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OLIGOPOLY: EVIDENCE FROM  
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## ABSTRACT

### Price Discrimination in Oligopoly: Evidence from Swedish Newspapers\*

This Paper provides an empirical examination of third-degree price discrimination in the Swedish newspaper industry. The results show that price discrimination is more prevalent in competitive markets and among newspapers with low market shares. This supports predictions from recent theoretical work, including Chen (1997) and Fudenberg and Tirole (2000), that suggest that firms attempt to poach consumers from rivals by offering targeted discounts. In addition, we find weak evidence that newspapers in markets with large inflows of new consumers and those covering wide geographical areas offer more discounts.

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## **1. Introduction**

Treatments of price discrimination have, until recently, primarily focused on the monopolist's pricing decision. Casual observation, however, suggests that the practice of selling the same (or similar) product to different consumers at different prices is prevalent also in competitive environments. Lately, several studies have examined third-degree price discrimination in oligopoly, showing both the firms' incentives and the consequences for different consumer groups. The most striking contrasts to the monopoly case are when consumers in oligopoly markets differ in their relative valuations of the firms' products, due to differences in preferences or geographical location. When firms can condition their prices on e.g. each consumers location, the possibility arises that all equilibrium prices to be lower than under uniform pricing, which would never occur in a monopoly setting; Corts (1998). Thus, oligopoly firms' ability to price discriminate may actually hurt their profits, so that they would wish to pre-commit to non-discriminatory pricing. Another effect arises when firms can condition their prices on a consumer's purchasing history. For example, firm A may target firm B's consumers with discounts, as those customers have revealed that their valuations of firm A's product are low; see Fudenberg and Tirole (2000); Villas-Boas (1999). Alternatively, with switching costs, firm A needs to offer a lower price in order to induce any of firm B's consumers to switch; see Chen (1997), Shaffer and Zhang (2000); Taylor (2000). In either case, the incentive to offer discounts is decreasing in a firm's market share. Below, we discuss the various models and their empirical implications in more detail.

To our knowledge, the predictions from the new theoretical models have not been tested empirically. In this paper, we address this issue with evidence on third-degree price discrimination from Swedish newspaper markets, where some consumers are offered discounted subscriptions. The industry contains a large number of geographical markets, some of which have one local newspaper while others are large enough to support two. This variation in market structure, together with other market-specific factors, is used to explain the wide differences across newspapers in their use of discounts. In particular, we test whether newspapers with

a local rival sell more subscriptions at a discount than others. We also test if there is a relation between a firm's market share and its use of price discrimination.

Our results show that third-degree price discrimination is more widespread in markets with two newspapers. There is also evidence the smaller newspaper in these markets sells a greater fraction of its subscriptions at a discount. These results are related to some findings in studies of price dispersion in airline markets. For instance, Borenstein and Rose (1994) and Stavins (2000) find that price dispersion in ticket prices tends to increase with the number of airlines serving a route. However, such price dispersion is likely to follow primarily from second-degree price discrimination (due to various ticket restrictions, e.g. Saturday night stays) rather than from different prices for identical products, as in the case of our newspaper subscriptions.

## **2 Theories and Previous Empirical Studies**

Third-degree price discrimination by monopolies has been thoroughly studied; for references see Varian (1989). A monopolist who can identify consumer groups with different price sensitivity will always choose to price discriminate (provided that consumer arbitrage can be prevented), and thereby makes higher profits. In this section, we consider some of the additional effects arising in an oligopoly setting. We begin with a discussion of single-period price setting and then proceed to the multi-period case. First, however, note the close analogy between the monopolist's decision and an oligopoly firm's decision: holding the rivals' prices fixed, the firm has a residual demand curve for each consumer group and therefore always the incentives to price discriminate.

Holmes (1989) considers the case where the two consumer groups' preferences are symmetric such that, for both firms, demand in one of the markets is more price sensitive (the 'weak' market) than demand in the other (the 'strong' market). He shows that the uniform price in a duopoly will necessarily lie between the discriminatory prices, as in the monopoly case. Corts (1998) generalizes Holmes' model to allow for situations where the consumer groups have asymmetric rankings of the firms' products. In this case, the weak market for one firm is the strong market for the other, and vice versa. This opens the possibility that price discrimination

yields prices that are lower for both groups than the uniform price, with corresponding lower profits for everyone. Hence, firms would like to commit to a uniform pricing strategy if possible, and unilaterally employing such a strategy may even be profitable if pre-commitment is credible (such as a “no haggle” policy or an “everyday low price” program). From the firms’ point of view, the all-out competitive outcome exhibits too much price discrimination.

An example of asymmetric valuations is found in markets with spatial differentiation. For instance, consumers in town A may have a higher valuation of the product offered in their hometown than of an (physically) identical product in town B. Hence, a firm in town B would like to set a lower price in market A than in market B, and the incentives are reversed for the firm in town A. Using numerical simulations, Borenstein (1985) examines spatial price discrimination in a circular city model. His results show that consumers located further away from the firm, in the more competitive territory, will be offered lower prices. Related work by Lederer and Hurter (1986) considers spatial price discrimination in a more general setup.

In multi-period models the consumers’ previous purchasing behavior can be used to map them into categories that can be targeted with selective price offers (sometimes referred to as behavioral pricing).<sup>1</sup> The purchasing history is important for two reasons. First, it can reveal the customer’s willingness to pay, even though a purchase does not alter his future valuations. Second, in the presence of switching costs or habit formation, an earlier purchase changes the future valuations. If switching costs are split into transaction cost and learning costs, that are only incurred at the first switch to a seller, as in Nilssen (1992), the entire purchasing history for an individual influences the prices she is offered.

Fudenberg and Tirole (2000) use a two-period model to examine the case of pure behavioral pricing, i.e. where history only reveals information. The information from first period choices leaves the firm with two types of consumers in the second period: its own past customers and those of its competitor. The competitor’s customers have

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<sup>1</sup> “Behavioral pricing” is a not easily categorized into either second or third-degree price discrimination. Clearly identifiable customer categories are offered different prices by the firm, third-degree, but at an earlier stage consumers can, to some extent, self-select in which category they will eventually end up, second-degree. It is widely believed that the advent of the new information technology will better enable firms to tailor prices and offers based on past purchases or even browsing patterns.

revealed a lower willingness to pay for the firm's product and can thus be targeted with discounts in the second period, referred to as "poaching". A firm with a small revealed customer base will have a larger pool from which to poach and will exhibit a more aggressive discounting behavior, i.e. a small market share gives incentives to increased use of discounts. Villas-Boas (1999) extends the Fudenberg and Tirole model to an overlapping generations model and the general results remain unchanged. In equilibrium, each firm will offer discounts to the other firm's customers, and the firm with the smaller market share will use more discounts.

Chen (1997) studies a situation where there is a direct cost for switching to another supplier. He uses a two-period model of a duopoly where, in the second period, firms offer discounts to induce switching by customers attached to the other firm. Chen finds that both firms will offer discounts to customers with a history of purchasing from the other firm. In equilibrium, both firms will charge the same prices and give the same nominal discount. With asymmetric market shares, more customers will switch to the smaller firm and it will thereby sell a larger share of its output at a discount. Shaffer and Zhang (2000) extend the work of Chen (1997) by generalizing the demand side. They find that if the loyalties of customer groups differ, it may be optimal for a firm to offer discounts to its own customers (loyalty premiums) rather than poaching customers from competitors. Taylor (2000) extends Chen's (1997) work in another direction by allowing for an arbitrary number of periods and randomly varying switching cost. The modeling of many periods enables Taylor to be explicit about strategic switching on the consumer side. This occurs when a customer solely switches to establish a history of frequent switching, thereby securing better future offers from his suppliers. However, the basic results remain: firms will offer discounts to the other firm's current customers and the firm with a smaller market share will use more discounting.

Empirically, the existence of third-degree price discrimination is well documented for a variety of products, e.g. fresh fish (Graddy, 1996) and mortgage lending (Ladd, 1998). The studies of European car markets by Verboven (1996) and Goldberg and Verboven (2001) show that part of the cross-country price differentials are in fact due to third-degree price discrimination. However, these studies do not directly relate third-degree price discrimination to market structure. There are a

number of studies that analyze prices in the U.S. domestic flights markets. In a seminal paper, Borenstein and Rose (1994) find that when the number of competitors in a market grows, the observed price dispersion increases. The prices they analyze are a mix of a menu of fare classes available to everyone and special fares offered to exclusive groups. Thus, both second and third-degree price discrimination are observed and impossible to untangle. In addition, the price dispersion might be due to differences in the date when the ticket was bought and differences in travel agents' mark-ups. Using similar data, Stavins (2000) also finds that price discrimination increases with competition. She explains her finding by noting that increasing competition will have a larger competitive impact on the cheapest fares while more expensive tickets remain relatively unchanged. In the light of this, it is surprising that she finds that, conditional on market concentration, firms with larger market shares use more price discrimination.<sup>2</sup> However, the earlier study by Hayes and Ross (1998) does not find a straightforward connection between market shares and price dispersion.

As noted, the observed price dispersion in the airline industry is likely to be largely due to second-degree rather than third-degree price discrimination. Joyce (1990) provides a better example of the latter. He considers pricing of academic journals that are sold at higher prices to libraries than individuals. In particular, he examines the importance of market power, measured as the number of citations rather than market share, on the use of price discrimination. No clear relation between market power and the use of third-degree price discrimination is found, which might be attributed to the fact that the number of citations also measures other features than the market power.

### **3 Data Description**

We examine price discrimination using data from the Swedish daily newspaper industry, but restrict the attention to regional morning newspapers with three or more issues per week, which gives a sample of approximately 100 newspapers each year

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<sup>2</sup> This finding is mirrored in Giulietti (1999) who analyzes the Italian grocery trade and also finds that firms with larger market shares use more (second-degree) price discrimination.

for the period 1979-1994.<sup>3</sup> Subscriptions of a regional newspaper are physically identical products and, due to a subsidy scheme from the Swedish government, there are no differences in the cost of distribution. Hence, newspaper subscriptions in Sweden provide a clean case for studying price discrimination; the common objection that what appears to be price discrimination has cost based explanations, see Lott and Roberts (1991), thus being without bite. More detailed information on the industry can be found in Asplund et al. (2001).

The circulation figures, collected by Tidningsstatistik AB, distinguish between subscriptions sold at full price and those sold at a discount. A discount subscription is one sold at a price no more than 25 percent below the regular annual subscription price.<sup>4</sup> Our primary dependent variable, *DISCOUNTS*, is defined as the percentage of a newspaper's total circulation sold at no more than 25 percent discount. As seen in Table 1, the mean of *DISCOUNTS* is 6.3 percent. However, there is substantial variation across newspapers: from zero discount subscriptions up to 38 percent of the circulation. We also have information on a third category, which carries a discount above 25 percent. There is a potential risk of measurement errors in the number of highly discounted subscriptions, as these are not audited by Tidningsstatistik AB. Nevertheless, we define a broader measure of the use of price discrimination as the ratio of all subscriptions sold at a price below the regular price to the total circulation, denoted *DISCOUNTS\_ALL*. The mean of *DISCOUNTS\_ALL* is 9.5 percent, with a maximum of 47 percent. Newspapers that sell a large fraction at a low

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<sup>3</sup> We have excluded four evening newspapers, sold almost exclusively as single copies. The second group excluded is morning newspapers with coverage in a very large number of local markets. This group includes three large national morning newspapers, and two newspapers tied to religious and political organizations, which cover most of the country but have very low local market shares. Finally, we do not consider 39 newspapers (most of them with very low circulation) with only one or two issues per week, read as a local or political additive to a regular newspaper and viewed as distinctly different by government agencies and people involved in the industry. The exact numbers vary slightly over the years, the above numbers are for 1985.

<sup>4</sup> The discount cannot exceed 25 percent (until 1995) for a subscription to be counted as part of the newspapers' audited circulation. One possible reason for this is that advertisers place a lower valuation on readers of discounted subscriptions. In 1995, Tidningsstatistik AB changed its definition of the measured circulation and, as a consequence, started to subdivide the discounted subscriptions into those sold at 1-25 percent discount and those discounted by 25-50 percent.

discount also tend to sell a large fraction at a high discount (the raw correlation was 0.54 in 1985).<sup>5</sup>

Each of the newspapers in our sample covers a relatively small geographical area. Our market definition is based on Swedish municipalities; the most disaggregated regional classification for which demographic statistics is readily available. We define a newspaper's primary market to be the municipality where it has its largest circulation; the median newspaper has 62 percent of its total circulation in its primary market.<sup>6</sup> Its secondary markets are all other municipalities where it has a measured presence (more than 100 annual subscriptions).

The newspapers have very different market positions which, following the discussion in the previous section, may give rise to differences in their use of price discrimination. In 1985, there were 284 municipalities out of which 60 (23) were primary markets for one (two) newspaper(s); no municipality outside the three largest cities is the primary market for more than two newspapers. Municipalities with two newspapers usually have a larger population than those with one. The remaining municipalities are generally too small to support a local newspaper and are served by nearby newspapers as secondary markets. Newspapers facing no local competition in their primary market are presumably those with most market power, and we expect them to behave approximately as monopolists in their pricing decisions. We denote this category *MONOPOLY* and newspapers facing a local competitor as *DUOPOLY*. The latter category is split into three sub-categories based on the distribution of market shares.<sup>7</sup>

The market share variable, *MARKETSHARE*, is constructed as follows. We weigh the circulation of each newspaper that is present in a municipality (i.e. this includes national newspapers and others that are not included in our sample) with a factor  $X/7$ , where  $X$  is the number of issues per week. The newspaper's market share

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<sup>5</sup> Both measures are quantity based, rather than price based. As we do not know the exact distribution of the prices paid for subscriptions, we cannot calculate an exact measure of the value of discounts given. Hence, we cannot use the average price of a subscription as a fraction of the listed price as a dependent variable.

<sup>6</sup> In one case only does the municipality where a firm has its largest circulation change. Since this newspaper has roughly the same circulation in the two municipalities, we let its home market remain the same over the sample period.

is then its weighted circulation in its primary market divided by the total weighted circulation of all newspapers present in this municipality. Note that this definition can result in “monopoly” newspapers having relatively low market shares. This will happen when such a newspaper has three or four issues per week and there are national newspapers (with seven issues per week) with a strong presence in its primary market.<sup>8</sup>

In some primary markets, there are two newspapers with approximately equal market shares, denoted *DUOPSYMM*. These markets are considered to be the most competitive by the government agency Presstödsnämnden. In other duopoly markets, the small paper, *DUOPSMALL*, has below 40 percent of the market and the large, *DUOPLARGE*, usually 60-85 percent.

[FIGURE 1 ABOUT HERE]

Figure 1, which gives the relation between *DISCOUNTS* and *MARKETSHARE* for 1985, indicates that discounts are related to market share in the duopoly markets but not in the monopoly markets. The larger the market share of a duopoly firm the less discounts it uses.

[FIGURE 2 ABOUT HERE]

In Figure 2 we show the time pattern of *DISCOUNTS*, while Table 1 gives some descriptive statistics, for the different newspaper types. There is evidently some variation over time but the basic observation is that small duopolists tend to sell a far larger fraction of their subscriptions at a discount, on average 12.1 percent, than others. Monopolies and the large newspaper in an asymmetric duopoly are very similar. It is clear that there is a slight upward trend in the use of price discrimination for each of the newspaper types.

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<sup>7</sup> Two newspapers are exceptions to this. Falun is the primary market for Falu-kuriren, and Borlänge is the primary market for Dalademokraten, but both have a very strong presence in each other's primary market. We treat these as (symmetric) duopoly newspapers.

<sup>8</sup> The geographical distribution of the circulation is only available for 1979, 1982, 1985, 1988, 1992 and for 1996 whereas total circulation is available for each year. The market shares and total

As noted above, each newspaper is assigned a primary market but most also have a presence in nearby municipalities. The local content of the newspaper is focused on the primary market and therefore of less value to consumers at other locations. In order to sell in neighboring markets, newspapers can offer discounts on the subscription price. Unfortunately, the data does not include information on how discounted subscriptions are distributed across markets, so the only prediction we can test is that *DISCOUNT* is an increasing function of the newspaper's regional dispersion. Two measures are used to capture the effects of dispersion. The first measure is the logarithm of the number of markets where the newspaper sells more than 100 subscriptions, *LNMARKETS*; as seen in Table 1, the average newspaper is present in seven markets. A presence in many local markets may increase the potential for third-degree price discrimination based on location. The drawbacks of this measure are that it does not account for the firm's relative position in different markets and that markets of different size carry equal weight. One way of measuring differences in demand for a newspaper is to use differences in markets shares where it is present.<sup>9</sup> This is done by using the weighted mean deviation from the weighted average market share, *WMD*, which for newspaper *i*, active in markets  $m=1, \dots, M$  is defined as:

$$WMARKETSHARE_i = \sum_{m=1}^M MARKETSHARE_{i,m} \times \frac{CIRCULATION_{i,m}}{CIRCULATION_i}$$

$$WMD_i = \sum_{m=1}^M |MARKETSHARE_{i,m} - WMARKETSHARE_i| \times \frac{CIRCULATION_{i,m}}{CIRCULATION_i}$$

The value of *WMD* is zero if a newspaper has the same market share in all local markets, and a high value of *WMD* indicates presence in markets with differing demand conditions. Weighting by circulation in the calculation of *WMD* ensures that a deviation from the mean market share in a market where the firm has a large

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circulation are quite stable over the years so we have interpolated market shares, as well as the variables *LNMARKETS* and *WMD* (defined below), for the intermediate years.

<sup>9</sup> Clearly, differences in market shares across regions both reflect preferences and prices. We argue that the former is most important as most of the subscriptions are sold at full price, on average 90 percent, and discounts are relatively small (about two thirds are discounted by less than 25 percent).

circulation adds more to *WMD* than a deviation in a market where the firm has a low circulation.

[TABLE 1 ABOUT HERE]

One main group targeted with discounted subscriptions is people having recently moved into the region.<sup>10</sup> This is captured by the percentage of inhabitants that migrated into the primary market during the year, *IMMIG*. Our prediction is that *DISCOUNT* is increasing in *IMMIG*.

#### 4 Econometric Results

We estimate the use of discounts as a function of market position, the dispersion of circulation and the inflow of new customers using standard least squares regressions.<sup>11</sup> We estimate separate regressions for each year with the specification

$$DISCOUNTS = a + b_1 DUOPOLY + b_2 MARKETSHARE * MONOPOLY + b_3 MARKETSHARE * DUOPOLY + b_4 LNMARKETS + b_5 IMMIG + e.$$

Results for five of the years are given in Table 2; the results on the market structure variables for the other years are similar. This specification has also been estimated with the broader measure of discounts, *DISCOUNTS\_ALL*, as the dependent variable. The results of those regressions, given in Table A1 in the Appendix, show that the key parameters remain qualitatively unchanged.

In Table 2, the coefficient on *DUOPOLY* is positive and highly significant in each of the years. The interaction terms, *MARKETSHARE\*MONOPOLY* and *MARKETSHARE\*DUOPOLY*, allow the effects of market shares to be different for

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<sup>10</sup> National newspapers also offer discounts to students, but this is uncommon among local newspapers. We have, however, tried to explain the use of price discrimination by the fraction of young people in the primary market, but without obtaining significant results.

<sup>11</sup> The dependent variable is bounded between zero and one. As evident in Table 1, there are some zero observations, which suggest that a Tobit model, rather than a least squares estimator, should be used. However, zeros only constitute a few percent and our estimates from Tobit regressions are virtually identical to the OLS estimates reported.

monopolies and duopolies. The results show that the market share does not affect the use of discounts for newspapers without a local competitor, while it is very important for duopoly newspapers. The point estimates on *MARKETSHARE\*DUOPOLY* suggest that an increase in market share of ten percentage points decreases *DISCOUNT* by more than one percentage point. These results confirm the pattern in Figure 1.

[TABLE 2 ABOUT HERE]

The coefficients in Table 2, *LNMARKETS* and *IMMIG*, are only significant in some of the years and the point estimates are unstable. A further examination of the results for all the 16 years shows that *LNMARKETS* has a significant positive coefficient at the ten (five, one) percent level in eight years (four, one). The effect of dispersion is of a rather small magnitude. With a coefficient for *LNMARKETS* of 0.866, as in column 2:3, a doubling of the markets where a newspaper is present from seven (the sample mean) to 14 only increases *DISCOUNTS* by 0.6 percentage points. A similar examination shows that the coefficient on *IMMIG* is positive for all years but one and significant at the ten (five, one) percent level in six (four, two) of the years in the sample. This lends some, if weak, support to the notion that discounts are given to individuals moving into the local market in order to capture them for the future.<sup>12</sup>

The results for some alternative specifications, for 1985 data, are reported in Table 2. In (2:6), *LNMARKETS* is replaced with *WMD*, which also gives some weak support for the hypothesis of a positive relationship between dispersion and the use of discounts. With the same specification for the years 1979-1994, the coefficient for *WMD* is positive for all years, and significantly positive at the ten (five, one) percent level in nine (five, two). We interpret this result as giving statistically weak evidence of newspapers giving discounts to consumers in neighboring areas whose valuations are lower. In (2:7) and (2:8), *DUOPOLY* and the interaction terms are replaced by three dummy variables. The newspapers with the weakest market position,

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<sup>12</sup> We have experimented with panel regressions (not reported) with only *IMMIG* as the explanatory variable (there is little or no time variation in the other variables). Both a fixed effects and a random effects estimator gave a positive coefficient on *IMMIG* around 0.4, and significantly different from zero.

*DUOPSMALL*, and those in symmetric duopoly markets, *DUOPSYMM*, sell significantly more of their output at a discount price. Large duopoly newspapers, *DUOPLARGE*, do not use discounts to a significantly larger degree than monopolies.

## **5. Concluding Remarks**

Price discrimination in various guises exists in every industry and is used by virtually every firm. In this paper, we explain differences in the use of price discrimination across firms operating in the same industry, but in different geographical markets, by a number of firm- and market-specific factors. We analyze the use of discounts in the Swedish local newspaper markets. The observed price discrimination is third-degree, where firms can condition their prices on e.g. the buyer's geographic location or previous purchasing history.

We show that newspapers with a local monopoly position sell relatively fewer subscriptions at a discount than do others. Stated differently, competition tends to give rise to price discrimination beyond the optimal level for a monopoly. This implies that not only may competition have an effect on price levels, but also on the relative prices paid by different consumer groups. A further finding is that, in competitive markets, newspapers with low market shares sell a larger fraction of their subscriptions at a discount. This lends empirical support to the recent work by Chen (1997), Fudenberg and Tirole (2000), Taylor (2000), and Villas-Boas (1999). In their models, where a firm can target the buyers of a rival's product with low prices (referred to as "poaching"), it is the firm with the smallest customer base that has the strongest incentive to offer discounts to attract new customers.

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## Appendix

**Table A1. Least squares regression results with *DISCOUNT\_ALL* as the dependent variable, for different years and specifications**

	Main specification results for different years					Alternative specifications, 1985		
	<i>1979</i> (A1:1)	<i>1982</i> (A1:2)	<i>1985</i> (A1:3)	<i>1988</i> (A1:4)	<i>1992</i> (A1:5)	(A1:6)	(A1:7)	(A1:8)
<i>CONSTANT</i>	4.43 (2.99)	6.84** (2.69)	7.84 (2.65)	7.43 (3.01)	7.63 (4.10)	5.14** (2.59)	7.21*** (2.06)	6.17*** (1.95)
<i>DUOPOLY</i>	11.0*** (3.02)	14.6*** (2.64)	12.0*** (2.26)	13.7*** (2.79)	7.08* (4.05)	13.0*** (2.51)		
<i>MARKETSHARE</i> <i>*MONOPOLY</i>	-0.00209 (0.0313)	-0.00419 (0.0253)	-0.0135 (0.0228)	-0.0231 (0.0221)	-0.0484 (0.0437)	0.00636 (0.0212)		
<i>MARKETSHARE</i> <i>*DUOPOLY</i>	-0.157*** (0.0357)	-0.199*** (0.0256)	-0.184*** (0.0229)	-0.211*** (0.0432)	-0.140*** (0.0325)	-0.170*** (0.0231)		
<i>DUOPLARGE</i>							-0.519 (1.16)	0.196 (1.08)
<i>DUOPSYMM</i>							2.52** (0.987)	2.40** (0.907)
<i>DUOPSMALL</i>							9.99*** (1.58)	9.85*** (1.65)
<i>LNMARKETS</i>	-0.104 (0.724)	0.334 (0.806)	1.36** (0.611)	1.51** (0.659)	0.965* (0.523)		0.763 (0.578)	
<i>WMD</i>						0.104*** (0.0301)		0.0869*** (0.0315)
<i>IMMIG</i>	0.780** (0.659)	-0.495 (0.680)	-0.477 (0.592)	-0.0216 (0.554)	1.10* (0.647)	0.0234 (0.631)	-0.288 (0.612)	-0.119 (0.630)
Number of obs.	104	108	106	99	98	106	106	106
Adj R <sup>2</sup>	0.274	0.370	0.450	0.490	0.327	0.473	0.445	0.468

Standard errors, using White's robust covariance matrix, are in parenthesis.

Variables starred \*\*\* are significant at the 1% level, with \*\* at the 5% level and \* at the 10% level.

**Table 1. Descriptive statistics by market position (Standard errors in parenthesis)**

	<i>ALL</i>	<i>MONO- POLY</i>	<i>DUO- POLY</i>	<i>DUOP LARGE</i>	<i>DUOP SYMM</i>	<i>DUOP SMALL</i>	<i>Number of obs.</i>
<i>DISCOUNTS</i>	6.14 (4.67)	4.70 (3.29)	8.20 (5.51)	4.72 (2.97)	7.80 (5.07)	12.1 (5.39)	1594
max.	29.5	21.2	29.5	14.5	29.5	29.5	
min.	0	0	0	0	0	0	
<i>DISCOUNTS_ALL</i>	9.36 (5.67)	7.45 (3.73)	12.1 (6.79)	7.26 (3.36)	11.4 (5.56)	17.6 (6.50)	1594
max.	41.0	27.3	41.0	19.2	34.8	41.0	
min.	0	0	2.33	2.33	2.41	6.50	
<i>CIRCULATION</i>	22200 (18900)	17100 (13400)	29500 (22700)	43500 (26600)	22800 (11200)	22000 (20200)	1594
<i>MARKETSHARE</i>	60.7 (24.2)	68.2 (21.4)	50.2 (23.9)	73.5 (13.8)	52.7 (13.2)	24.1 (10.3)	1594
<i>LNMARKETS</i>	1.69 (0.760)	1.50 (0.638)	1.95 (0.842)	2.12 (0.798)	1.60 (0.825)	2.10 (0.804)	1594
<i>WMD</i>	20.0 (11.5)	18.9 (11.6)	21.5 (11.2)	16.4 (7.21)	21.4 (13.6)	26.9 (9.46)	1594
<i>IMMIG</i>	3.16 (0.756)	3.13 (0.742)	3.19 (0.775)	3.15 (0.798)	3.17 (0.735)	3.24 (0.789)	1594
<i>Number of obs.</i>	1594	936	658	224	213	221	

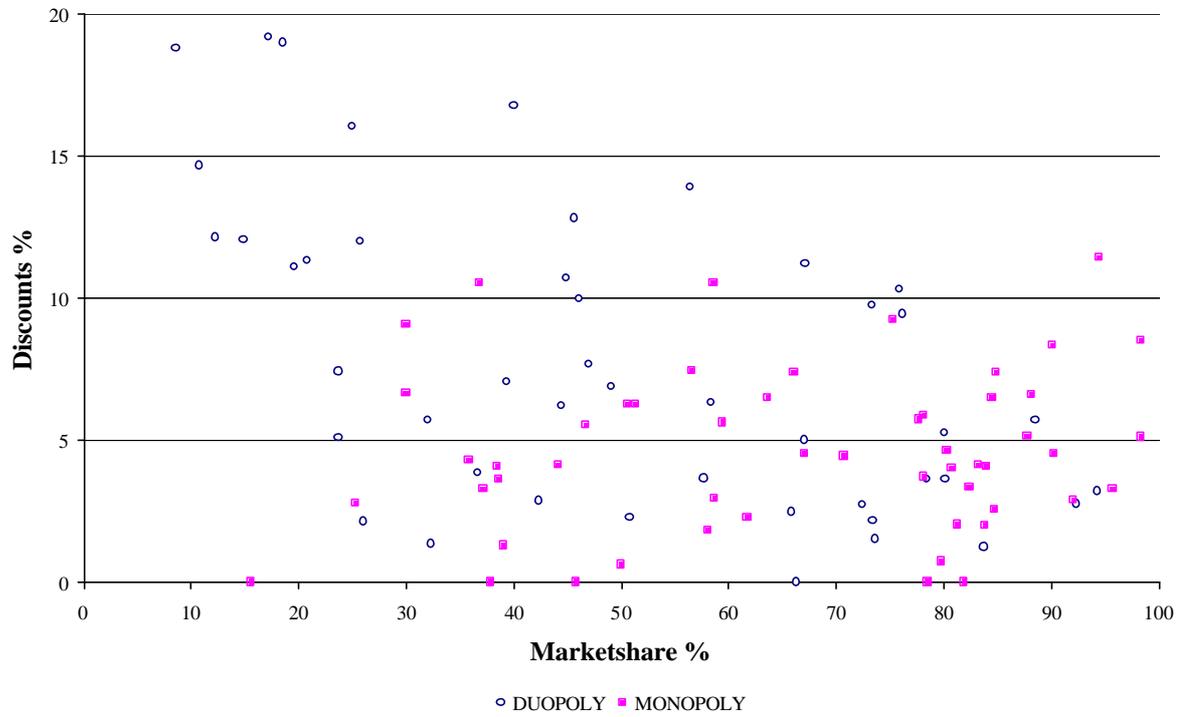
**Table 2. Least squares regression results with *DISCOUNT* as the dependent variable, for different years and specifications**

	Main specification results for different years					Alternative specifications, 1985		
	1979 (2:1)	1982 (2:2)	1985 (2:3)	1988 (2:4)	1992 (2:5)	(2:6)	(2:7)	(2:8)
<i>CONSTANT</i>	2.74 (2.62)	3.94* (2.16)	3.12 (2.34)	7.43** (3.02)	7.63* (4.10)	1.39 (2.28)	3.34* (1.73)	2.72 (1.69)
<i>DUOPOLY</i>	7.56*** (2.66)	10.3*** (2.17)	8.95*** (2.01)	13.7*** (2.80)	7.08* (4.37)	9.57*** (2.15)		
<i>MARKETSHARE</i> <i>*MONOPOLY</i>	-0.00202 (0.0281)	-0.000487 (0.0211)	-0.00103 (0.0208)	-0.0286 (0.0273)	-0.0484 (0.0437)	0.0117 (0.0199)		
<i>MARKETSHARE</i> <i>*DUOPOLY</i>	-0.102*** (0.0277)	-0.138*** (0.0291)	-0.124*** (0.0229)	-0.211*** (0.0432)	-0.140*** (0.0324)	-0.115*** (0.0231)		
<i>DUOPLARGE</i>							-0.172 (1.06)	-0.294 (0.993)
<i>DUOPSYMM</i>							1.81** (0.872)	1.74** (0.813)
<i>DUOPSMALL</i>							7.26*** (1.32)	7.21*** (1.36)
<i>LNMARKETS</i>	-0.0510 (0.587)	0.0960 (0.646)	0.866 (0.538)	1.51* (0.811)	0.965* (0.458)		0.517 (0.487)	
<i>WMD</i>						0.0669** (0.0301)		0.0531* (0.0291)
<i>IMMIG</i>	1.29** (0.605)	-0.108 (0.593)	0.0830 (0.592)	0.216 (0.554)	1.10* (0.647)	0.372 (0.561)	0.150 (0.579)	0.275 (0.548)
Number of obs.	104	108	106	99	98	106	106	106
Adj R <sup>2</sup>	0.218	0.286	0.334	0.490	0.326	0.348	0.355	0.367

Standard errors, using White's robust covariance matrix, are in parenthesis.

Variables starred \*\*\* are significant at the 1% level, with \*\* at the 5% level and \* at the 10% level.

**Figure 1: Fraction of subscriptions sold at a discount in relation to market share, for monopoly and duopoly newspapers in 1985.**



**Figure 2: Average fraction of subscriptions sold at a discount.**

