Intra- and Inter-Channel Competition in Local-Service Sectors

KATHLEEN CLEEREN, MARNIK G. DEKIMPE AND FRANK VERBOVEN

ERIM REPORT SERIES *RESEARCH IN MANAGEMENT*	
ERIM Report Series reference number	ERS-2005-018-MKT
Publication	March 2005
Number of pages	37
Email address corresponding author	dekimpe@rsm.nl
Address	Erasmus Research Institute of Management (ERIM) Rotterdam School of Management / Rotterdam School of Economics Erasmus Universiteit Rotterdam P.O.Box 1738 3000 DR Rotterdam, The Netherlands Phone: + 31 10 408 1182 Fax: + 31 10 408 9640 Email: info@erim.eur.nl Internet: www.erim.eur.nl

Bibliographic data and classifications of all the ERIM reports are also available on the ERIM website:
www.erim.eur.nl

ERASMUS RESEARCH INSTITUTE OF MANAGEMENT

REPORT SERIES

RESEARCH IN MANAGEMENT

ABSTRACT AND KEYWORDS	
Abstract	Although economically very important, local-service sectors have received little attention in the extensive literature on competitive interactions. Detailed data gathering in these sectors is hard, not only because of the multitude of local players, but also because key service dimensions are hard to quantify. Using empirical entry models, we show how to infer information on these sectors' degree of intra- and inter-channel competition from the observed entry decisions in different local markets. The approach also controls for relevant socio-demographic characteristics of the trading area that may affect performance. We apply the proposed empirical entry model to the video-rental market. Additional entries of video stores are found to significantly increase the level of intra-channel competition. Unlike the predictions of many normative economic models, we find this increase to be larger when the entry occurs in a duopoly than in a monopoly, a pattern consistent with recent experimental research on collusive behavior in oligopolies. We also find evidence of inter-channel cannibalization from the upstream channel (movie theatres), but not from the downstream channel (premium cable). Finally, various socio-demographic characteristics of the trading zone, such as income and household size, are found to also have a significant impact on store performance.
Free Keywords	Channel competition, Empirical entry models, Movie industry

Intra- and Inter-Channel Competition in Local-Service Sectors

Kathleen Cleeren
Marnik G. Dekimpe
Frank Verboven*

March 15, 2005

* Kathleen Cleeren is a doctoral candidate at the Catholic University Leuven (Belgium); Marnik G. Dekimpe is Professor of Marketing at the Catholic University Leuven and Professor of Marketing Management at the RSM Erasmus University (The Netherlands). Frank Verboven is Associate Professor at the Catholic University Leuven. The authors thank Katrijn Gielens, Els Gijsbrechts, Miklos Sarvary, Jan-Benedict E.M. Steenkamp and Harald van Heerde for constructive comments on an earlier version of the paper. The second and third author acknowledge support of the Flemish Science Foundation (FWO) under grant nr. G.0116.04 and G.0089.04. Finally, the authors thank Randy Brenkers and Catherine Schaumans for assistance with data preparation.

Intra- and Inter-Channel Competition in Local-Service Sectors

Abstract

Although economically very important, local-service sectors have received little attention in the extensive literature on competitive interactions. Detailed data gathering in these sectors is hard, not only because of the multitude of local players, but also because key service dimensions are hard to quantify. Using empirical entry models, we show how to infer information on these sectors' degree of intra- and inter-channel competition from the observed entry decisions in different local markets. The approach also controls for relevant socio-demographic characteristics of the trading area that may affect performance.

We apply the proposed empirical entry model to the video-rental market. Additional entries of video stores are found to significantly increase the level of intra-channel competition. Unlike the predictions of many normative economic models, we find this increase to be larger when the entry occurs in a duopoly than in a monopoly, a pattern consistent with recent experimental research on collusive behavior in oligopolies. We also find evidence of inter-channel cannibalization from the upstream channel (movie theatres), but not from the downstream channel (premium cable). Finally, various socio-demographic characteristics of the trading zone, such as income and household size, are found to also have a significant impact on store performance.

Keywords: Channel competition, Empirical entry models, Movie industry

JEL classification: M3, L8

1. INTRODUCTION

Traditionally, marketing researchers concentrated on *consumer* response to marketing decision variables. Because of the decline in most Western economies, increasing attention became devoted to the behavior of *competitors* in the marketplace (Leeflang and Wittink, 1992), as reflected in special issues on competition in the *International Journal of Research in Marketing* (2001) and *Marketing Science* (2005). Many of the empirical applications in the area, however, deal with fast-moving consumer goods (e.g. Leeflang and Wittink, 1992; Steenkamp et al., 2005), the car market (Roy, Hanssens and Raju, 1994; Sudhir, 2001) and the pharmaceutical industry (Shankar, 1997). Not surprisingly, these are sectors where detailed information on performance and support variables tends to be available.[1]

In service sectors such as the hotel, restaurant and video-rental industry, however, it is difficult to collect data on the different marketing and/or performance variables of all players in the market. Firms in these sectors typically compete in local markets, as customers need local contact with the service provider (Fuentelsaz, Gomez and Polo, 2002). These so-called local-service sectors are economically very important. For example, in 2001, the US and UK hotel and restaurant sector contributed respectively 1% ($ 88.4 billion dollar) and 3% (£29 billion) to Total Gross Value Added (United Nations statistics, 2001). These sectors have recently received increasing attention in the marketing literature. The focus, however, has remained on the *customer* side (see e.g. Smith and Bolton, 1999), while the *competitor* side has been largely neglected (see Venkataraman and Kadiyali (2004) for a notable exception).

Certain characteristics of local-service sectors inhibit the application of traditional methods that have been used to make inferences on the competitive structure of a market, such as Granger-Causality tests (e.g. Leeflang and Wittink, 1996), the Conjectural Variations

[1] Data providers in those sectors are, for example, IRI or A.C. Nielsen for fast-moving consumer goods, Ward's Automotive Handbook for cars, and IMS in the pharmaceutical industry. We refer to Hanssens, Parsons and Schultz (2001) for a more extensive discussion on these and other data providers.

approach (e.g. Kim and Parker, 1999), and the Non-Nested Model Comparisons approach (e.g. Kadiyali, Chintagunta and Vilcassim, 2000). Two key inhibiting factors are (i) the large number of local players, and (ii) the existence of difficult-to-observe decision variables.

First, local-service markets are often fragmented with many local players. The UK hotel sector, for example, consists of more than 40,000 establishments, while Germany (France) has around 38,000 (20,000) hotels (Eurostat, 2002). Geographic diversification decisions are crucial in such industries, as customers expect a local contact with the firm. As such, operating in a geographical market necessitates in-market facilities from which to deliver the service (Fuentelsaz, Gomez and Polo, 2002). Gathering detailed data on all individual market participants is nearly impossible.

Second, firms in service sectors not only compete on the basis of readily observable tactical marketing variables, but also on a number of other, less directly observable, factors (Zeithaml and Bitner, 2000). Service marketers have found that the traditional 4 P's of marketing are often inadequate to describe key aspects of their job. Personal interactions with employees, physical surroundings, and the flow and progress of the process are also important (Rust, Zahorik and Keiningham, 1996). Even though measurement scales have been developed to operationalize these components (see e.g. SERVQUAL in Parasuraman, Zeithaml and Berry, 1988), it quickly becomes impossible to obtain the relevant measures for all players in the market.

Because of these characteristics of many local-service sectors, we advocate the use of another approach to make competitive inferences that has less stringent data requirements. *The general idea is to infer information on the degree of competition from the observed entry decisions, and its relationship with local market size and other market characteristics.* Hence, to draw inferences on the degree of competition, it is not necessary to observe individual firms' profits. Intuitively, the empirical framework studies by how much the local market size

should increase to sustain an additional entrant. If the required market size increase is large, this implies that an additional entrant leads to a strong increase in competition. Even though the effect of new *product* entry on market structure has been thoroughly researched in marketing (e.g. Pauwels and Srinivasan, 2004; van Heerde, Mela and Manchanda, 2004), little attention has been paid to the impact of new *outlets* on the extent of intra-channel competition in local-service sectors, nor to the competitive impact arising from other channels that deliver a comparable service.

We illustrate the proposed framework in the context of the Belgian video-rental industry. People tend to patronize a video store that is close to home (Zhu, 2001). As a consequence, markets tend to be very local, resulting in a large amount of players in the industry. In the US alone, the video-rental industry consists of more than 28,000 video stores (Seim, 2001), while also the Belgian sector consists of over 1,000 stores.

Since the late 1980s, video[2] rental and retail (sales) has become the largest source of income to the movie industry, creating almost $ 8 billion of worldwide revenues for the major film studios in 2000 (Vogel, 2001). Inspite of the economic importance of secondary movie markets such as video rental, marketing researchers have focused almost exclusively on the movie-theatre channel (see e.g. Elberse and Eliashberg, 2003; Eliashberg et al., 2000; Swami, Eliashberg and Weinberg, 1999), largely neglecting the subsequent channels of movie distribution (see Lehmann and Weinberg, 2000 and Prasad, Bronnenberg and Mahajan, 2004 for two notable exceptions).

Apart from its intrinsic economic importance, an additional interesting feature of the video-rental industry is the competition it experiences from other channels of movie distribution, such as movie theatres. As a consequence, we also contribute to the growing literature on inter-channel competition. Previous studies have concentrated on *simultaneous*

[2] In this paper, the digital video disk (DVD) and videocassette are both referred to as video.

distribution channels (e.g. Biyalogorsky and Naik, 2003; Deleersnyder et al., 2002). We extend this to *sequential* distribution channels by measuring the competitive impact of channels both upstream and downstream in the movie distribution sequence.

2. MODEL DEVELOPMENT

To study both profit determinants and the role of competition without directly observing individual profit, cost, price or other strategic marketing information on the various market players, we assume that firms enter a local market as long as this is profitable. Based on this assumption, the observed number of firms allows one to infer bounds on the profitability in each local market. A similar assumption was made by Bresnahan and Reiss (1991) in their study on, amongst others, doctors, dentists and druggists. Other studies adopting this assumption include Asplund and Sandin (1999), Genesove (2004), Manuszak (2002), and Pfann and Van Kranenburg (2003).

Using the estimated relationship between the observed number of (profitable) entrants and the observed market characteristics, one can subsequently derive entry thresholds. An entry threshold is defined as the minimum market size required for a given number of firms to break even, after controlling for other observed market characteristics, in a market. It is the population level at which the expected profitability is equal to zero. Entry thresholds provide information on how the extent of competition changes as more firms enter the market. Specifically, if an additional entrant provides a strong constraint on firm profits, the entry threshold to carry that additional firm raises more than proportionally. For example, if the critical market size required to carry one firm consists of 1,000 inhabitants and the market size to carry two firms is 3,000 inhabitants, one can infer that the second firm increases the degree of competition in that market, as the per-firm threshold has increased. In contrast, if

the market size required to support two firms is 2,000, the entry of the second firm did not affect the level of competition, as the per-firm threshold did not change.

2.1. Econometric framework

Firm profits when there are *n* firms in market *i* are given by the latent variable $\prod_i^n$, which consists of an observed component (π_i^n) and an unobserved component (ε_i):

$$\prod_i^n = \pi_i^n - \varepsilon_i \quad . \tag{1}$$

The observed component is allowed to depend on the number of firms in the market. The unobserved component represents a random part that is specific to market *i*, but common to all firms in that market.

The latent variable $\prod_i^n$ is linked to the observed number of firms through the assumption that there will be entry as long as this is profitable. Make the weak assumption that profits decrease as the number of firms increase, i.e. $\prod_i^n > \prod_i^{n+1}$. The number of firms in market *i* (N_i) is then equal to *n* if $\prod_i^n \geq 0$ and $\prod_i^{n+1} < 0$, for *n=1,…, K-1,* with *K* the largest market structure observed in the data. It is equal to 0 if $\prod_i^1 < 0$, i.e. even a monopolist does not find it profitable to enter. Finally, N_i is greater than or equal to *K* if $\prod_i^K \geq 0$. From (1), we therefore have the following conditions:

$$\begin{aligned} &N_i = 0 \quad \textit{if} \quad \varepsilon_i > \pi_i^1 \\ &N_i = n \quad \textit{if} \quad \pi_i^n \geq \varepsilon_i > \pi_i^{n+1}, \quad n = 1,..,K-1 \\ &N_i \geq K \quad \textit{if} \quad \pi_i^K \geq \varepsilon_i \quad . \end{aligned} \tag{2}$$

If the market-specific errors (ε_i) follow a standard normal distribution function, the market-entry probabilities are given as:

$$\begin{aligned} P(N_i = 0) &= 1 - \Phi(\pi_i^1) \\ P(N_i = n) &= \Phi(\pi_i^n) - \Phi(\pi_i^{n+1}), \quad n = 1,...,K-1 \\ P(N_i \geq K) &= \Phi(\pi_i^K) \quad . \end{aligned} \tag{3},$$

with $\Phi(\cdot)$ the cumulative standard normal distribution. These probabilities are used to construct the likelihood function, which leads to an ordered probit specification.

2.2. Specification

The performance measure π_i^n may be modeled as a function of market characteristics. Overall store performance has been found to increase with local market potential and buying power, and to vary with the level of local competition (Campo et al., 2000). Local market potential and buying power are influenced by socio-demographic characteristics, such as the market's population, age distribution and income level (see e.g. Johnson, 1997). As for the level of competition, we do not only control for direct competitors, but also for the availability of possible substitutes in the environment (Mulhern, Williams and Leone, 1998). In the case of video-rental stores, these could, for example, include the presence of movie theatres and/or premium cable.[3] We therefore specify store performance π_i^n in market *i* as:

$$\pi_i^n = \alpha \ln(\text{POP}_i) + \beta \, \text{DEMOGR}_i + \gamma \, \text{SUBST}_i - \lambda^n \quad , \qquad (4)$$

which is subsequently substituted in the various expressions of (3) to arrive at the ordered-probit likelihood function. POP_i is the population in market *i*, DEMOGR_i is a vector of other socio-demographic market characteristics, SUBST_i is a vector capturing the presence of possible substitutes in market *i*, and the parameters λ^n are fixed effects, measuring the impact of the number of firms *n* on performance. In general, a positive difference between λ^n and λ^{n-1} can be interpreted as evidence that entry has a negative effect on performance.

The estimated parameters $(\hat{\alpha}, \hat{\beta}, \hat{\gamma}, \hat{\lambda}^n)$ provide two types of insights. First, they have an interest in their own right, as they allow us to test which factors have a significant impact on firm performance. Second, they can also be used to derive entry thresholds, i.e. the minimum market sizes required to support a given number of firms. These thresholds offer insights on how entry affects the extent of competition. More formally, the *n*-firm entry

[3] Premium-cable providers are allowed to show a movie about a year before regular (cable) television providers (Doyle, 2002). Subscribers to this channel pay a fixed per-month subscription rate.

threshold (S^n) is defined by the population level at which the expected value of $\prod_i^n$ is equal to zero. Using (4), the estimate for S^n can be computed as:

$$\hat{S}^n = \exp\left(- \frac{\hat{\beta}\,\overline{\text{DEMOGR}} + \hat{\gamma}\,\overline{\text{SUBST}} - \hat{\lambda}^n}{\hat{\alpha}} \right), \tag{5}$$

where $\overline{\text{DEMOGR}}$ and $\overline{\text{SUBST}}$ are the covariates evaluated at their sample mean. As discussed earlier, entry thresholds increase disproportionally with the number of firms if entry has a substantial impact on firm performance, and increase proportionally if entry does not affect firm performance. The entry-threshold ratio (R^n) summarizes this information. It is defined as the ratio of the per-firm *n*-firm entry threshold over the per-firm *n-1* entry threshold, and can be computed as:

$$\hat{R}^n = \frac{\hat{S}^n}{n} \Big/ \frac{\hat{S}^{n-1}}{n-1} = \exp\left(\frac{\hat{\lambda}^n - \hat{\lambda}^{n-1}}{\hat{\alpha}} \right) \times \frac{n-1}{n} \quad . \tag{6}$$

If the threshold ratio is above one, the extent of competition increases with the additional entry. For example, an estimated threshold ratio of 1.05 means that the per-firm market size has to increase by 5% to support an additional firm. Note that the threshold ratios in (6) only depend on the fixed entry effects λ^n and on the market size parameter α. Although they do not directly depend on the other market characteristics, they do so indirectly as the parameter estimates of λ^n and α may be affected by their inclusion in the model.

Some additional remarks on specification (4) are in order. First, population could, of course, be viewed as one additional element of the vector of socio-demographic characteristics DEMOGR_i. However, we write it separately since it is used to compute the entry thresholds, which summarize the role of competition. Second, population enters in logarithmic form. This ensures that the computed entry thresholds are non-negative. In addition, the logarithmic functional form is consistent with a specification in which the drivers of store performance influence the ratio of variable profits over fixed costs, as in

Genesove (2004). It is therefore not necessary to separately identify the effects of market characteristics on variable profits versus fixed costs as in Bresnahan and Reiss (1991), which in practice proves to be difficult. Third, unlike previous empirical entry models, such as Asplund and Sandin (1999), Bresnahan and Reiss (1991) and Manuszak (2002), our inclusion of $SUBST_i$ allows us to measure, in addition to intra-channel competition, competition arising from other channels that deliver similar services.

3. CONCEPTUAL DEVELOPMENT

In line with previous research, we argue that overall store performance varies with (i) the level of local competition, and (ii) local market potential and buying power.

3.1. Competition

The competitive character of the trading area may strongly affect a store's performance (Campo et al., 2000; Hoch et al., 1995; Montgomery, 1997). However, the level of local competition may not only be influenced by the number of direct competitors (in our case, other video stores), but also by the availability of possible substitutes in the environment (Mulhern, Williams and Leone, 1998), such as movie theatres and premium cable.

3.1.1. Intra-channel competition

The extent of competition has often been operationalized through concentration indices such as the combined market share of the top players in the market (see e.g. Gielens and Steenkamp, 2004) or the Herfindahl Index (see e.g. Bronnenberg and Mela, 2004). In local-service industries, however, market-share information on the various incumbents is often unavailable (see Section 1).

Other studies have used the number of market players as a proxy for the extent of competition/market structure (see e.g. Dhar and Hoch, 1997; Nijs et al., 2001). However, the assumed exogeneity of the market-structure variables in those studies can be questioned. Market structure not only influences conduct and performance. Conduct can, in turn, affect market structure (Kadiyali, Sudhir and Rao, 2001). An observed market structure is then seen as the outcome of firms' profit-maximizing decisions that take the expected behavior and performance of incumbent and potential players into account (Manuszak, 2002). Our approach addresses this concern. Market structure is treated as an endogenous variable, as determined through the zero-profit market equilibrium. Through the evolution in the aforementioned threshold ratios, we are subsequently able to quantify how the extent of competition changes when a new player enters various existing market structures (monopoly, duopoly,…).

Different patterns for this evolution may be obtained. Both the Cournot and the differentiated Bertrand model predict the increase in competition to be largest when entry occurs in a monopoly market (Tirole, 1988). Competition will then continue to increase with new entrants, albeit at a diminishing rate, until the market has become perfectly competitive, i.e. until price-cost margins have become equal to zero. According to these models, estimated threshold ratios will be greater than one, but decrease as more players enter the market until the market has become perfectly competitive, in which case the estimated threshold ratio will be equal to one. In the Bertrand model with undifferentiated products, in contrast, new entrants do not increase the extent of competition as soon as two firms are already active (Cabral, 2000). In this model, only the first estimated threshold ratio will thus be significantly larger than one. Third, in contestable markets, the competitive effect of entry is already zero for entries into monopoly markets. Indeed, in these markets, the threat of potential entrants is already effective in disciplining the incumbent firm, decreasing its price-cost margin already

before entry (Baumol, Panzar and Willig, 1982). Actual entry will therefore not increase the extent of competition, implying that all estimated threshold ratios for contestable markets will be equal to one. Also in markets with sustainable collusion (e.g. d'Aspremenont and Gabszewicz, 1985), the effect of entry on the extent of competition in the market will be zero, as long as the entry does not cause the collusion to break down. Estimated threshold ratios for collusive markets should thus be equal to one.

Hence, different model assumptions lead to differing normative implications, making the actual evolution of the entry thresholds an empirical issue.

3.1.2. Inter-channel competition

In recent years, the use of multiple distribution channels has become the rule rather than the exception (Frazier, 1999). Still, empirical research on the performance implications of having multiple channels is rare. Notable exceptions are some recent studies on the potential cannibalization effects of adding an Internet channel to one's channel portfolio (see e.g. Biyalogorsky and Naik, 2003; Deleersnyder et al., 2002). However, these studies considered the *simultaneous* distribution of a product across multiple channels, where the extent of cannibalization may well be different from instances where the distribution coverage is gradually extended. Fashion houses, for example, introduce designs *sequentially* into lower-priced outlets (Pesendorfer, 1995). In the movie industry, a typical release sequence starts with the theatrical release, followed by a short pay-per-view window after 4-6 months, and a home-video release after 6-9 months. A movie, on average, becomes available through the premium-cable channel approximately 12 months after the first theatrical release, and through the regular television channel after another 12 months (Doyle, 2002).

Even though some minor modifications to the product may be made in the process, the main differences have to do with the timing, the choice of distribution channel and the price

(Lehmann and Weinberg, 2000), as margins often decrease as products are offered through channels down the sequence (see also Prasad, Bronnenberg and Mahajan, 2004). Different versions of the same product can be considered substitutes, causing possible cannibalization from channels upstream and downstream in the sequence. Indeed, potential customers may already have purchased the product (in our setting, seen the movie) in an earlier channel, and subsequently leave the market (Lehmann and Weinberg, 2000), while others may have an incentive to postpone their purchase as they anticipate a price decrease (Purohit, 1997). If these phenomena, which so far have been documented at the individual product (movie) level, occur consistently across multiple products (movies), the overall performance of the intermediate channel (the video stores) will be affected negatively by the presence of the upstream (movie theatres) and downstream (premium cable) channel.

3.2. Socio-demographic control variables

Apart from intra- and inter-channel competition, various socio-demographic characteristics of the trading zone may also have an impact on the profitability of firms operating in a given market (Campo et al., 2000). We control for the following characteristics: average income and household size, the age and ethnic composition of the population, and the degree of urbanization of the local market.

Income As it has a positive impact on purchasing power, income in a local market may have a positive effect on the profitability of the various firms in that trading zone. On the other hand, as high-income families are also less price sensitive (see e.g. Montgomery, 1997), income may cause a shift in demand towards the more expensive channels. Vogel (2001) estimates that watching a rented home video is approximately seven times cheaper (per person per hour) than a movie-theatre visit, and somewhat more expensive than watching it on premium cable. Of course, each of these options is more expensive than watching regular

television. As video rental is neither the most expensive nor the cheapest option, the net effect of these opposing forces is hard to predict. In addition, wealthy people usually have higher opportunity costs (Hoch et al., 1995), which may influence their valuation of time and their sensitivity to services offered within the different channels of movie distribution.

Household size Larger families have been found to be more price sensitive (Hoch et al., 1995), which may affect the share of a movie distribution channel relative to both the more (upstream) and less (downstream) expensive channels in the sequence, even though the net effect is again hard to predict. Larger families may also be characterized by a higher heterogeneity in preferences (Seetharaman and Chintagunta, 1998), which may translate in the purchase of multiple products (Gielens and Steenkamp, 2004).

Age Even though retired people have more leisure time, they have been found to spend less on entertainment than younger people (Vogel, 2001), and to be more price-elastic (Boatwright, Dhar and Rossi, 2004), which may affect their channel choice for movie entertainment.

Ethnicity Different ethnic groups have been found to differ in their price elasticity (Hoch et al., 1995), which may (as argued before) affect their demand for high- versus low-cost forms of entertainment. In addition, minority groups often tend to participate less in mainstream leisure activities because of differences in economic resources, value systems, norms and socialization patterns (see e.g. Floyd et al., 1994).

Urbanization We also include the level of urbanization as control variable, as this has been shown to affect shopping behavior (e.g. Gatignon, Eiashberg and Robertson, 1989; Gielens and Steenkamp, 2004) and hence, store performance.

4. DATA AND INDUSTRY

4.1. The Video Rental Market

The movie industry does not only derive revenue from theatrical exhibition, but also from home videos, premium cable, and other television channels (Vogel, 2001). Recently, the home-video channel surpassed the movie-theatre industry as most important source of consumer spending on movies. In 2002, for example, US consumers spent more than $22 billion on video and DVD rental ($ 10 bn) and buying ($12 bn) compared to almost $10 billion on theatre tickets (IVF, 2003; MPA, 2003). Also in Western Europe, consumers spend a considerable amount on home video, reaching almost $12 billion in 2002 (IVF, 2003).

We concentrate on the Belgian market, which is representative for Western Europe in terms of various macro-economic indicators (GDP/capita and wholesale, retail trade, restaurants and hotels as % of GDP), and, even more importantly, on several key characteristics of the video-rental business, such as VCR and DVD penetration, average spending on video rental, the average number of rental transactions per TV household, and the average rental charge (see Table 1).

[Table 1 goes about here]

The video-rental sector has limited entry and exit barriers (Gomery, 1993) which further justifies our assumption that video stores enter as long as this is profitable.

4.2. Data description

4.2.1. Sample composition

Our sample consists of all active video stores in 2003 (1,275 in total) in 2,576 Belgian local markets. We define local markets at the level of “townships”. Townships used to form separate juridical entities. In the late seventies, several of them were merged with each other to form larger “municipalities”. The smaller level of aggregation is selected because of two reasons. First, local markets should be self-contained in that there is no relevant direct competition coming from outside the defined market (Abraham, Gaynor and Vogt, 2003).

Second, townships still have their own community centre, around which several stores tend to cluster and which people still visit for many of their day-to-day (grocery) purchases. As customers have been found to primarily rent their videos from a store close to their home[4] (Zhu, 2001), which reflects the typical need for local contacts in service encounters, the smaller level of aggregation is more appropriate. Following Asplund and Sandin (1999), we exclude all townships of the largest Belgian cities from our sample. As such, we exclude all townships of the 18 largest cities (e.g. Antwerp, Ghent and Liege) in Belgium (i.e. 167 townships), as well as the 19 municipalities that constitute Brussels. These townships were found to be five times larger than the rest in terms of population, and therefore could consist of multiple local markets. In total, we have 2,390 or 93% of all townships left for analysis, with an average population size of around 3,000. To control for potentially relevant cultural and economic differences between the two main Belgian regions, i.e. the Dutch-speaking Northern part (Flanders) and the French-speaking Southern part (Wallonia), we also include an additional region dummy variable.

4.2.2. Dependent variable

Data on the number of video stores operating in each local market (township) was obtained from a specialized data provider, which derived the information primarily from the Yellow Pages. Information from the Yellow Pages was also used to identify the relevant stores in a trading zone by Campo et al. (2000), Mortimer (2004) and Seim (2001), among others. These data were extensively cross-validated (and in a limited number of instances, extended) with addresses obtained from the websites of Belgian video-store chains, contacts with film distributors, and field research. Summary statistics on the relative occurrence of various market structures are given in Table 2. A majority of the townships (80%) does not have a

[4] In this setting, the limited distance to a local video store is even more relevant, as each interaction requires two contacts (renting plus returning of the video).

local video store, while other market structures reflect a monopoly or duopoly situation (276 and 120 cases, respectively). There are 40 local markets with three stores and 33 markets with more than three stores. As there are few observations with more than four videos stores, we combine these observations in a single 4+ category. A similar practice was adopted in Bresnahan and Reiss (1991) and Manuszak (2002).

[Insert Table 2 about here]

4.2.3. Explanatory variables

Data on the local markets' demographic characteristics was obtained through the Belgian National Institute of Statistics (NIS). Some of the information was only available at a higher level of aggregation (e.g. municipality or ZIP-code level), in which case the corresponding value was assigned to each local market in that municipality or ZIP-code area (see Bresnahan and Reiss (1991) or Manuszak (2002) for a similar practice).

Following Genesove (2004), we measure the population size of a trading zone through the log of its number of inhabitants (in 1,000). As in Macé and Neslin (2004) and Pfann and Van Kranenburg (2003), we operationalize household size as the average number of people per household (based on per-municipality data). Income information was obtained from per-municipality tax-declaration data. In line with Gijsbrechts, Campo and Goossens (2003), we measure a market's income distribution through two variables, capturing the percentage of tax declarations with a low (i.e. <$ 13,400) and high (i.e. > $ 26,800) net income. These cut-off values are driven by the income classes reported by the Belgian NIS. Census information is used to derive the age and ethnic composition of the different local markets. Following Abraham, Gaynor and Vogt (2003) and Campo et al. (2000), we proxy age by the percentage of people older than 64 years. The ethnic composition of the market is operationalized as the percentage of foreigners living in a given local market. In line with Campo et al. (2000), we

constructed, using a typology proposed in Van Hecke (1998), a dummy variable to identify highly urbanized areas.[5] Finally, a dummy variable is included to indicate whether the considered township is located in Flanders.

To quantify the extent of inter-channel competition, two additional variables are introduced. First, we construct a dummy variable indicating whether a movie theatre is situated in a municipality within 7 miles of the center of the municipality to which a given township belongs on the basis of data provided by the NIS. The seven-mile cutoff value is based on industry reports which indicate that moviegoers are, on average, willing to travel 7 miles to go to a movie theatre (Newspaper Society, 2000).[6] Information on the extent of competition from premium cable (at the zipcode level) was only available for Wallonia, the Southern part of the country. The variable was operationalized as the percentage of households in the zipcode with a premium-cable subscription. Data were provided by Canal+ Wallonia, the only provider of premium cable in the region. Summary statistics on the various explanatory variables are given in Table 3.

[Insert Table 3 about here]

5. EMPIRICAL RESULTS

Table 4 presents the parameter estimates based on the ordered probit model as outlined in Section 2. Calculated Variance Inflation Factors were all well below the critical threshold of 10, indicating that there was no serious multicollinearity problem (Gujarati, 1995). The first two columns focus on the effects of intra-channel competition and upward inter-channel competition (movie theatres), with and without accounting for socio-demographics. These specifications are based on the full sample, i.e. both the region of Flanders and Wallonia. The

[5] Van Hecke (1998) classifies Belgian municipalities on the basis of degree of equipment (e.g. schools, transportation, hospitals). Three types of municipalities are considered to have a high degree of urbanization: large, regional and small cities.

[6] Results, not reported here, show that the findings on inter-channel competition hold with deviations of one mile above and below this cutoff point.

third column presents the results from a specification that also considers the role of downward inter-channel competition (premium cable). Since information on premium-cable subscriptions was not available for Flanders, the estimates in the third column are based on the sample for Wallonia only. Table 5 subsequently presents the estimated entry thresholds and threshold ratios implied by the estimates of the three specifications in Table 4.

[Insert Tables 4 and 5 about here]

5.1. Intra-channel competition

To discuss our findings on intra-channel competition, i.e. competition between videos stores in the same local market, we first discuss the results of specification (1), which is based on the full sample, excluding the demographic information. We subsequently address the robustness of our findings when socio-demographic information is included.

As mentioned in section 2.2, the estimated fixed effects λ^n measure the impact of competition on firm performance. As indicated earlier, a positive difference between λ^n and λ^{n-1} can be interpreted as evidence that entry has a negative effect on performance. The results show that the differences are always positive. For example, the difference between λ^2 and λ^1 is 2.92 – 1.91=1.01. To better interpret the parameters, we turn to the more informative competition measures, i.e. the entry thresholds S^n and implied entry-threshold ratios R^n, which are computed from the λ^n; see equations (5) and (6) and the earlier discussion in section 2.1.. The first panel in Table 5 shows the entry-threshold levels S^n (computed for an average market). Specification (1) implies that a monopolist needs a market size of approximately 5,100 inhabitants to break even. The break-even market sizes for a duopoly, and markets with three and four or more firms are, respectively, around 11,600, 22,900 and 37,700. This shows that market size needs to increase disproportionally to support

additional entry, suggesting that intra-channel competition is indeed a constraint on firm performance.

The entry-threshold ratios R^n show this more accurately. The entry-threshold ratio for a duopoly relative to a monopoly is equal to 1.13. In words, this says that the per-firm minimum required market size to support a duopoly market structure is 13% larger than the market size required to support a monopoly. The entry-threshold ratios for subsequent entry are respectively 1.31 and 1.24: the per-firm market size should increase by an additional 31% to support three firms, and by an additional 24% to support four or more firms. Wald tests confirm that the ratios are all significantly above one. Hence, we find that intra-channel competition has a significant negative effect on firm performance. For the smaller market structures, these findings on the effects of entry on competition are in line with Asplund and Sandin (1999), Bresnahan and Reiss (1991), and Manuszak (2002). However, in contrast to Asplund and Sandin (1999) and Bresnahan and Reiss (1991), we still find threshold ratios significantly above one for the larger market structures, indicating that additional entry in markets which already have three stores still increases the extent of competition. Our findings imply that the models of contestable markets (in which a monopoly is sufficient for perfect competition) or of perfectly sustainable collusion can be rejected. In addition, the Bertrand model with homogeneous products can also be rejected (since that model would imply that all the effects of entry on competition would take place upon entry in a monopoly market).

The observed pattern of the entry-threshold ratios gives interesting additional findings. We tested whether the consecutive per-firm entry-threshold ratios differ significantly from each other, i.e. whether $R^{n-1} = R^n$. As shown in the third panel of Table 5, the first entry-threshold ratio R^2 is significantly smaller than R^3 ($\chi^2(1) = 4.29$, $p = 0.04$), implying that a shift from monopoly to duopoly has a lower impact on competition than a shift to a market structure with three firms. The third and fourth ratios do not differ significantly from each

other (χ^2 *(1)* = 0.34, p = 0.56). This pattern is inconsistent with traditional models of oligopolistic competition, such as the Cournot model or Bertrand model with differentiated products, which have the property of smoothly declining entry-threshold ratios. The pattern is, however, consistent with models with imperfectly sustainable collusion. Recent experimental research by Huck, Normann and Oechssler (2004) has shown that collusion can be sustained in a duopoly, while it is never observed in market structures with more firms, thereby confirming the general belief that cooperative behavior should be expected in small groups, whereas in large groups non-cooperative behavior should prevail. Our estimated threshold ratios are consistent with this pattern, since the entry-threshold ratio is largest when shifting from a duopoly market to a market with three firms (ratio = 1.31).

Our main findings on intra-channel competition, as summarized by the entry-threshold ratios R^n, remain very robust in the second specification, which includes the socio-demographic variables. Indeed, even though the socio-demographic control variables somewhat affect the estimated threshold values (i.e. the S^n), the threshold ratios (i.e. the R^n), which are central to our inferences on the extent of competition, are very robust across specifications.

5.2. Upward inter-channel competition

Specification (1) in Table 4 shows that the presence of competition from an upward channel, i.e. a nearby movie theatre, has a significantly negative impact on the performance of video stores (point estimate of $\gamma_{Theatre}$ is –0.17, p = 0.03). Our results on the competitive impact from the upstream channel extends previous work by Lehmann and Weinberg (2000). They found cannibalization effects from earlier theatre visits on the subsequent rental performance of the same movie. Our results show that the cannibalization effect of movie theatres extends

beyond this direct (same-movie) effect, and affects the overall performance of video stores in the theatre's trading zone as well.

To better interpret the extent of inter-channel competition, one may compute the entry-threshold levels S^n separately for markets with and without a movie theatre.[7] The computations show that the market size required to support a monopoly video store when a movie theatre is present is equal to 5,331 inhabitants as opposed to 4,659 when this is not the case. Similarly, the market size required to support a duopoly when a movie theatre is present is equal to 12,076 inhabitants, and 10,554 if this is not the case.

Finally, one can also re-interpret the movie-theatre parameter $\gamma_{Theatre}$ more compactly as the percentage market-size increase required for a particular number of firms to break even when there is inter-channel competition (independent of whether inter-channel competition occurs in a monopoly, duopoly or otherwise). The parameter estimate of -0.17 implies that the percentage market-size increase required to support any market structure in the presence of inter-channel competition is 14%.[8] We can compare this with our previous findings on intra-channel competition: inter-channel competition appears to have a comparable percentage effect on firm performance as a shift from monopoly to duopoly (which was 13%), but a lower effect than shifts to market structures with more competition. In this sense, the impact of inter-channel competition is as strong as the impact of intra-channel competition in a duopoly market, but weaker than the additional impact of a new entrant in less concentrated markets.

Note that also the effect of upward inter-channel competition is robust in the second specification, which includes socio-demographic variables.

---

[7] Our estimates of threshold values S^n in Table 5 were based on a representative average market, with an average movie theatre presence equal to 0.72. Our calculations in this paragraph separately distinguish between markets with and without a movie theatre.

[8] This can be derived by computing the ratio of threshold values S^n with and without a movie theatre. It is straightforward to derive that this ratio is given by $\exp(-\hat{\gamma} / \hat{\alpha}) = \exp(0.17 / 1.24) = 1.14$.

5.3. Downward inter-channel competition

Next, we consider the impact of downward inter-channel competition, i.e. competition between the video stores and channels lower in the distribution chain. As discussed in section 3.1.2., video stores possibly face downward inter-channel competition from premium cable. We assessed the impact of premium cable on video-store performance using the Wallonia sample (n = 1,338) only, since data on the number of subscriptions to premium cable was only available for this region. The third specification in Tables 4 and 5 shows the results. It is the analogue of the second specification, but estimated on the limited sample of Wallonia only. Before discussing the role of downward inter-channel competition, note that the other results regarding intra-channel and upward inter-channel competition are essentially robust. Regarding intra-channel competition, the threshold ratios are usually still significantly above one.[9] Furthermore, the threshold ratio for adding a second store R^2 is again significantly below the entry threshold for adding a third store R^3 ($\chi^2(1) = 2.87$, $p = 0.09$), consistent with our explanation that collusion may be more difficult to sustain from the third store onwards. Finally, it is still the case that R^3 is not significantly different from R^4 ($\chi^2(1) = 0.19$, $p = 0.66$). Regarding upward inter-channel competition, the point estimate for the presence of a video store is very similar (-0.16 instead of –0.17). The standard error becomes larger (due to the more limited number of observations), but significance still holds at the 10% level ($p = 0.10$).

For the role of downward inter-channel competition, we look at the parameter estimate for premium cable. We find that the percentage of households with a subscription to premium cable does not have a significant effect on the performance of video stores (point

[9] The only exception is the entry-threshold ratio when shifting from monopoly to duopoly. This threshold is still above one, though not significantly so. This can, however, be attributed to the lower number of observations in the limited Wallonia sample.

estimate of 1.01, $p = 0.45$). Hence, there appears to be no cannibalization by the downward distribution channel, in contrast with our finding on the upward distribution channel.

Our findings on inter-channel competition extend Lehmann and Weinberg's (2000) argumentation that customers that have already bought the product may subsequently leave the market, resulting in downward cannibalization. On the other hand, the absence of an effect from the downstream channel (premium cable), shows that customers do not postpone their purchase in anticipation of a price decrease, as was suggested by Purohit (1997). This is a reassuring finding for movie studios, as their margin is largest for channels highest in the sequence (Doyle, 2002).

5.4. Socio-demographic control variables

Specification (2), for the full sample, and specification (3), for Wallonia only, include socio-demographic variables. As indicated before, their inclusion did not affect our substantive implications on the nature of intra- and inter-channel competition.

In line with earlier findings from the micro-marketing literature (e.g. Campo et al., 2000; Hoch et al., 1995, and Montgomery, 1997), we find that socio-demographic variables have an important effect on store profit. Specification (2) in Table 4 shows that the addition of socio-demographic variables increases the model fit (*pseudo* R^2 of 0.39 instead of 0.37 in the first specification). A likelihood-ratio test shows a highly significant joint effect of the socio-demographic variables ($p < 0.001$). Specification (3), for the sample of Wallonia only, again shows that the fit increases when socio-demographic variables are included. A likelihood-ratio test confirms that the demographics are again jointly significant ($p = 0.003$).

We base our discussion regarding the socio-demographic variables on specification (2).[10] The effect of *income* appears to be dual. Both markets with many low-income families and markets with many high-income families are associated with a significantly lower video-store performance, as compared to markets with more intermediate-income families ($p = 0.01$ and 0.05, respectively). For families at the lower tail of the income distribution, the traditional income effect may hold: they may have to cut back on entertainment and spend their income on necessary goods. For the higher incomes, the substitution effect comes into play. They may spend their budget on more expensive forms of entertainment. The latter finding is in line with recent industry reports that conclude that high-income segments have a lower propensity to rent videos (VSDA, 1998).

Larger families appear to spend more on video rental ($p = 0.03$). As larger families are typically families with children, this result is consistent with industry reports that found that families with children rent far more videos than other households (VSDA, 1998). The percentage of *foreigners* in a market has a negative influence on video-store profit ($p = 0.02$). This confirms our prior argumentation that foreigners may face economic, cultural or linguistic barriers that prevent them from renting videos. *Elderly* increase the profitability of a video store, as is indicated by the significant positive effect of the percentage of older people ($p < 0.001$), which may be explained by their typically larger amount of leisure time (Vogel, 2001). In line with the findings of industry reports (VSDA, 1998), people in *urban* surroundings rent more videos, thereby increasing video-store profitability ($p = 0.02$). Finally, also *regional differences* turn out to be important, as the parameter associated with this control variable was highly significant ($p < 0.001$).

[10] Most of these findings are robust when only the results for the limited sample of Wallonia are considered, even though some of the demographic effects become insignificant due to the reduced number of observations. Specifically, the effect of age and the degree of urbanization remain significant, while both the effects of household size and the percentage of foreigners are comparable in sign and size to the results from the larger sample.

6. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Local-service sectors have been largely neglected in the widely-studied field of competitive interactions. This may be attributed to the fact that detailed data gathering in these sectors is typically difficult because of the multitude of players, and the fact that key service components are hard to quantify. An empirical entry model is proposed to study competition in local-service sectors by inferring information on the profitability and the degree of competition from the observed entry decisions of firms in local markets. This approach, which imposes very few data demands, does not only allow us to infer information on the relative degree of intra-channel competition in different market structures, but also to measure the effect of up- and downstream inter-channel competition, as well as of various socio-demographic factors, on a service store's performance.

In our application on the Belgian video-rental market, we find that intra-channel competition increases with every entry. However, contrary to predictions from most traditional economic models, we find that this increase is larger when entry occurs in a duopoly than in a monopoly. The observed pattern is consistent, however, with recent experimental research on collusion in oligopolies by Huck, Normann and Oechssler (2004). Moreover, we also find evidence for inter-channel competition from the upstream channel (movie theatre). Premium cable, on the other hand, does not impact video-store performance significantly. In line with the micro-marketing literature, we also find that socio-demographic characteristics of the local market have an important effect on store performance. Specifically, we find that the percentage of both low-income and high-income families have a negative effect on video-store performance. Also the percentage of foreigners was found to influence video-store performance negatively. Larger families and families in urban surroundings, on the other hand, are found to rent more movies.

Our framework allows us to infer the nature of competition in local-service markets without very stringent data requirements. In so doing, some implicit assumptions were made which could be relaxed in future research. First, firms in a given market are assumed to be homogeneous. Despite the fact that video stores offer a relatively homogenous product, store organization as well as economies of scale in inventory management and/or advertising could result in different demand and cost structures between independent and chain-affiliated video stores (Seim 2001). However, our homogeneity assumption may still hold in most European countries where video chains are limited in size (number of stores). In Belgium, for example, the largest chain has only 60 stores, which is hardly comparable to American chains as Blockbusters and Hollywood Entertainment with, respectively, 5,000 and 1,800 video stores (Seim, 2001). Still, more research is needed to relax this assumption when chains get larger. In principle, one could follow the approach of Mazzeo (2002) and explicitly account for different types of video stores (independent versus chain-affiliated stores). For this particular application, however, this did not provide a feasible option, as very few stores belong to a chain (only 8% of all Belgian video stores). This would imply very limited variation across different market structure combinations (as defined by the number of stores of each type). Second, the various markets in our sample are assumed to be non-overlapping. To that extent, we omitted larger cities from our sample, and focused on townships, rather than the larger municipalities, as relevant geographical entity. However, some overlap may still exist in a number of instances; for example, when transient shoppers patronize video stores on their route to work rather than in their home's township (Gijsbrechts, Campo and Goossens, 2003). To mitigate this effect, one could follow Bresnahan and Reiss (1991), and include socio-demographic characteristics of the neighboring townships as additional control variables in Equation (4). Third, the nature of competition is inferred under a steady-state, equilibrium, condition. Even though this assumption may be reasonable for mature industries as the video-

rental sector, the nature of competition may, in some instances, evolve over time (see e.g. Sudhir, Chintagunta and Kadiyali, 2005). Such time variation cannot be inferred from a one-shot analysis.

Another avenue for future research involves the application of our framework to other countries and/or other local-service sectors (s.a. restaurants and hotels), which would allow to see whether some of our substantive implications on the nature of both intra- and inter-channel competition are idiosyncratic to this specific setting, or form the onset of empirical generalizations.

REFERENCES

Abraham, Jean Marie, Martin Gaynor, and William B. Vogt. (2003). "Entry and Competition in Local Hospital Markets", Working Paper, pp. 29.

Asplund, Marcus and Rickard Sandin. (1999). "The Number of Firms and Production Capacity in Relation to Market Size", Journal of Industrial Economics, 47 (1), 69-85.

Baumol, William Jack, John C. Panzar, and Robert D. Willig. (1982). Contestable Markets and the Theory of Industrial Structure. New York: Harcourt Brace Jovanovich.

Biyalogorsky, Eyal and Prasad Naik. (2003). "Clicks and Mortar: The Effect of On-line Activities on Off-line Sales", Marketing Letters, 14 (1), 21-32.

Boatwright, Peter, Sanjay Dhar, and Peter E. Rossi. (2004). "The Role of Retail Competition, Demographics and Account Retail Strategy as Drivers of Promotional Sensitivity", Quantitative Marketing and Economics, 2 (2), 169-190.

Bresnahan, Timothy F. and Peter C. Reiss. (1991). "Entry and Competition in Concentrated Markets", Journal of Political Economy, 99 (5), 977-1009.

Bronnenberg, Bart J. and Carl F. Mela. (2004). "Market Roll-Out and Retailer Adoption for New Brands", Marketing Science, 23 (4), 500-518.

Cabral, Luís M.B. (2000). Introduction to Industrial Organization. Cambridge (Mass.): MIT Press.

Campo, Katia, Els Gijsbrechts, Tom Goossens, and A. Verhetsel. (2000). "The Impact of Location Factors on the Attractiveness and Optimal Space Shares of Product Categories", International Journal of Research in Marketing, 17 (4), 255-279.

D'Aspremont, Claude and Jean Jaskold Gabszewicz. (1985). "On the Stability of Collusion". In Joseph E. Stiglitz and G. Frank Mathewson (eds.), New Developments in the Analysis of Market Structure. Cambridge (Mass.): MIT Press.

Deleersnyder, Barbara, Inge Geyskens, Katrijn Gielens, and Marnik G. Dekimpe. (2002). "How Cannibalistic is the Internet Channel? A Study of the Newspaper Industry in the United Kingdom and The Netherlands", International Journal of Research in Marketing, 19 (4), 337-348.

Dhar, Sanjay K. and Stephen J. Hoch. (1997). "Why Store Brand Penetration Varies by Retailer", Marketing Science, 16 (3), 208-227.

Doyle, Gillian. (2002). Understanding Media Economics. London: Sage Publications.

Elberse, Anita and Jehoshua Eliashberg. (2003). "Demand and Supply Dynamics for Sequentially Released Products in International Markets: The Case of Motion Pictures", Marketing Science, 22 (3), 329-354.

Eliashberg, Jehoshua, Jedid-Jah Jonker, Mohanbir S. Sawhney, and Berend Wierenga. (2000). "MOVIEMOD: An Implementable Decision-Support System for Prerelease Market Evaluation of Motion Pictures", Marketing Science, 19 (3), 226-243.

Eurostat. (2002). "Eurostat statistics on Industry, Trade and Services".

Floyd, Myron F., Kimberly J. Shinew, Francis A. McGuire, and Francis P. Noe. (1994). "Race, Class, and Leisure Activity Preferences: Marginality and Ethnicity Revisited", Journal of Leisure Research, 26 (2), 158-173.

Frazier, Gary L. (1999). "Organizing and Managing Channels of Distribution", Journal of the Academy of Marketing Science, 27 (2), 226-240.

Fuentelsaz, Lucio, Jaime Gomez, and Yolanda Polo. (2002). "Followers' Entry Timing: Evidence from the Spanish Banking Sector after Deregulation", Strategic Management Journal, 23 (3), 245-264.

Gatignon, Hubert, Jehoshua Eliashberg, and Thomas S. Robertson. (1989). "Modeling Multinational Diffusion Patterns: An Efficient Methodology", Marketing Science, 8 (3), 231-247.

Genesove, David. (2004). "Why are there so few (and fewer and fewer) Two-Newspaper Towns?", Working Paper, pp.51.

Gielens, Katrijn and Jan-Benedict E.M. Steenkamp. (2004). "What Drives New Product Success? An Investigation across Products and Countries", MSI-report nr. 04-108.

Gijsbrechts, Els, Katia Campo, and Tom Goossens. (2003). "The Impact of Store Flyers on Store Traffic and Store Sales: a Geo-Marketing Approach", Journal of Retailing, 79 (1), 1-16.

Gomery, Douglas. (1993). "Who Owns the Media ?". In Alison Alexander, James Owers and Rodney Carveth (eds.), Media Economics Theory and Practice. Hillsdale (NJ): Lawrence Erlbaum Associates.

Gujarati, Damodar N. (1995). Basic Econometrics (3rd edition). New York (N.Y.): McGraw-Hill.

Hanssens, Dominique M., Leonard J. Parsons, and Randall L. Schultz. (2001). Market Response Models: Econometric and Time Series Analysis (2nd ed.). Boston (Mass.): Kluwer.

Hoch, Stephen J., Byung-Do Kim, Alan L. Montgomery, and Peter E. Rossi. (1995). "Determinants of Store-Level Price Elasticity", Journal of Marketing Research, 32 (1), 17-29.

Huck, Steffen, Hans-Theo Normann, and Jörg Oechssler. (2004). "Two are Few and Four are Many: Number Effects in Experimental Oligopolies", Journal of Economic Behavior and Organization, 53 (4), 435-446.

IVF (International Video Federation). (2003). “The European Video Yearbook”, Brussels.

Johnson, Maureen. (1997). “The Application of Geodemographics to Retailing: Meeting the Needs of the Catchment”, Journal of the Market Research Society, 39 (1), 203-224.

Kadiyali, Vrinda, Pradeep Chintagunta, and Naufel Vilcassim. (2000). “Manufacturer-Retailer Channel Interactions and Implications for Channel Power: An Empirical Investigation of Pricing in a Local Market”, Marketing Science, 19 (2), 127-148.

Kadiyali, Vrinda, K. Sudhir, and Vithala R. Rao. (2001). “Structural Analysis of Competitive Behavior: New Empirical Industrial Organization Methods in Marketing”, International Journal of Research in Marketing, 18 (1-2), 161-186.

Kim, Namwoon and Philip M. Parker. (1999). “Collusive Conduct in Private Label Markets”, International Journal of Research in Marketing, 16 (2), 143-155.

Leeflang, Peter S.H. and Dick R. Wittink. (1992). “Diagnosing Competitive Reactions Using (Aggregated) Scanner Data”, International Journal of Research in Marketing, 9 (1), 39-57.

Leeflang, Peter S.H. and Dick R. Wittink. (1996). “Competitive Reaction versus Consumer Response: Do Managers Overreact?”, International Journal of Research in Marketing, 13 (2), 103-119.

Lehmann, Donald R. and Charles B. Weinberg. (2000). “Sales Through Sequential Distribution Channels: An Application to Movies and Videos”, Journal of Marketing, 64 (3), 18-33.

Macé, Sandrine and Scott A. Neslin. (2004). “The Determinants of Pre- and Postpromotion Dips in Sales of Frequently Purchased Goods”, Journal of Marketing Research, 41 (3), 339-350.

Manuszak, Mark D. (2002). “Endogenous Market Structure and Competition in the 19th Century American Brewing Industry”, International Journal of Industrial Organization, 20 (5), 673-692.

Mazzeo, Michael J. (2002). “Product Choice and Oligopoly Market Structure”, RAND Journal of Economics, 33 (2), 221-242.

Montgomery, Alan L. (1997). “Creating Micro-Marketing Pricing Strategies Using Supermarket Scanner Data”, Marketing Science, 16 (4), 315-337.

Mortimer, Julie Holland. (2004). “Vertical Contracts in the Video Rental Industry”, Working Paper, pp. 63.

MPA (Motion Picture Association). (2003). “US Entertainment Industry: 2003 MPA Market Statistics”, Encino (CA).

Mulhern, Francis J., Jerome D. Williams, and Robert P. Leone. (1998). "Variability of Brand Price Elasticities across Retail Stores: Ethnic, Income, and Brand Determinants", Journal of Retailing, 74 (3), 427-446.

Newspaper Society. (2000). "Consumers Choice IV Pocketbook 2000", London.

Nijs, Vincent R., Marnik G. Dekimpe, Jan-Benedict E.M. Steenkamp, and Dominique M. Hanssens. (2001). "The Category-Demand Effects of Price Promotions", Marketing Science, 20 (1), 1-22.

Parasuraman, A., Valarie A. Zeithaml, and Leonard L. Berry. (1988). "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality", Journal of Retailing, 64 (1), 12-40.

Pauwels, Koen and Shuba Srinivasan. (2004). "Who Benefits from Store Brand Entry?", Marketing Science, 23(3), 364-390.

Pesendorfer, Wolfgang. (1995). "Design Innovation and Fashion Cycles", American Economic Review, 85 (4), 771-792.

Pfann, Gerard A. and Hans Van Kranenburg. (2003). "Tax Policy, Location Choices, and Market Structure", Journal of Law and Economics, 46 (1), 61-83.

Prasad, Ashutosh, Bart Bronnenberg, and Vijay Mahajan. (2004). "Product Entry Timing in Dual Distribution Channels: The Case of the Movie Industry", Review of Marketing Science, 2, 1-18.

Purohit, Devavrat. (1997). "Dual Distribution Channels: The Competition Between Rental Agencies and Dealers", Marketing Science, 16 (3), 228-245.

Roy, Abhik, Dominique M. Hanssens, and Jagmohan S. Raju. (1994). "Competitive Pricing by a Price Leader", Management Science, 40 (7), 809-823.

Rust, Roland T., Anthony J. Zahorik, and Timothy L. Keiningham. (1996). Service Marketing. New York (N.Y.): HarperCollins.

Seetharaman, P.B. and Pradeep K. Chintagunta. (1998). "A Model of Inertia and Variety-Seeking with Marketing Variables", International Journal of Research in Marketing, 15 (1), 1-17.

Seim, Katja. (2001). "Spatial Differentiation and Market Structure: The Video Retail Industry", Unpublished Phd Dissertation, Yale University, pp.119.

Shankar, Venkatesh. (1997). "Pioneers' Marketing Mix Reactions to Entry in Different Competitive Game Structures: Theoretical Analysis and Empirical Illustration", Marketing Science, 16 (3), 271-293.

Smith, Amy K. and Ruth N. Bolton. (1999). "A Model of Customer Satisfaction with Service Encounters Involving Failure and Recovery", Journal of Marketing Research, 36 (3), 356-372.

Steenkamp, Jan-Benedict E.M., Vincent R. Nijs, Dominique M. Hanssens, and Marnik G. Dekimpe. (2005). "Competitive Reactions to Advertising and Promotion Attacks", Marketing Science, 24(1), 35-54.

Sudhir, K. (2001). "Competitive Pricing Behavior in the Auto Market: A Structural Analysis", Marketing Science, 20 (1), 42-60.

Sudhir K., Pradeep K. Chintagunta, and Vrinda Kadiyali (2005), "Time Varying Competion", Marketing Science, 24(1), 96-109.

Swami, Sanjeev, Jehoshua Eliashberg, and Charles B. Weinberg. (1999). "SilverScreener: A Modeling Approach to Movie Screens Management", Marketing Science, 18 (3), 352-372.

Tirole, Jean. (1988). The Theory of Industrial Organization. Cambridge (Mass.): MIT Press.

United Nations Statistics. (2001). "National Accounts Statistics: Main Aggregates and Detailed Tables", New York, NY.

Van Hecke, Etienne. (1998). "Actualisering van de Stedelijke Hiërarchie in België", Tijdschrift van het Gemeentekrediet, 52 (3), 45-76.

van Heerde, Harald. J., Carl F. Mela, and Puneet Manchanda. (2004). "The Dynamic Effect of Innovation on Market Structure", Journal of Marketing Research, 41(2), 166-183.

Venkataraman, Sriram and Vrinda Kadiyali. (2004). "Price-Location Links in Consumer and Competitive Choices: An Application of the Generalized Nested Logit", working paper, pp.48.

Vogel, Harold L. (2001). Entertainment Industry Economics: A Guide for Financial Analysis (5th ed.). Cambridge: Cambridge University Press.

VSDA (Video Software Dealers' Assocation). (1998). "An Annual Report on the Home Video Market", Encino (CA).

Zeithaml, Valarie A. and Mary Jo Bitner. (2000). Services Marketing: Integrating Customer Focus across the Firm (2nd ed.). Boston (Mass.): Irwin/McGraw-Hill.

Zhu, Kevin. (2001). "Internet-Based Distribution of Digital Videos: the Economic Impacts of Digitization on the Motion Picture Industry", Electronic Markets, 11 (4), 273-280.

TABLES

Table 1: Comparison of Belgium with Western Europe

	Belgium	Western Europe[(c)]
Macro-economic indicators		
GDP/capita (2002, $)[(a)]	23,768	23,285
Wholesale, retail trade, restaurants, hotels as % of GDP (2002)[(a)]	12%	13%
Video-rental statistics		
VCR penetration (2002, % of TV households)[(b)]	79%	79%
DVD-player penetration (2002, % of TV households)[(b)]	17%	18%
Spending on video rental per TV household (2002, $)[(b)]	21	18
Number of rental transactions per TV household (2002)[(b)]	6	5
Average rental charges (2002, $)[(b)]	3.2	3.6

(a) United Nations Statistics.
(b) Own calculations based on numbers from the European Video Yearbook 2003, published by the International Video Federation (IVF).
(c) Following the IVF, we define Western Europe as the 15 countries of the European Union at the end of 2000, together with Iceland, Norway and Switzerland.

Table 2: Number of observations per market structure

Video Stores in Market	Number of Local Markets (percentage)	
0	1,921	(80%)
1	276	(12%)
2	120	(5%)
3	40	(2%)
4+	33	(1%)
Total	2,390	(100%)

Table 3: Descriptive statistics

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Inter-channel competition					
(Movie) Theatre	2,390	72%[(a)]			
Premium Cable	1,338[(b)]	19%	5%	0%	35%
Socio-demographic characteristics					
Population	2,390	3,030	4,433	14	41,481
Low Income	2,390	23%	4%	15%	37%
High Income	2,390	27%	5%	14%	42%
Household size	2,390	2.49	0.14	2.03	2.93
Age	2,390	16%	3%	7%	37%
Ethnicity	2,390	4%	5%	0%	59%
Urbanization	2,390	21%[(a)]			
Region	2,390	43%[(a)]			

(a) Dummy variables. We report the proportion of observations having the value 1.
(b) Information on premium-cable subscriptions applies only to townships in Wallonia. In addition, data were missing for 22 Walloon townships.

Table 4: Estimated parameters of expected-profit functions[(a)]

Coefficient	Specification		
	(1)	**(2)**	**(3)**
$\alpha_{\log(\text{Population})}$	1.24***	1.39***	1.18***
	(0.05)	(0.05)	(0.07)
λ_1	1.91***	3.13***	4.85***
	(0.09)	(1.09)	(1.56)
λ_2	2.92***	4.19***	5.80***
	(0.11)	(1.10)	(1.56)
λ_3	3.76***	5.08***	6.65***
	(0.13)	(1.10)	(1.57)
λ_4	4.38***	5.74***	7.45***
	(0.15)	(1.10)	(1.58)
γ_{Theatre}	-0.17**	-0.17**	-0.16*
	(0.09)	(0.09)	(0.13)
$\gamma_{\text{Premium Cable}}$	–	–	1.01
			(1.33)
$\beta_{\text{Household size}}$	–	0.78**	0.72
		(0.35)	(0.56)
$\beta_{\text{Low Income}}$	–	-3.58***	-0.58
		(1.42)	(1.83)
$\beta_{\text{High Income}}$	–	-2.10**	0.20
		(1.06)	(1.70)
β_{Age}	–	5.48***	8.23***
		(1.48)	(1.99)
$\beta_{\text{Ethnicity}}$	–	-1.63**	-0.41
		(0.70)	(1.04)
$\beta_{\text{Urbanization}}$	–	0.22**	0.27**
		(0.09)	(0.14)
β_{Region}	–	-0.67***	–
		(0.10)	
Pseudo R^2	0.37	0.39	0.36
Number of observations	2,390	2,390	1,338

(a) Standard errors between parentheses. *, ** and *** indicate a significant result at, respectively, 10%, 5% and 1% significance level. Reported significance tests are two-tailed, except for the effect of movie-theatre presence.

Table 5: Estimated threshold values (S_n) and ratios (R_n)

Variable	Specification		
	(1)	(2)	(3)
Threshold values			
S_1	5,133	4,638	4,386
S_2	11,628	9,969	9,829
S_3	22,877	18,922	20,106
S_4	37,708	30,597	39,744
Threshold ratios[(a)]			
R_2	1.13***	1.07*	1.12
	(6.85)	(2.67)	(2.03)
R_3	1.31***	1.27***	1.36***
	(17.35)	(14.91)	(6.87)
R_4	1.24***	1.21***	1.48**
	(6.82)	(6.21)	(4.07)
Test on ratios[(b)]			
$R_2 = R_3$	4.29**	6.12***	2.87*
$R_3 = R_4$	0.34	0.19	0.19

(a) Numbers between parentheses are the Wald test statistics for the null hypothesis that the ratio equals one. *,**,*** indicate significant effects at the 10%, 5% and 1% level.

(b) Numbers are the Wald test statistics for the null hypothesis that two consecutive ratios are equal to each other. *,**,*** indicate significant differences at the 10%, 5% and 1% level.

Publications in the Report Series Research* in Management

ERIM Research Program: "Marketing"

2005

Assessing Customer Evaluation and Revenue Consequences of Component Sharing Across Brands in the Vertical Product Line
Peter C. Verhoef and Koen H. Pauwels
ERS-2005-007-MKT

Intra- and Inter-Channel Competition in Local-Service Sectors
Kathleen Cleeren, Marnik G. Dekimpe And Frank Verboven
ERS-2005-018-MKT

---

* A complete overview of the ERIM Report Series Research in Management:
https://ep.eur.nl/handle/1765/1

ERIM Research Programs:
LIS Business Processes, Logistics and Information Systems
ORG Organizing for Performance
MKT Marketing
F&A Finance and Accounting
STR Strategy and Entrepreneurship