address. Thus, 0-0.5 counts the number of screens within a circle of 0.5mile radius of the theater. In addition to the regressors reported, a dummy variable is included that indicates when the revenue observation is the first revenue observation at a theater or the last. The former is important since theaters open part way through the quarter and so first quarter revenues are often substantially below subsequent revenue observations. The latter because closing theaters demonstrate marked reductions in revenues in their last quarter of operation. All regressions include time fixed effects. Annual changes provide similar results to the within theater regression results reported here.

5.3 Evaluating the Market Expansion and Business Stealing Effects

In Table 10 I report the distribution of the predicted business stealing and market expansion effects isolated using the within theater and within market regressions reported above. The first six columns are calculated using the estimation results from column (2) in Table 9. For each observation indexed by *hmt* the estimated model provides the predictions $\hat{\alpha}_1'(screens_{hmt} * own_{hmt})$ and $\hat{\alpha}2'(screens_{hmt} * rival_{hmt})$, business stolen from other theaters owned by the same chain and business stolen from other theaters owned by rival chains respective. These predicted effects are reported for each size of theater. Thus, the median predicted effect across one-screen theaters in the dataset is that the business stolen from rival theaters is $6,173 per quarter. The final column reports the median predicted market expansion effect calculated from column (6) in Table 7.

The results show that median business stolen from the theater circuit's own theaters is substantial, but that the majority of the cannibalization effect in a median theater is actually business stolen from rivals. The cannibalization effect is estimated to be very large indeed. The median figures suggest that about 20% percent of a new one-screen theater's business comes from existing rivals, whilst about 30% of a new ten-screen theater and 35% of a new twenty-screen theater comes from rivals. By the time theaters approach 24 screens the predicted business stealing effect is approaching 45%. The magnitudes of these predicted effects are substantially greater in the lower tail of the distribution across theaters.

	Predicted Business Stolen from *Own Theaters*			Predicted Business Stolen from *Rival Theaters*			Market Expansion
Screens	**Lower Quartile**	**Median**	**Upper Quartile**	**Lower Quartile**	**Median**	**Upper Quartile**	
1	-6,906	0	0	-33,657	-6,173	0	32,650
2	-11,697	0	0	-37,921	-5,851	0	65,326
3	-23,152	-2,613	0	-73,377	-22,409	0	98,029
4	-43,310	-10,789	0	-103,163	-36,993	-335	130,759
5	-43,548	-7,628	0	-138,924	-43,639	-332	163,515
6	-58,434	-19,476	0	-179,877	-88,272	-19,497	196,297
7	-61,786	-9,831	0	-199,759	-76,862	-12,727	229,105
8	-55,315	-14,325	0	-223,897	-112,475	-29,363	261,940
9	-69,622	-14,866	0	-242,874	-101,674	-24,163	294,802
10	-86,176	-12,635	2,800	-256,815	-122,148	-37,836	327,690
15	-213,797	-39,764	38,532	-464,289	-151,880	-84,607	492,525
20	-587,880	-34,818	3,295	-446,724	-281,020	-120,584	658,020
24	-2,254,79	-42,943	0	-734,390	-555,885	-231,963	824,175

Table 10: *The Business Stealing and Market Expansion effects of Theater Scale.* The calculations reported here take estimates from column (2) in Table 9 to predict business stolen from rivals and the estimates from column (6) in Table 7 to predict the market expansion effect of introducing a new first run theater of each size. The predicted effect of business stolen is calculated for each theater in each time period and the numbers report the lower quartile, median and upper quartile of the predicted effects by theater screen size by own and rival theaters respectively.

While these business-stealing effects are very substantial, the market expansion effect of new screens increases approximately linearly with the number of new screens at approximately $32,000 per screen per quarter. In most cases, market expansion still accounts for a slim majority of a theater's revenues. Thus, the emerging picture is certainly not one reminiscent of the purest form of 'excess' entry where incumbents revenues are cannibalized by new entrants with little market expansion.

Breaking the predicted business stealing effects up by year provides another interesting display of the trends in the industry caused by the dramatic building of new theaters. As before, the median own effects are an order of magnitude smaller than the effects from

rivals. However, Table 11 also makes clear that large scale entry during the latter half of the period, particularly 1996 and 1997 dramatically increased the extent of business stealing in the industry. As the entry of new first run movie theaters increased during the rest of the decade, presumably so did the magnitude of the business stealing effects.

	Predicted Business Stolen from *Own Theaters*			**Predicted Business Stolen from** *Rival Theaters*		
Year	Lower Quartile	Median	Upper Quartile	Lower Quartile	Median	Upper Quartile
1993	-39,333	-4,264	0	-131,232	-41,830	-1,760
1994	-39,671	-3,888	0	-135,193	-44,477	-1,669
1995	-40,952	-4,690	0	-143,385	-46,903	-1,728
1996	-44,568	-5,567	0	-156,634	-53,040	-2,243
1997	-49,781	-6,979	0	-183,078	-60,197	-3,434

Table 11: The evolution of business stealing by own and rival theaters. Figures report the distribution of predicted business stealing effects across all theaters in each year. Each figure represents the distribution of predicted effects *per quarter* in 1997 Q4 dollars.

6. Discussion and Conclusions

Entry and Exit: There was a great deal of both entry and exit from the first run exhibition market during 1993-1997. Most of the entry was of high quality large first run theaters while much of the exit was of smaller lower quality theaters. In addition, much of the exit remained hidden in the aggregate screen counts popularly reported in the trade press: although there were some theater closures, there was also substantial exit from first run by theaters who remained active in the second run market. The raw numbers documenting a 50% increase in theater screens dramatically overstate the extent of net entry into first run. Rather, there has been an approximately 16% increase in the number

of first run screens. That entry has been associated with a 19% real increase in revenues during the data period in the 101 DMA's studied.

Localization of Competition: The business stealing effects of entry dissipate at around fifteen miles from a theater. That is, a theaters competition appears to be localized approximately to within a 15 mile radius. The fact that the relevant competitive market area is quite large, is perhaps reassuring for other retail markets since admission to a theater has such a low unit price meaning that there are low incentives for consumer travel in comparison to many retail items (eg., cars.)

Business Stealing: The estimated business stealing effects from own theaters are reasonably small for the median data point, barely accounting for 3 or 4% of revenues at a median theater. However, business stolen from theaters owned by rival chains is extremely substantial (see Table 10) and is estimated to account for as much as 40% of the median theaters revenues. If anything this estimate *understates* revenue cannibalization since theaters that immediately exit to second run when facing a new rival no longer report revenues to EDI and thus, disappear from the revenue sample.

Market Expansion: The estimated market expansion effects of new first run screens account for more than 50% of the median theater's revenues. This is a very substantial effect reflecting the dramatic increase in the quality of new theaters as well as a modest 16% increase in the actual number of screens.

Excess Entry: The substantial market expansion effects generated by new theater entry demonstrate that new entry has made consumers substantively better off. However, the large revenue cannibalization effects of new first run theaters that I document have very clearly been an important factor in the recent bankruptcy of a large fraction of the industry. I conclude that this dataset provides as compelling evidence as one might hope to find of the economic forces that *would and could* drive an 'excess' entry story.

Establishing whether there actually was excessive entry requires an estimate of the uncaptured consumer surplus provided by the introduction of the new products. That, in turn, entails estimating a demand system. Some progress to that end is made in the model and estimates provided in an earlier paper Davis(1999,) albeit using a substantially less comprehensive database than now available. In that paper I used just one week of data on the revenue achieved by each film at each theater. That data suggested that the revenue cannibalization effects were much smaller than this dataset reveals they actually were, while the estimated uncaptured consumer surplus effects were estimated to be large. The reason is that there was no observed entry by new theaters in the dataset. The evidence provided in this paper should at least temper that conclusion and perhaps even raises the possibility that it should be reversed. Estimating a full new demand system is beyond the scope of the current paper, but is clearly a necessary next step to establish a compelling answer to the 'excessive entry' question in this particular case. While that is an interesting avenue I shall explore in future work, it is probably less interesting than the more limited goal of this paper – to establish that the forces at work that would push in the direction of excess entry are very real and data relevant effects. I conclude that we should take these effects extremely seriously when thinking about appropriate policy toward entry into differentiated product markets, both generally and in retail markets in particular.

That conclusion has particular pertinence to at least two important policy arenas. First, it suggests that antitrust policy seeking to promote competition between stores within a geographic market by actively managing the ownership of stores should consider seriously the extent of the relative business stealing and market expansion effects before proceeding to impose ownership constraints on market participants. Second, it suggests an important caveat to the professions interpretation of the demise of the 'mom and pop store' or 'corner shop.' The dominant view of the current trend is that the significant efficiencies provided in retail distribution through the use of larger shops clearly justify their entry. Individually we complain only about the exit of our own local corner store rather than the trend as a whole. The presence of manifestly large cannibalization effects documented in this particular retail market make that position in need of active

justification. It also suggests that further study of the magnitude of these effects in the large retail markets, particularly supermarkets, should be of great interest.

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