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Japanese Newspapers

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abstract

In Japan, newspapers enjoy a special exemption from antimonopoly prohibitions against resale price maintenance (suppliers' stipulations that bar downstream firms from price discounting), but are each required to set uniform prices throughout Japan. In fact, the newspapers have rarely changed their subscription prices in recent years, and the three leading national dailies, together accounting for about half the total industry circulation, and thirteen other papers accounting for another one eighth of industry circulation, all have set exactly the same price (3,925 yen per month for combined morning-and-evening editions, and 3,007 yen per month for morning-only). The remaining local papers all set lower prices. Econometric analysis here shows that Japanese newspaper subscription prices are far below the levels that would maximize joint profit, given the newspaper content. The authorized resale price maintenance, and prohibition against prices that vary geographically, seems to have allowed only modest collusive price increases.

JEL codes: D4, L4
Keywords: resale price maintenance, two-sided markets, newspapers, advertising

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Japanese Newspapers

1. Introduction.

In Japan, newspapers enjoy a special exemption from antimonopoly prohibitions against resale price maintenance (suppliers' stipulations that bar downstream firms from price discounting), but are each required to set geographically uniform prices throughout Japan. The three leading national dailies, and eleven of the regional and local dailies, seem to have exploited this antitrust exemption to maintain collusive subscription fees, setting the same subscription prices as one another which are higher than those of the smaller circulation newspapers. The main result of the present paper is that these presumptively collusive subscription prices are actually well below the levels that would maximize the joint profit of the newspapers that set those prices, given the newspaper content. This result is based on estimates of the elasticities of demand facing each newspaper, and estimates of some costs of producing newspapers net of the marginal profit from newspaper advertising. It is an open question whether the subscription price collusion is simply ineffective, or is effective but constrained (for example constrained by the likelihood that collusive price increases would induce costly expansions of newspaper content).

The econometric analysis that is the central focus of the present paper follows in a line of research on newspaper economics initiated by Rosse (1970) and extending to Van Argentesi and Filistrucchi (2007), Cayseele and Vanormelingen (2009), Fan (2013), and others. The main novelties of this paper are that it uses micro-data rather than only aggregate data to estimate demand, and it models the interdependence of demand between morning-only subscriptions and morning-and-evening subscriptions offered by the same newspaper. It is also the first contribution to this literature that focuses on the Japanese newspaper industry, which is among the largest in the world based on circulation and which is showing remarkable resilience in the face of increasing competition from digital media.

The micro-data used here come from a March 2007 random-direct-dial telephone survey of 27,788 persons living throughout Japan conducted by Video Research, Ltd. (the 2007 edition of its annual JREAD survey). I use these data to estimate the common parameters of a mixed-logit indirect utility function relating respondents' choices among available daily newspaper subscriptions (including the choice of not subscribing to any newspaper), to their own individual characteristics such as age, income and education and to attributes of the newspapers available in the prefecture where each resides. Attributes of the newspapers include subscription price, number of pages of content per month, and whether the subscription is morning-and-evening or morning-only. Although the national newspapers are priced the same everywhere in Japan, they compete with different local and regional newspapers in each prefecture. The variation in choice sets across prefectures is sufficient to identify the effects of subscription price and other newspaper attributes on respondents' choices. I find that price elasticities of demand for most newspapers lie between *1.2* and *2* and that elasticities of demand with respect to number of pages of content per month lie between *0.2* and *0.5*. Because many of the Japanese newspapers offer a choice between morning-and-evening subscriptions and morning-only, interpreting these estimates requires a model that can accommodate the effects of price of each type of subscription on the demand for the other type. In effect, the newspapers offering both kinds of subscription are multiproduct oligopolists. I show how profit-maximizing newspapers consider the cross-elasticity of demand between the different types of subscription when setting the prices. I also estimate the demand and supply of newspaper advertising using 2007 cross-section data.

Before describing the analysis and estimates just alluded to, I shall first describe some relevant features of the Japanese newspaper industry and its pricing practices.

2. The Japanese Newspaper Industry.

Japan has five national news dailies (Mainichi, Asahi, Yomiuri, Nikkei and Sankei), several bloc papers that are available in contiguous prefectures (Tokyo Shinbun, Chunichi Shimbun, Chugoku Shinbun, and Nishi Nippon Shinbun), and another 40 or 50 newspapers that each mainly serves a single prefecture. The Nikkei, often compared with the Wall Street Journal, features business and financial news. In this sense it is in a different category than the other national daily newspapers of Japan. More than half of the Nikkei subscribers also subscribe to another daily newspaper, while dual subscriptions among the newspapers other than Nikkei are rare. I will exclude Nikkei from my sample and maintain the assumption that each household selects at most one newspaper from among those other than Nikkei. The other four national dailies –Yomiuri, Mainichi, Asahi, and Sankei– together account for about half the total circulation of all newspapers. The total circulation of news dailies (not including sports dailies, tabloids, or political newspapers) in Japan is about 85 percent of the number of households and more than 95 percent of sales are by monthly subscription rather than single-issue.

Table 1 shows the 2007 household penetration rates in each prefecture for the newspapers that are the focus of this study. It includes the four national dailies other than Nikkei and all of the other dailies with circulation of 100,000 or more. Of the 47 newspapers, all four of the national newspapers and nine local newspapers are available in at least some prefectures either as morning-only subscription or morning-and-evening subscription. Another eight newspapers are only available as morning-and-evening subscription. And the remaining 18 do not publish evening editions. It is evident from the table that the local papers enjoy large shares in many of the less populous prefectures. This is even more evident in the Figure 1 showing the aggregate circulation of newspapers in each prefecture of Japan moving from west to east.

The newspaper publishers distribute through independent newsdealers. The typical

arrangement entails an exclusive geographic territory assigned by the newspaper company, daily purchase of a number of copies, the number being set by the newspaper company, and resale at a price stipulated by the newspaper –exclusive territory, stipulated resale price and a sales quota. That the newspapers enforce sales quotas, which would violate antimonopoly proscriptions, is widely denied by the newspaper companies but is evidently a fact. The newspapers that are shipped and billed to the distributors, and unwanted by them, are referred to as *oshigami*–literally "push papers". Documentation of this practice can be found in the Wikipedia entry for "*shinbun hanbai ten*" (newspaper sellers in Japan).

The Japanese newspapers, and other publishers, enjoy a special exemption from antimonopoly prohibitions against resale price maintenance (Antimonopoly, Section 23-2 (4)). The exemption dates from the 1953 amendments to the 1947 Antimonopoly Law. Newspaper publishers are also bound by a special directive of the Japan Fair Trade Commission enjoining against charging differing prices according to the area or person buying (most recently "Specific Unfair Trade Practices in the Newspaper Business", Fair Trade Commission Notification, no. 9, July 21, 1999, amending the similar earlier notification no. 14, 1964). The directive also disallows discount pricing by newspaper distributors, and disallows the newspaper publishers from imposing minimum quantities (sales quotas) on distributors, though apparently as already stated the publishers do this anyway. Under the special directive, each newspaper is free to set its own price but must then charge that same price wherever the newspaper is sold. Different editions of a newspaper may command differing prices. At least since 1945 and probably before that, the three leading national dailies Yomiuri, Asahi and Mainichi, have all set the same subscription price as one another and changed that price at roughly the same time as one another. Price changes for all of the newspapers are infrequent. The last price change was in 2003, ten years ago. Since then, a monthly morning-and-evening subscription to any of the four national newspapers is 3,925 yen (around $40). A morning-only subscription to the three other than Sankei is 3,007 yen per month. Not only

the three leading national newspapers but also 13 local and bloc newspapers set exactly these same prices. The other newspapers set lower prices. The Japan Newspaper Association has publicly supported the continuation of the special antitrust exemption allowing newspapers to maintain retail prices and indeed forestalled the adoption of a proposal in 2001 to repeal it.

Why resale price maintenance? A quick –and I think wrong– answer is that the retail price stipulation is actually a maximum retail price and is to prevent the independent distributors from exploiting the local monopolies that their exclusive territories confer. By raising the price to increase its own profit a distributor would actually diminish the total profit in the supply chain, the successive monopoly problem. Those who are familiar with US antitrust law will recall the *Albrecht* case[1] in which Herald Publishing Company, publisher of the St. Louis Globe Democrat, was found by the U. S. Supreme Court to have violated prohibitions against resale price maintenance in an apparent attempt to deter exactly this sort of overpricing. The resale price maintenance of Japanese newspapers is different because the sales quotas that the newspapers impose on the distributors deter the distributors from raising prices. The sales quotas are set at levels that not only deter overpricing but that also encourage solicitation of new subscriptions. Because of this, the stipulated retail prices are binding downward; they are price floors, not price ceilings.

The resale price maintenance might be part of a cartel scheme[2] among the newspaper companies. But my estimates of the unit costs and elasticities of demand facing Japanese newspapers, which are the main content of the present paper, indicate that subscription prices

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[1] Albrecht v., Herald Co., 390 U.S. 145 (1968).

[2] Examples of resale price maintenance as a producer cartel scheme have been noted empirically and explored theoretically. We have the Telser (1960) discussion of the light bulb case. In the early twentieth century, duopolists Westinghouse and GE sold light bulbs through exclusive independent retail outlets and both stipulated the same minimum resale prices. In Telser's explanation, retail price discounting could be more easily detected and deterred than could wholesale price discounting, and exclusive dealing prevented retailers' profiting from any secret wholesale price discounts that were not passed on as retail price discounts. In Flath (1989) I suggested that a producer cartel scheme was the likely motive for resale price maintenance by the three producers of infant powdered milk in Japan, as documented in a series of antimonopoly cases, from the 1960s and 1970s. Jullien and Rey (2007) develop an algebraic model in which resale price maintenance facilitates collusion among producers because it makes deviations from the collusive scheme easier for the colluders to detect and credibly deter, as explained by Telser.

are well-below the levels that would maximize the combined profits of the presumptively colluding newspapers. That the leading newspapers set the same subscription prices as one another, prices that are higher than those of the smaller circulation local newspapers, and change those prices at the same time as one another and infrequently, all suggests coordination. If cooperating in choosing prices, then why not set the prices that maximize joint profit? I have no definitive answer apart from the obvious one that the impossibility of deterring cheating precludes cartel pricing. Perhaps the setting of a common price, even one below the cartel price, benefits the newspapers. Or perhaps the newspaper price collusion is constrained by the costly expansions of newspaper content that are induced by collusive price increases and difficult to block.

It is undeniable that the newspapers collusively restrict their content, by observing a monthly newspaper holiday. On one particular Monday each month, the newspapers all refrain from issuing a morning and evening edition. The Japan Newspaper association defends this practice as needed to give the newspaper distributors vacation days. This is absurd. By rotating work shifts or deploying substitute workers, newsdealers could permit vacations. The newspaper holidays amount to a collusive restriction of industry output, for both distributors and publishers. That the newspaper holidays of the different papers are on the same days is evidence of collusion among the newspaper companies. A rare instance of deviation is also revealing. In February 2002, the Sankei Shimbun refrained from the practice of newspaper holiday. The other papers publicly criticized Sankei but also themselves refrained from holidays. Three months later the practice was reinstated, again with Sankei participating. That deviation by Sankei triggered deviations by the others strongly suggests that the newspaper holidays have the character of a prisoners' dilemma, as is generally true of cartel schemes.

My aim is to characterize the pricing behavior of Japanese newspapers. This will require econometric estimation of the demands facing Japanese newspapers and of their costs

of production, and that is the main focus of the remainder of the paper.

3. Demand for Newspaper Subscriptions

I begin by describing random-parameter logit estimates of the demand for Japanese newspaper subscriptions. The data for this estimation come from the Japan Readers and Area Data (JREAD) survey conducted by Video Research Ltd. This is a random-direct-dial telephone survey conducted in March each year that profiles newspaper readers and subscribers throughout Japan. The data are mostly used by advertisers. I purchased temporary access to the 2007 survey with funds from a JSPS grant. From the 2007 edition of the survey (with some considerable effort) I collected micro data for the 27,788 respondents including which edition of which newspaper each subscribes to if any, age and education of the head of household, household annual income, prefecture of residence, and whether the respondent participates in local festivals and holiday events (a major focus of local community activity in Japan). I used these data to estimate a utility function that relates the respondents` choices of newspapers to characteristics of the newspapers. The data on newspaper characteristics mostly come from the Japan Audit Bureau of Circulation (JABC), augmented with data from Dentsu, Inc. These include in which prefectures each edition of each newspaper was available, circulation, the subscription prices, number of pages of ads per month and number of pages of content per month. Although the data are cross-sectional for the single year 2007 and the subscription price of each newspaper is geographically uniform, there does exist enough variation in the choice sets across prefectures (that is which newspapers in which editions are available for subscription), to estimate common parameters of an indirect utility function for newspapers.

The basic econometric model is a multinomial logit model of utility with random coefficient on one variable, price of subscription. The utility of newspaper subscription choice j by individual i is a linear function of (1) attributes of the choice, (2) interactions

between choice-invariant characteristics of the individual and attributes of the choice, and (3) an unobservable error ε_{ij} that varies randomly across individuals and alternatives according to the Gumbel distribution (Type I Extreme Value distribution). Stipulate also that the utility function coefficient on price of subscription p_j varies randomly across individuals according to the Normal distribution[3].

[1] $$U_{ij} = \beta' x_{ij} + \alpha_i p_j + \varepsilon_{ij}$$
$$\alpha_i = \alpha + \sigma v_i, \text{ where } v_i \sim Normal\ [0,\ 1]$$
$$\varepsilon_{ij} \sim\ Gumbel$$

The individual i chooses from among his choice set C_i the one alternative with the greatest utility value. The choice set includes any newspapers available for subscription in the place where the person lives and the choice of subscribing to no newspaper at all ($j=0$). It will be the case that $x_{i0} = 0$ and $p_0 = 0$, so by construction, the mean utility value of not subscribing to any newspaper is zero: $U_{i0}=0$.

From the observed choice set of each individual, observed attributes of each alternative, observed characteristics of each individual, and observed choice of each individual, I estimate the parameters of the utility function that are common to all individuals $(\beta,\ \alpha,\ \sigma)$ using the method of simulated maximum likelihood (computed with the software NLOGIT).[4]

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[3] Stipulating that the coefficient on price is distributed normally does allow the possibility of positive price coefficient but in the actual estimates all 27,788 individual price coefficients are negative. I attempted estimates with price coefficient distributed lognormally but the estimates did not converge. On the merits and demerits of lognormal versus normal distribution of random parameters in mixed logit estimates see Hensher and Greene (2001).

[4] The probability that individual i chooses j is

$$\pi_{ij} = \int \frac{exp(\beta' x_{ij} + (\alpha + \sigma v_i) p_j)}{\sum_{k \in C_i} exp(\beta' x_{ik} + (\alpha + \sigma v_i) p_j)} f(v_i) dv_i\ ,$$

where $f(v_i)$ is the density function of v_i. The simulated approximate probability that individual i chooses j is

$$\tilde{\pi}_{ij} = 1/S \sum_{s=1}^{S} \frac{exp(\beta' x_{ij} + (\alpha + \sigma v_i(s)) p_j)}{\sum_{k \in C_i} exp(\beta' x_{ik} + (\alpha + \sigma v_i(s)) p_j)}$$

where $v_i(s)$ is the randomly drawn value of v_i on simulation s and S is the total number of simulations (which I set equal to 500). The simulated log-likelihood function is

$$\tilde{\mathcal{L}} = \sum_{i=1}^{N} \sum_{j=0}^{J} d_{ij} ln(\tilde{\pi}_{ij})$$

where $d_{ij} = \begin{cases} 1 \text{ if individual } i \text{ chooses alternative } j \\ 0 \text{ otherwise} \end{cases}$

The variables that enter the utility function are made up as follows.

Attributes of the newspaper subscription choices that do not vary across individuals:

—Subscription price (units=yen per month) p_j

—Natural logarithm of number of pages of content per month ("news hole")

Interactions between choice-invariant characteristics of the individual and attributes of the choice (with units of measurement equal to underlined expressions where present, otherwise equal to zero or one):

—Age head of household (one of four discrete intervals) ×
Natural log of pages of content per month

—Household annual income (one of sixteen discrete intervals ranging from zero to 30-million yen or more per year) if greater than zero ×

1. Natural log of pages of content per month
2. National newspaper × morning-and-evening subscription
3. Local or Bloc newspaper × morning-and-evening subscription

—Each national newspaper (Yomiuri, Asahi, Mainichi, Sankei) ×

1. Survey response: "Participates in local festivals and holiday events."
2. Head of household highest education level is college or above

—For each national and bloc paper, square of road distance (th. km) from newspaper home base to each individual's prefecture of residence (home base for national papers Yomiuri, Asahi and Mainichi: Tokyo, for Sankei: Osaka; and for bloc papers Chunichi: Aichi, Chugoku: Hiroshima, and Nishi Nippon: Fukuoka).

Table 2 reports the utility function parameter estimates. Dividing the other coefficients by the estimated marginal disutility of subscription price converts them to monetary units (yen per month). From the estimates several things are evident. First, the marginal value of a page of content becomes greater as income rises. Second, the value of morning-and-evening subscription rather than morning-only, holding constant pages of content per month, is greater the greater the income, and is generally greater for national newspapers than for other newspapers. Third, the more distant is the prefecture of residence from the newspaper home base the lower is its value. This effect is stronger for the bloc papers than for

the national papers. And among the national papers it is stronger for Sankei than for Asahi, Mainichi or Yomiuri. Fourth, those who participate in local festivals and holiday events place a lower value on subscription to national papers; this effect is strongest for Sankei. Fifth, college education inclines subscribers to more value Asahi and less value Sankei.

Further interpretation of the estimates comes from simulations that expose the effects on demand for each edition of each newspaper of changes in subscription price or changes in number of pages of content. I computed arc elasticities and arc cross-elasticities of demand with respect to changes in prices and pages of content, by simulating the effects of a five-percent increase in subscription price of each edition of each newspaper, respectively, and five-percent increase in numbers of pages of content in each edition of each newspaper, respectively. These estimates may be found in the appendix Tables A1 and A2. It seems that the price-elasticity of demand of most newspapers lies between *1.2* and *2* and is a bit higher for the leading national papers than for the others. The elasticity of demand with respect to pages of content lies between *0.2* and *0.5*. This matches some results of other estimates of demand for newspapers in the literature.

Van Cayseele and Vanormelingen (2009) estimate a pair of equations describing the demand for ads and demand for subscriptions in Belgian newspapers. The demand for subscriptions is specified as nested logit, in which readers first choose between subscription to the local paper versus a national one, and then choose within the one category or the other. Demand for subscriptions depends on the characteristics of newspapers and of readers, and on the prices. Van Cayseele and Vanormelingen find that the elasticity of demand for subscriptions ranges from *1.25* to *3.05*. Argentesi and Filistrucchi (2007) estimate a nested logit specification for reader demand and simple logit specification for advertising demand for Italys' four national newspapers. In their preferred specification the newspapers set ad rates noncooperatively but collude in setting cover prices. Fan (2013) estimates a multiple discrete choice model of the demand for U.S. newspapers (a model in which demanders may subscribe

to more than one paper), with endogenous choice by newspapers of their quality and their prices, including price of advertising. She uses the estimated model to simulate the effects of mergers of local papers with overlapping markets.

Rosse (1970) estimates demand for newspaper subscription, using data for local newspapers across the US. Rosse allows for curvature of the cost function (which my simple model here will not exhibit), and also allows demand for subscriptions to depend directly on amount of ads. He finds a price elasticity of demand for subscriptions of *1.4*, taking into account the effect of change in subscription price on amount of ads, as interpreted by Blair and Romano (1993). Rosse was the first to notice that variation in demand across cities could be exploited as a kind of natural experiment in measuring the effect of shifting demand on the costs and pricing of local newspaper monopolists. As far as I am aware, the present paper is the first to use this principal in analyzing Japan's newspapers.

4. Price of advertising and demand for advertising

I will now specify and estimate equations determining the price of advertising and demand for advertising in Japanese newspapers. For my purpose, it is necessary to accommodate newspapers that offer their readers a choice between a morning-only subscription and a morning-and-evening subscription,[5] and that offer morning edition and evening edition advertising.

4.1. Basic framework of demand

Let s_1 denote the number of morning-only subscribers to a newspaper and s_2 be the number of morning-and-evening subscribers. And denote by k_m and a_m the pages of content and pages of ads in the morning edition, and by k_e and a_e the pages of content and pages of ads in

[5] Virtually none proffer evening-only subscriptions. The Shizuoka Shinbun claims to offer a choice between evening-only subscription and morning-and-evening subscription but based on circulation data, hardly any of their subscribers opt for evening-only.

the evening edition. Here an ad is defined as a printed item supplied to all subscribers, the same as the subscription content. The only difference is that the ad is paid for by the advertiser but the other content is paid for by the subscribers.

Let us suppose that the demand for ads depends on the price to place an ad per subscriber, $\frac{p_{a_m}}{s_1+s_2}$ if in the morning edition or $\frac{p_{a_e}}{s_2}$ if in the evening edition. Let us also suppose that the readers regard the ads indifferently. To keep matters simple, posit a constant-elasticity demand system facing the newspaper in which all elasticities have the appropriate signs and lie within meaningful ranges. Local approximation of the demand system implied by the indirect utility function estimate of the previous section is such a system:

[2] $$\begin{pmatrix} ln\, s_1 \\ \vdots \\ ln\, s_n \end{pmatrix} = \begin{pmatrix} ln\, A_1 \\ \vdots \\ ln\, A_n \end{pmatrix} + \begin{pmatrix} -\xi_1 & \cdots & \xi_{1n} \\ \vdots & \ddots & \vdots \\ \xi_{n1} & \cdots & -\xi_n \end{pmatrix} \begin{pmatrix} ln\, p_1 \\ \vdots \\ ln\, p_n \end{pmatrix} + \begin{pmatrix} \theta_1 & \cdots & \theta_{1n} \\ \vdots & \ddots & \vdots \\ \theta_{n1} & \cdots & \theta_n \end{pmatrix} \begin{pmatrix} ln\, k_1 \\ \vdots \\ ln\, k_n \end{pmatrix}$$

As before, suppose that subscript *1* denotes the morning-only subscription to a particular newspaper and subscript *2* the morning-and-evening subscription to the same newspaper. The first two rows of equation [2] can be represented as follows, where $k_1 \equiv k_m$ and $k_2 \equiv k_m + k_e$:

Demand by morning-only subscribers:

[3] $$s_1 = A_1\, {p_{s_1}}^{-\xi_1}\, {p_{s_2}}^{\xi_{12}}\, {k_m}^{\theta_1} (k_m + k_e)^{\theta_{12}}$$

Demand by morning-and-evening subscribers:

[4] $$s_2 = A_2\, {p_{s_2}}^{-\xi_2}\, {p_{s_1}}^{\xi_{21}}\, {k_m}^{\theta_{21}} (k_m + k_e)^{\theta_2}$$

To these I now append constant-elasticity demands for newspaper advertising:

Demand for ads in morning edition:

[5] $$a_m = B_m \left(\frac{p_{a_m}}{s_1+s_2}\right)^{-\xi_a}.$$

Demand for ads in evening edition:

[6] $$a_e = B_e \left(\frac{p_{a_e}}{s_2}\right)^{-\xi_a} .$$

I will maintain that the demands for advertising in each newspaper and each edition (morning edition, evening edition) have the same elasticity with respect to price per subscriber ξ_a, but differing intercepts.

4.2. Newspaper costs

The costs of newspaper production depend on number of ads and circulation, and on amount of content. These costs include first-copy costs and costs that depend on the number of subscriptions of each type. For a particular newspaper offering both morning-only and morning-and-evening subscriptions:

$$[7] \quad \boldsymbol{Cost} = \overbrace{f_a a_m + f_a a_e}^{first-copy\ cost\ of\ ad\ pages} + \overbrace{f_k k_m + f_k k_e}^{first-copy\ cost\ of\ content\ pages} + \overbrace{(c_{0m} + \bar{c}(a_m + k_m))s_1}^{costs\ that\ depend\ on\ morning-only\ subscriptions} + \overbrace{(c_{0m} + c_{0e} + \bar{c}(a_m + k_m + a_e + k_e))s_2}^{costs\ that\ depend\ on\ morning-and-evening\ subscriptions}$$

Here, c_{0m} and c_{0e} are the unit cost of distribution in morning and in evening net of advertisers' payments to distributors for including inserts (substantial in Japan, almost as large as advertisers' payments to newspapers for print ads). $\bar{c}$ is the cost per page of actually printing the newspaper (where *k* and *a* are the numbers of pages of content and of ads), f_k is the first-copy cost of producing a page of content and f_a is the first-copy cost to the newspaper of producing a page of advertising. Notice that because of the terms $\bar{c}a_m(s_1 + s_2)$ and $\bar{c}a_e s_2$ in the cost function, the costs are not separable into cost of subscription and cost of advertising. This makes it problematic to speak separately of the profits from subscriptions and from advertising.

Most newspaper advertising in Japan is contracted through advertising agencies, of which Dentsu is the largest. The advertiser pays the ad agency the price set by the newspaper but the ad agency pays a lower price to the newspaper. In the empirical estimates below I will take the publically posted advertising rates of the newspapers to be the prices actually paid by clients but consider the advertising prices received by the newspapers (which I do not observe) to be a set fraction ψ of these prices, the difference representing the advertising agency commission (The commission rate is $1 - \psi > 0$). For reference, the standard advertising agency commission rate for newspaper ads in Japan is 15 percent.

4.3. Price of advertising

Each newspaper chooses content, prices of ads, and prices of subscriptions to maximize an objective function. The objective function of a particular newspaper, again with morning-only subscriptions denoted by subscript *1* and morning-and-evening subscriptions by subscript *2*, is:

[8] $$\max_{p_s,p_a,k}(\pi_1+\pi_2) = \overbrace{\sum \omega_{1j}p_j s_j + \sum \omega_{2j}p_j s_j}^{revenue\ from\ subscriptions} + \overbrace{\psi p_{am}a_{am} + \psi p_{ae}a_{ae}}^{revenue\ from\ advertising} - \boldsymbol{Cost}$$

Here the parameters ω_{ij} are equal to zero or one depending upon the collusive regime and upon the commonality of newspapers. I assume that $\omega_{12}=\omega_{21}=1$ because *1* and *2* are different subscription types offered by the same newspaper. Also, $\omega_{jj}=1$ for all *j*. In a fully collusive pricing regime $\omega_{ij}=1$, for all *i*, *j*. Revenue from subscriptions –or more precisely, the contribution of revenue from subscriptions to the objective function of the newspaper– does not directly depend on price of ads nor on quantity of ads (by my presumption that readers regard the ads indifferently). And there is no interdependence in demands for advertising across newspapers (by my presumption that each household subscribes to at most one newspaper). It is thus possible to infer an advertising pricing rule that does not depend upon the state of collusion among newspapers. The pricing rule follows from the necessary condition for maximizing newspaper profit as in equation [8] with respect to advertising prices, for morning edition, and for evening edition:

[9] $$p_{a_m} = \left(f_a + \bar{c}(s_1+s_2)\right)\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1}$$

[10] $$p_{a_e} = (f_a + \bar{c}s_2)\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1}$$

Within this basic framework, much of the variation in price of advertising across newspapers can be related to variation in number of subscribers. The price of ads (not per subscriber) varies linearly with number of subscribers. The equations [9] and [10] can be pooled into a single

equation:

[11] $$p_a = f_a\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} + \bar{c}\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} s$$

where $p_a = p_{am}$ or p_{ae}, and $s = \begin{cases} s_1 + s_2\,, & if\ p_a = p_{am} \\ s_2\ \ \ \ \ , & if\ p_a = p_{ae} \end{cases}$

Newspapers with greater circulation, all else the same, have higher ad prices:

[12] $$\frac{dp_a}{ds} = \bar{c}\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} > 0\,,$$

but lower ad prices per subscriber:

[13] $$\frac{d\left(\frac{p_a}{s}\right)}{ds} = -f_a\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} s^{-2} < 0\,.$$

It is conceivable that elasticity of demand for advertising would vary from one newspaper to another. But it turns out that much of the actual variation in ad pricing across Japan's local newspapers is linearly related to number of subscribers, as implied by the model just described and assuming that the elasticity of demand for advertising is the same for all newspapers.

4.4. Estimates of advertising pricing equation

Table 4 reports OLS regressions in which newspaper ad pricing is a linear function of circulation as in equation [11]:

[14] $$p_a = \gamma_0 + \gamma_1 s + \epsilon$$

There are four different prices, so four separate regressions. The dependent variable in the left-most regression of the table is the price for a legal notice posted in the society page per centimeter width of a horizontal column (*dan* in Japanese). This is the basic plain-vanilla ad rate that is the anchor for each newspaper's menu of ad prices. The dependent variables in the other three Table 3 regressions are contract prices per horizontal column for black-and-white business display ads. These vary depending on whether the contract is for one, five or fifteen horizontal columns, within a six-month period. A page is divided into fifteen horizontal columns, so these are prices for one-fifteenth page, one-third page or one page, cumulatively within the contract period. The rate for ads smaller than one horizontal column is the same as

for a legal notice and is priced per horizontal column per centimeter width. A (Yomiuri Shimbun) page is *37.9* cm wide. A (perhaps typical) small ad might amount to one half column (in other words *1/30*th of a page), and so its price would be *18.95* x the price per centimeter portion of a horizontal column for a legal notice. The regressions use 2007 circulation, but 2003 was the year in which the prices were last changed; they have remained the same in the ten years since then. The unit of observation is the particular edition of each paper. Some of the observations are for ads placed in more than one regional edition of a national newspaper. For these I aggregated the circulation over the regional editions covered. With those observations excluded, Chow tests favored the pooling of national and local papers. Chow tests favored pooling of morning and evening editions even with those observations included. The estimates reported in Table 4 are for the pooled sample. The R-squared is *0.89* for legal notice and *0.90* for the business display ads. It seems that the basic framework adequately describes the newspaper advertising cost function and the ad pricing behavior of newspapers. That is, the newspapers each face a similar elasticity of demand for advertising and have similar first-copy costs of supplying advertising. The newspapers with greater circulation have correspondingly lower incremental costs and so set lower prices. Picard (1998) notes an approximately similar pattern in the advertising rates of U.S. newspapers.

4.5. System estimates of demand for newspaper advertising

To estimate the demand for newspaper advertising requires instrumental variables for advertising price because of possible endogeneity. In my way of thinking here, the newspaper circulation determines the incremental cost per page of ads, and so given constant elasticity of demand for advertising, circulation also determines the profit-maximizing price of advertising per page of ads. But the demand for ads depends on the price per page of ads per subscriber. The fundamental endogeneity in ad price per subscriber arises from the effects of subscription price on number of subscribers. Using instrumental variables for circulation resolves this

endogeneity. My instruments for circulation *s* are the number of households in the newspaper home prefecture if it is a local or bloc newspaper, a dummy variable if it is a national newspaper, and number of pages of content per month. Because greater circulation lowers the incremental cost of pages of content, number of pages of content is a valid instrument for circulation (It is inversely correlated with circulation). I estimate the following pair of equations with the generalized method of moments, using SAS software:

Equation 1—Advertising price per page of ads:

[15] $$p_a = \gamma_0 + \gamma_1 s$$

Equation 2—Demand for advertising:

[16] $$\ln a = \beta_0 + \xi_a \, ln(\gamma_0/s + \gamma_1) + \beta_1 \ln AvgIncome + \beta_2 \, PcntCollege$$

Instruments for *s*: (1) pages of content per month, (2) newspaper home prefecture number of households if bloc newspaper or local newspaper, (3) dummy=1 if national newspaper and =0 if not. *AvgIncome* is average annual household income of subscribers to the newspaper and *PcntCollege* is the percent of the subscribers to the newspaper that have a college education.

From the estimates which are in Table 4, the elasticity of demand for advertising appears to be about *1.3* with a standard error of *0.5*. This seems about right, close to the corresponding estimate for Belgian newspapers (*=1.5*) reported by Van Cayseele and Vanormelingen (2009), and the estimate for U.S newspapers (*=1.6*) by Rosse (1970). There are three pairs of regressions in Table 4. The dependent variables in the demand equations are the business display ad rates per page of ads divided by circulation, for 1-dan, 5-dan and 15-dan contracts. All three regressions are similar.

From the Table 4 regressions we can glean some information about the first-copy cost of a page of advertising f_a and the cost per subscriber of actually printing and distributing a page of ads $\bar{c}$. Based on the estimates using the 15-dan ad rate, if elasticity of demand for advertising ξ_a is around *1.27* as here estimated, then first-copy cost of a page of advertising is

$$f_a = \gamma_0\left(1-\frac{1}{\xi_a}\right) \approx 1.03\ million\ yen\ per\ page \times \left(1-\frac{1}{1.27}\right) = 0.2\ million\ yen\ per\ page,$$

and

$$\bar{c}\psi^{-1} = \gamma_1\left(1-\frac{1}{\xi_a}\right) \approx 5.67\ yen\ per\ page\ per\ subscriber \times \left(1-\frac{1}{1.27}\right) =$$

$$1.2\ yen\ per\ page\ per\ subscriber.$$

A widely repeated claim in both Japan and the US is that the standard advertising agency commission rate for newspaper advertising, $1-\psi$, is *15* percent. Presuming the other parameter estimates are accurate, that suggests that $\bar{c}$ is around one yen per page.

It is useful to compare this estimate of cost of printing per page with the subscribers' marginal valuations of content pages based on the utility function estimate. Figure 2 shows these marginal valuations averaged across subscribers for each edition of each newspaper plotted against monthly pages of content, k_m if a morning subscription, k_m+k_e if morning-and-evening. The marginal values decrease as pages increase which reflects the diminishing marginal valuation of each person and self-selection of newspapers with more content by those with higher marginal valuation (because of their higher income for instance). The marginal value of content for the newspapers with most pages of content (large circulation morning-and-evening editions) are fairly close to one yen per page, actually a bit below that. This is consistent with the "efficiency at the top" character of nonlinear pricing schemes as deduced in Mussa and Rosen (1978). The profitable strategy is to supply the efficient quality of content to the higher valuing morning-and-evening subscribers but supply less than the efficient content to the morning-only subscribers to deter subscribers from switching from morning-and-evening to morning-only. I explore this aspect of Japanese newspaper behavior in more detail in Flath (2013). My point here is that the estimated marginal value of content to subscribers is consistent with per-copy cost of actually printing a page of content $\bar{c}$ of just under one yen per page.

I now turn to the pricing of subscriptions and choice of content.

5. Newspaper Subscription Prices and Content.

The next task is to model the subscription prices in a way that can be used to infer whether Japanese newspapers set their subscription prices collusively and assess the effects of their doing so. As shown by Nevo (2001), price-cost-margins can be inferred from estimated elasticities and cross-elasticities of demand, conditional on the nature of the pricing regime. In our case, the price-cost margin is the percentage each subscription price exceeds marginal cost net of the marginal profit per subscriber from advertising. Because marginal cost net of the marginal profit per subscriber from advertising can be less than zero, price-cost margins greater than one can be consistent with local profit maximization, indeed can be required by it. That is, newspapers may set subscription prices in an inelastic range of demand, to capture expanded advertising revenue.

First let us represent the objective functions for setting subscription prices and pages of content. Following Nevo (2001), we again define parameter ω_{ij} equal to one if the revenue and cost of *j* enters the objective function in choosing subscription price of *i* and equal to zero otherwise. The objective functions are as follows for *i=1,…n,* (with subscripts *j* on advertising revenue and cost not shown):

[17] $$\max_{p_i,p_a,k} \pi_i = \sum_j \omega_{ij} \left(p_j s_j + \psi p_{am} a_{am} + \psi p_{ae} a_{ae} - \boldsymbol{Cost} \right)$$
$$= \sum_j \omega_{ij} \left(p_j s_j - x_j \right) .$$

Arranged as the rows of a matrix equation, these objective functions become

[18] $$\begin{pmatrix} \pi_1 \\ \vdots \\ \pi_n \end{pmatrix} = \begin{pmatrix} p_1 s_1 - x_1 & \cdots & \omega_{1n}(p_n s_n - x_n) \\ \vdots & \ddots & \vdots \\ \omega_{n1}(p_1 s_1 - x_1) & \cdots & p_n s_n - x_n \end{pmatrix} .$$

Now notice that the derivatives of x_j with respect to subscriptions s_j are as follows[6]

[6] The last two terms in this expression $\frac{\psi p_a a}{s}$ come from the marginal profit that arises indirectly from advertising with each copy sold (for given price of advertising p_a):

[19] $$\frac{\partial x_j}{\partial s_j} = c_{0m} + c_{0e} + \bar{c}(a_m + k_m + a_e + k_e) - \frac{\psi p_{am} a_m}{(s_m + s_e)} - \frac{\psi p_{ae} a_e}{s_e} \ .$$

Define the price-cost margin for newspaper subscription *j* as

[20] $$\frac{1}{\lambda_j} = \frac{p_j - \frac{\partial x_j}{\partial s_j}}{p_j} \ .$$

From [19] and [20], continuing the example in which subscripts *1* and *2* are morning-only and morning-and-evening subscriptions to the same newspaper:

[21] $$\left(1 - \frac{1}{\lambda_1}\right) p_{s1} = c_{0m} + \bar{c}(a_m + k_m) - \frac{\psi p_{am} a_m}{(s_1 + s_2)} \ ,$$

and

[22] $$\left(1 - \frac{1}{\lambda_2}\right) p_{s2} = c_{0m} + c_{0e} + \bar{c}(a_m + k_m + a_e + k_e) - \frac{\psi p_{am} a_m}{(s_1 + s_2)} - \frac{\psi p_{ae} a_e}{s_2} \ .$$

Now the precise content of these expressions [21] and [22] depends on the equilibrium price-cost margins $\frac{1}{\lambda_j}$, which in turn depend on the pricing regime, represented by the matrix Ω (the matrix with typical element ω_{ij} equal to zero or one). The expressions [21] and [22] are valid for all pricing regimes.

The first-order conditions for choices of subscription prices are

[23] $$\frac{\partial \pi_i}{\partial p_i} = p_i s_i - \frac{1}{\lambda_i} \xi_i p_i s_i + \sum_{j \neq i} \left(\frac{1}{\lambda_j} \omega_{ij} \xi_{ij} p_j s_j \right) = 0, \quad i=1\ldots n.$$

Arranged as the rows in a matrix equation, these conditions become

[24] $$\begin{pmatrix} \xi_1 p_1 s_1 & \cdots & -\omega_{1n} \xi_{1n} p_n s_n \\ \vdots & \ddots & \vdots \\ -\omega_{n1} \xi_{n1} p_1 s_1 & \cdots & \xi_n p_n s_n \end{pmatrix} \begin{pmatrix} 1/\lambda_1 \\ \vdots \\ 1/\lambda_n \end{pmatrix} = \begin{pmatrix} p_1 s_1 \\ \vdots \\ p_n s_n \end{pmatrix} \ .$$

Price-cost margins for all subscriptions, conditional on the price-setting regime Ω, are thus (c.f. Nevo, 2001, p. 313):

$$\frac{\partial(\psi p_a a - f_a a - \bar{c} a s)}{\partial a} \frac{\partial a}{\partial s} + \frac{\partial(\psi p_a a - f_a a - \bar{c} a s)}{\partial s} = (\psi p_a - f_a - \bar{c} s) \frac{\partial a}{\partial s} - \bar{c} a$$

$$= (\psi p_a - f_a - \bar{c} s) \frac{\psi p_a \xi_a}{s} - \bar{c} a$$

$$= \frac{\psi p_a a}{s} - \bar{c} a$$

This marginal profit equals the marginal revenue that arises indirectly from advertising (=$\psi p_a a/s$), minus the added-cost-per-copy attributable to advertising (=$\bar{c}a$). Note also that

$$c_{0m} + c_{0e} + \bar{c}(a_m + k_m + a_e + k_e) = \frac{\partial \, \boldsymbol{Cost}}{\partial s_j} - \bar{c}(a_m + a_e)$$

[25] $$\begin{pmatrix} 1/\lambda_1 \\ \vdots \\ 1/\lambda_n \end{pmatrix} = \begin{pmatrix} \xi_1 p_1 s_1 & \cdots & -\omega_{1n}\xi_{1n} p_n s_n \\ \vdots & \ddots & \vdots \\ -\omega_{n1}\xi_{n1} p_1 s_1 & \cdots & \xi_n p_n s_n \end{pmatrix}^{-1} \begin{pmatrix} p_1 s_1 \\ \vdots \\ p_n s_n \end{pmatrix} .$$

I will explore several pricing regimes: Nash pricing by each newspaper, collusive pricing to maximize joint profit of all newspapers, and collusive pricing by a subset of the newspapers with Nash pricing by the others.

My strategy for determining which pricing regime best describes the data is to determine the precise unit costs of distribution c_{0m} and $c_{0m} + c_{0e}$ of each newspaper implied by each regime, and compare them across regimes. From [21] and [22], for a morning-only subscription

[26] $$c_{0m} = \left(1 - \frac{1}{\lambda_1}\right) p_{s1} - \bar{c}(a_m + k_m) + \frac{\psi p_{am} a_m}{(s_1 + s_2)} ,$$

and for a morning-and-evening subscription

[27] $$c_{0m} + c_{0e} = \left(1 - \frac{1}{\lambda_2}\right) p_{s2} - \bar{c}(a_m + k_m + a_e + k_e) + \frac{\psi p_{am} a_m}{(s_1 + s_2)} + \frac{\psi p_{ae} a_e}{s_2} .$$

I observe for each newspaper the subscription price p_s, monthly number of pages $k+a$, and gross advertising revenue per subscriber $\frac{p_a a}{s}$. From the earlier analysis of advertising demand and costs we have that $\bar{c} = 1$ and $\psi = 0.85$. Thus to calculate unit costs of distribution requires only the price-cost margins $\frac{1}{\lambda_j}$, which vary depending on the regime. The main result of this exercise is that the Nash pricing regime is the only one that implies reasonable values for unit costs of distribution for most newspapers.

5.1. Nash pricing regime

In the Nash pricing regime, ω_{ij}=1 for i and j corresponding to subscriptions offered by the same newspaper, and otherwise ω_{ij}=0. In the Nash pricing equilibrium, from equation [25]:

[28] $$\frac{1}{\lambda_1} = \frac{\left(1 + \left(\frac{p_{s2} s_2}{p_{s1} s_1}\right)\frac{\xi_{21}}{\xi_2}\right)}{\left(\xi_1 - \frac{\xi_{12}\xi_{21}}{\xi_2}\right)} = \frac{1}{\xi_1} \text{ if } \xi_{21} = 0$$

and

[29] $$\frac{1}{\lambda_2} = \frac{\left(1 + \left(\frac{p_{s1} s_1}{p_{s2} s_2}\right)\frac{\xi_{12}}{\xi_1}\right)}{\left(\xi_2 - \frac{\xi_{12}\xi_{21}}{\xi_1}\right)} = \frac{1}{\xi_2} \text{ if } \xi_{12} = 0 .$$

These expressions [28] and [29] capture cross-effects, as when the newspaper raises the price of morning-only subscriptions to increase the demand for morning-and-evening subscriptions.

Table 5 lists the estimates of $\frac{1}{\lambda_1}$, $\frac{1}{\lambda_2}$ for the Nash pricing regime based on the arc

elasticities computed from simulations using the mixed-logit utility function estimate. The mean value across newspapers shows that λ_1 and λ_2 average *1.4* and *1.3*, slightly lower than ξ_1 and ξ_2 which average *1.6* and *1.8*. This reflects the positive cross-elasticity of demand between morning-only subscriptions and morning-and-evening subscriptions to the same newspaper (ξ_{12} and ξ_{21} which average *0.4*). In the Nash equilibrium, newspapers offering both types of subscription would raise both subscription prices slightly to exploit this cross effect.

The values of unit costs of distribution implied by the Nash pricing regime are shown in Figure 3 for morning-only subscriptions and Figure 4 for morning-and-evening subscriptions. These figures omit the extreme outliers. The implied values of c_{0m} shown in Figure 3 range between 1,500 and 3,500 yen per subscriber per month, averaging around 2,750. The implied values of $c_{0m} + c_{0e}$ shown in Figure 4 range between 2,000 and 5,000 yen per subscriber per month, averaging around 3,500.

5.2. Collusive pricing of subscriptions

Under the Japan Fair Trade Commission special directive each newspaper is obliged to set geographically uniform prices but need not set the same price as rival newspapers. Nikae (2010) usefully points out that the legally mandated geographic uniformity can itself lead to softer price competition. This is not part of my analysis. My focus here is on collusive pricing.

There are various possible collusive regimes. In the simplest, the objective is to set all subscription prices to maximize the combined profits of all the newspapers. This corresponds to the objective functions of equation [18] with $\omega_{ij} = 1$ for all *i, j*. The price-cost margins of equation [25] for this case shown in Table 5 are implausibly large. The smallest is *2.6* and the average is *10.2*. They imply unit costs of distribution that are negative and large, which is quite unlikely. Conclude that the newspapers are not pricing subscriptions to maximize industry profit.

A further possibility is collusion by only a subset of the newspapers. The three national

newspapers Asahi, Mainichi, Yomiuri,[7] and 13 local newspapers all set the same common price per morning-and-evening subscription of 3,925 yen per month which is the highest price set by any in my sample, and morning-subscription price of 3,007 yen per month which is also the highest of any in my sample. That leaves 33 other newspapers setting lower prices. The Shizuoka Shimbun is the largest circulation local newspaper with a subscription price below that of the national dailies. Its morning-and-evening subscription price is 2,900 yen per month and its circulation tops 700,000. Suppose that the newspapers setting the highest subscription prices (3,925 yen per month for morning-and-evening and 3,007 yen per month for morning-only) maximize their own joint profit, but the other newspapers price subscriptions non-cooperatively. For this exercise I consider that the Sankei morning-and-evening price is set collusively but its morning-only price is not. The implied price-cost margins for this case, also shown in Table 5 are smaller than for the industry cartel case but still implausibly large, averaging *1.66* and *2.26*.

Finally, a variant to the regime just described, presumes that colluding newspapers (those setting morning-only subscription price at 3,007 yen per month and morning-and-evening price at 3,925 yen per month), maximize joint profit subject to the constraint that all set the same price. To compute the implied price-cost margins for this regime I simulated the effects of a simultaneous five percent increase in subscription prices of all of these presumptively colluding newspapers, using the indirect utility function estimates, and computed arc elasticities and cross-elasticities of the effects of this for the subscription sales of all the colluding newspapers combined. Here I consider Sankei not among the colluders. This is analogous to the Nash-pricing regime but with the subscription revenue and advertising revenue of the colluding newspapers aggregated as though the colluders were a single firm. The price-cost margins of the colluders are computed using equations [28] and

[7] Though the morning-and-evening subscription price of the other national paper Sankei is 3,925 yen per month, its morning-only subscription price is 2,950 yen per month,.

[29], with the data for this being: $\xi_1 = 1.17$ and $\xi_2 = 1.73$ $\xi_{12} = 0.57$ and $\xi_{21} = 0.86$ and $\frac{p_{s1}s_1}{p_{s2}s_2}$=1.30 . The result is: $\frac{1}{\lambda_1} = 1.55$, and $\frac{1}{\lambda_2} = 1.24$. The implied unit costs of distribution of the colluding newspapers for this regime (based on weighted average pages of content =1,099 morning and 1,530 morning-and-evening pages per month, with the weights equal to numbers of subscribers, and advertising revenue per subscriber =2,634 and 4,159 yen per subscriber per month), are $c_{0m} = -119$ yen per month, and $c_{0m} + c_{0e} = 1{,}687$ yen per month. These are vastly lower than the unit distribution costs computed for the presumptively non-colluding newspapers, and so implausible.

5.3. Content *k*

The typical first-order condition for choice of number of pages of content is

[30] $$\frac{\partial \pi_i}{\partial k_i} = \frac{\partial (p_i s_i)}{\partial k_i} - \frac{\partial x_j}{\partial s_j}\frac{\partial s_j}{\partial k_i} - (f_k + \bar{c}s_i) + \sum_{j \neq i} \omega_{ij} \left(\frac{\partial (p_j s_j)}{\partial k_i} - \frac{\partial x_j}{\partial s_j}\frac{\partial s_j}{\partial k_i} \right) = 0$$

$$= \frac{p_i}{\lambda_i}\frac{\partial s_j}{\partial k_i} - (f_k + \bar{c}s_i) + \sum_{j \neq i} \omega_{ij} \left(\frac{p_j}{\lambda_j}\frac{\partial s_j}{\partial k_i} \right) = 0$$

$$= \frac{p_{si}s_i}{\lambda_i}\frac{\theta_i}{k_i} - (f_k + \bar{c}s_i) + \sum_{j \neq i} \omega_{ij} \left(\frac{p_{sj}s_j}{\lambda_j}\frac{\theta_{ji}}{k_i} \right) = 0 \ ,$$

where, as before, $\theta_{ji} \equiv \frac{k_i}{s_j}\frac{\partial s_j}{\partial k_i}$. Rearranging terms, we have:

[31] $$\frac{(f_k + \bar{c}s_i)k_i}{p_{si}s_i} = \frac{\theta_i}{\lambda_i} + \sum_{j \neq i} \omega_{ij} \left(\frac{\theta_{ji}}{\lambda_j} \right) \frac{p_{sj}s_j}{p_{si}s_i}$$

Continuing the example where *j=1* and *j=2* are morning-only and morning-and-evening subscriptions to a same newspaper ($k_1 \equiv k_m$ and $k_2 \equiv k_m + k_e$), at the Nash equilibrium of content choice (with subscription price set collusively or not), the pages of content fulfill the conditions as below[8]:

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[8] These expressions (showing cost of content relative to subscription revenues) have a close relation to the Dorfman-Steiner rule for advertising, most evident for the single-edition case:

$$\frac{(f_k + \bar{c}s_j)k_j}{p_{sj}s_j} = \frac{\theta_j}{\xi_j}$$

This expression resembles the Dorfman-Steiner condition describing optimal advertising expenditure. This is because, analytically, the model here is the same as the Dorfman-Steiner advertising model: Demand for subscriptions has constant elasticity ($0<\theta_j<1$) with respect to

[32] $$\frac{(f_k+\bar{c}s_1)k_m}{p_{s1}s_1} = \frac{\theta_1}{\lambda_1} + \left(\frac{\theta_{21}}{\lambda_2}\right)\frac{p_{s2}s_2}{p_{s1}s_1} ,$$

and

[33] $$\frac{(f_k+\bar{c}s_2)(k_m+k_e)}{p_{s2}s_2} = \frac{\theta_{12}}{\lambda_1}\left(\frac{p_{s1}s_1}{p_{s2}s_2}\right) + \frac{\theta_2}{\lambda_2} .$$

These equations show the interdependence in pages of content for morning editions and evening editions. From the demand estimates (appendix Table A.2), averaged across all newspapers: θ_{21}=*-0.13*, θ_{12} =*-0.08*, θ_1=*0.34* and θ_2=*0.35*. The content cost relative to subscription revenue for each type of subscription to each newspaper (computed according to the right-hand sides of equations [32] and [33] using price-cost margins based on Nash pricing, are shown in the last columns of Table 5. These average *0.21* for morning subscriptions and *0.16* for morning-and-evening subscriptions.

From [32] and [33], a collusive increase in price-cost margins $\frac{1}{\lambda_j}$ would induce costly expansions of content. This could inhibit or constrain price collusion, because it makes the gain from maintaining a collusive pricing agreement smaller (higher prices mean more content) and the gain from cheating on a collusive pricing agreement larger (a price discounter reduces its content). As already noted, the Japanese newspapers observe a monthly newspaper holiday, which amounts to a coordinated withholding of content. Such withholding of content could be a practical accompaniment to price collusion, necessary to assure that the price collusion succeeds. If the collusive increases in subscription prices are small, as appears to be the case, perhaps the reason is that collusive restriction on content is limited to the once-a-month newspaper holiday.

6. Conclusion

Japan's leading national newspapers and eleven of its largest regional and local papers, protected by a special 1953 exemption from antimonopoly law, have persistently kept their

content, just as in the Dorfman-Steiner model demand for the product has constant elasticity with respect to quantity of ads.

monthly subscription prices at the same common level, which is higher than the subscription prices of the other newspapers with whom they compete. Furthermore, all of the newspapers, not just the high-pricers, change their prices infrequently, and in unison. Still further, all of the newspapers observe a monthly newspaper holiday, in which on the same set day they refrain from publishing. Superficially at least, it appears that Japanese newspapers are acting collusively. Yet the demand elasticities estimated here are not consistent with pricing that maximizes the joint profit of the leading (high pricing) newspapers.

The conclusion that subscription prices lie below the levels that would maximize joint profit is based on new econometric estimates of Japanese newspaper demands and costs. I estimate the parameters of an indirect utility function, using micro-data compiled from survey responses of 27,788 persons living throughout Japan in March 2007. From the estimates of utility function parameters I infer arc elasticities and arc cross-elasticities of demand for each type of subscription to each newspaper. Following the same logic Nevo (2001) applied to the US breakfast cereal industry, I use these demand elasticities to construct price-cost margins implied by each alternative pricing regime. Price-cost margins for newspaper subscriptions are the percentages by which the subscription prices exceed marginal cost of printing and distributing the newspapers net of marginal profit from selling newspaper advertising. The actual price-cost margins for newspapers can be greater than one (because marginal profit from advertising can outweigh production and distribution costs). To determine which pricing regimes imply the closest match to actual price-cost margins requires information about costs and about the marginal profitability of ads. Accordingly, I estimate a system of demand for newspaper ads and costs of supplying ads, using cross-section data. Putting it all together, I find the assumption of Nash pricing yields plausible estimates of newspaper price-cost margins but the assumption of cartel pricing does not.

There could still be some collusive increase in the subscription prices of Japanese

newspapers. The high-pricers could well have collusively raised their prices by around ten percent, and the prices would still be much closer to the Nash equilibrium than a cartel equilibrium. Indeed I believe that is the most likely. I have shown that collusive increases in subscription prices are likely to precipitate costly expansions of newspaper content, that both reduce the profit from collusion and make it more difficult to maintain collusion. Japanese newspapers have established the custom of observing a monthly newspaper holiday, a day each month when all refrain from publishing. The collusive restriction of newspaper content is a logical accompaniment to a modest collusive price increase.

If the newspapers are collusively raising their prices, how much does it matter? This line of inquiry connects with previous literature. Similar estimates of newspaper demand to mine but based on aggregate data rather than micro-data have been used by others to assess the unilateral effects of mergers in the newspaper industries of the U.S. (Fan, 2013), and the Netherlands (Filistrucchi, Klein and Michielsen, 2012). Using my estimates I can perform an opposite kind of analysis by simulating the effects of a reduction in price coordination among newspapers rather than an increase in coordination.

Let us calculate the effects on consumer surplus and newspaper profits of an end to collusive pricing starting with an assumption about how subscription prices would change if the special exemption from antimonopoly prohibition against resale price maintenance were revoked and coordinated pricing ended. For this calculation, let us suppose that the newspapers now setting morning-and-evening prices of 3,925 yen per month and morning prices of 3,007 yen per month were to lower these by 340 yen per month and 140 yen per month, to 3,585 yen per month and 2,867 yen per month. Suppose also that the other newspapers keep prices unchanged. From simulation using the mixed-logit utility estimate of newspaper demand it turns out that these price reductions would confer an average increase in consumer surplus of 126 yen per month per household. This is the average difference in mean utility under the two scenarios divided by the utility of a one-yen price decrease (equal to the absolute value of the estimated coefficient on price), as in Small and Rosen (1981). Totaled over all 53.1-million Japanese households this would equal about 6.7 billion yen per month (80.2-billion yen per year, roughly $800-million per year). It would

increase total subscriptions of all newspapers by about 0.7 percent, which would have little effect on the demand for newspaper ads. Much of the shift in subscriptions would be from morning-only to morning-and-evening subscriptions of the same newspaper, rather than switching between national and local papers. It would reduce revenue from subscriptions by 54.2-billion yen per year. Further calculations imply that this would decrease newspaper profit by about 63.4-billion yen per year (46.2-billion yen per year among the collusive newspapers and 17.2-billion yen per year among the non-collusive newspapers). The net increase in social welfare would thus amount to 90.2-63.4=16.8-billion yen per year.

The calculation for effect on profit of the posited price reduction is based on the following and ignores any change in number of pages of content or ads. From equations [9], [10], [21] and [22], the profit of each newspaper company is

[34] $$\pi = \frac{p_{s1}s_1}{\lambda_1} + \frac{p_{s2}s_2}{\lambda_2} - f_a(a_m + a_{me}) - f_k(k_m + k_e) \ .$$

Collusive price-setting raises the first two terms on the right-hand side of equation [34], increasing profit. An end to collusive price setting reverses this, and lowers profit. Using the estimated values of λ_1 and λ_2 conditional on Nash pricing (corresponding to the no-cartel case) I impute the cartel price-cost margins λ' for each newspaper from

[35] $$p_{cartel}\left(1 - \frac{1}{\lambda'}\right) = p_{no.cartel}\left(1 - \frac{1}{\lambda}\right) \ .$$

The change in profit caused by reversion from collusive pricing to non-collusive is, for each newspaper:

[36] $$\Delta\pi = \frac{p_{s1}s_1}{\lambda_1} + \frac{p_{s2}s_2}{\lambda_2} - \frac{(p_{s1}s_1)'}{\lambda_1'} - \frac{(p_{s2}s_2)'}{\lambda_2'}$$

All of this assumes that no newspapers would go out of business and that total costs of production would be little affected.

Appendix 1. Data sources:

Pages of Ads, Total Pages:

Dentsu Inc. (Annual a). Dentsuu koukoku nenkan (Dentsu advertising annual), Dentsu.

Dentsu Inc. (Annual b). Dentsuu shinbun nenkan (Dentsu newspaper annual), Dentsu.

Subscription Prices, Circulation:

Japan Audit Bureau of Circulation, shinbun hakkousha repooto (Report on newspaper publishers), Nihon ABC kyoukai, semi-annual. 2007, and 2007 July-December, Jan-June.

Prices of Advertising:

Koukoutantou.com. Website http://www.koukokutantou.com/newspaper_1.html

Survey of Newspaper Readers

Video Research Ltd., Japan Readers and Area Data (JREAD) Survey conducted in March 2007.

Table A1. 2007 Elasticity of Demand with Respect to Price (arc elasticities based on five percent increase in price of row newspaper)

Id. No.	Newspaper	THE ASAHI SHIMBUN morning	THE ASAHI SHIMBUN morning + evening	MAINICHI SHIMBUN morning	MAINICHI SHIMBUN morning + evening	YOMIURI SHIMBUN morning	YOMIURI SHIMBUN morning + evening	SANKEI SHIMBUN morning	SANKEI SHIMBUN morning + evening	HOKKAIDO SHIMBUN morning	HOKKAIDO SHIMBUN morning + evening	TOO NIPPO morning + evening	DAILY TOHOKU	THE IWATE NIPPO morning + evening	THE KAHOKU SHIMPO morning	THE KAHOKU SHIMPO morning + evening	AKITA SAKIGAKE SHIMPO morning + evening	YAMAGATA SHIMBUN morning + evening	FUKUSHIMA MINPO	FUKUSHIMA MINYU	THE IBARAKI SHIMBUN	SHIMOTSUKE SHIMBUN	THE JOMO SHINBUN	THE TOKYO SHIMBUN morning	THE TOKYO SHIMBUN morning + evening	KANAGAWA SHIMBUN	NIIGATA NIPPO morning	NIIGATA NIPPO morning + evening	KITANIPPON SHIMBUN morning	THE HOKKOKU SHIMBUN morning	THE HOKKOKU SHIMBUN morning + evening	THE HOKURIKU CHUNICHI SHIMBUN morning	THE HOKURIKU CHUNICHI SHIMBUN morning + evening	FUKUI SHIMBUN	THE NIKKAN KENMIN FUKUI	YAMANASHI NICHINICHI SHIMBUN	SHINANO MAINICHI SHIMBUN morning	SHINANO MAINICHI SHIMBUN morning + evening	GIFU SHIMBUN morning	GIFU SHIMBUN morning + evening	SHIZUOKA SHIMBUN morning + evening	THE CHUNICHI SHIMBUN morning	THE CHUNICHI SHIMBUN morning + evening	KYOTO SHIMBUN morning	KYOTO SHIMBUN morning + evening
1	THE ASAHI SHIMBUN morning	-1.81	0.15	0.18	0.09	0.28	0.14	0.09	0.03	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.07	0.04	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.01	0.01
2	THE ASAHI SHIMBUN morning + evening	0.24	-2.15	0.14	0.17	0.23	0.24	0.08	0.04	0.01	0.02											0.00	0.01	0.01	0.12	0.06	0.02											0.02		0.02	0.02	0.01	0.05	0.04	0.01	0.01
13	MAINICHI SHIMBUN morning	0.28	0.15	-1.88	0.10	0.28	0.14	0.11	0.04	0.01	0.02	0.02	0.01	0.03	0.02	0.02	0.03	0.03	0.02	0.02		0.01	0.01	0.01	0.08	0.04	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.01	0.01
14	MAINICHI SHIMBUN morning + evening	0.23	0.27	0.17	-2.25	0.23	0.23	0.10	0.06	0.02	0.02											0.02	0.02	0.02	0.12	0.08	0.02											0.02		0.02	0.02	0.02	0.06	0.04	0.02	0.02
25	YOMIURI SHIMBUN morning	0.27	0.14	0.17	0.09	-1.81	0.14	0.09	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01		0.01	0.01	0.01	0.07	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.01	0.01
26	YOMIURI SHIMBUN morning + evening	0.23	0.25	0.14	0.16	0.23	-2.16	0.08	0.05	0.03	0.03											0.01	0.01	0.01	0.13	0.08	0.01				0.03	0.01	0.01	0.01	0.01			0.03				0.01	0.01	0.01	0.03	0.03
49	SANKEI SHIMBUN morning	0.27	0.15	0.22	0.13	0.27	0.15	-1.89	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.05	0.02	0.02	0.02
50	SANKEI SHIMBUN morning + evening	0.20	0.27	0.13	0.20	0.20	0.27	0.20	-2.27																																		0.00		0.00	0.00
54	HOKKAIDO SHIMBUN morning	0.19	0.19	0.09	0.09	0.19	0.19	0.00		-1.52	0.66		0.00																																	
55	HOKKAIDO SHIMBUN morning + evening	0.10	0.10	0.10	0.10	0.10	0.19	0.00		0.58	-1.84		0.00																																	
56	TOO NIPPO morning + evening	0.23		0.11		0.23		0.00				-1.26	0.46																																	
58	DAILY TOHOKU	0.16		0.16		0.16		0.00				0.82	-1.48																																	
59	THE IWATE NIPPO morning + evening	0.38		0.19		0.38		0.00						-1.14																																
61	THE KAHOKU SHIMPO morning	0.43		0.29		0.43		0.00							-1.59	0.58																													
62	THE KAHOKU SHIMPO morning + evening	0.31		0.31		0.31		0.00							0.47	-1.86																													
63	AKITA SAKIGAKE SHIMPO morning + evening	0.35		0.26		0.35		0.00									-1.04																												
65	YAMAGATA SHIMBUN morning + evening	0.36		0.27		0.44		0.09										-1.16																											
67	FUKUSHIMA MINPO	0.42		0.28		0.42		0.00											-1.40	0.56																									
68	FUKUSHIMA MINYU	0.27		0.14		0.27		0.00											0.55	-1.51																									
69	THE IBARAKI SHIMBUN	0.22	0.22	0.00	0.00	0.22	0.22	0.00													-1.78			0.22																				
70	SHIMOTSUKE SHIMBUN	0.23	0.23	0.23	0.23	0.23	0.45	0.00														-1.82		0.45																				
71	THE JOMO SHINBUN	0.21	0.21	0.00	0.21	0.21	0.21	0.00															-1.86	0.41																				
74	THE TOKYO SHIMBUN morning	0.25	0.27	0.16	0.18	0.25	0.27	0.02													0.04	0.04	0.04	-1.51	0.20	0.04																			
75	THE TOKYO SHIMBUN morning + evening	0.24	0.24	0.12	0.16	0.20	0.24	0.00																0.36	-1.94	0.04																			
76	KANAGAWA SHIMBUN	0.19	0.19	0.19	0.19	0.19	0.19	0.00																0.37	0.19	-1.85																			
77	NIIGATA NIPPO morning	0.45		0.30		0.45		0.00																			-1.64	0.60																	
78	NIIGATA NIPPO morning + evening	0.32		0.16		0.32		0.00																			0.48	-1.90																	
79	KITANIPPON SHIMBUN morning	0.21		0.21		0.21	0.41	0.00																					-1.65																
82	THE HOKKOKU SHIMBUN morning	0.00		0.00		0.00	0.00	0.00																						-1.62	0.54	0.54	0.54											
81	THE HOKKOKU SHIMBUN morning + evening	0.00		0.00		0.00	0.00	0.00																						0.29	-2.35	0.00	0.29											
83	THE HOKURIKU CHUNICHI SHIMBUN morning	0.00		0.00		0.25	0.25	0.00																						0.25	0.25	-1.77	0.25											
84	THE HOKURIKU CHUNICHI SHIMBUN morning + evening	0.29		0.29		0.29	0.29	0.00																						0.29	0.29	0.29	-2.29											
85	FUKUI SHIMBUN	0.19		0.19		0.19		0.19																										-1.51	0.57								0.19			
86	THE NIKKAN KENMIN FUKUI	0.12		0.12		0.24		0.12																										0.37	-1.10								0.12			
87	YAMANASHI NICHINICHI SHIMBUN	0.21	0.21	0.21	0.21	0.42	0.42	0.00																												-1.68									
88	SHINANO MAINICHI SHIMBUN morning	0.33		0.17		0.33		0.00																													-1.67	0.50						0.17			
89	SHINANO MAINICHI SHIMBUN morning + evening	0.36		0.18		0.36		0.18																													0.54	-1.80						0.18			
90	GIFU SHIMBUN morning	0.23	0.23	0.23	0.23	0.23		0.23																															-1.82	0.45				0.45	0.23		
91	GIFU SHIMBUN morning + evening	0.17	0.17	0.00	0.17	0.17		0.00																															0.35	-1.91				0.35	0.17		
92	SHIZUOKA SHIMBUN morning + evening	0.27	0.27	0.14	0.14	0.27	0.27	0.14																																		-1.49	0.27	0.14		
94	THE CHUNICHI SHIMBUN morning	0.24	0.24	0.12	0.12	0.28	0.04	0.12	0.00																									0.00	0.04	0.00	0.00	0.00	0.04	0.08	0.04	-1.78	0.20	0.04	0.00
95	THE CHUNICHI SHIMBUN morning + evening	0.26	0.35	0.17	0.17	0.26	0.09	0.17																											0.09				0.09	0.09	0.09	0.35	-2.18	0.00	0.00
97	KYOTO SHIMBUN morning	0.23	0.23	0.11	0.11	0.23	0.23	0.11	0.11																																		0.11		-1.82	0.23
98	KYOTO SHIMBUN morning + evening	0.19	0.19	0.00	0.00	0.19	0.19	0.00	0.00																																		0.00		0.19	-2.31
99	KOBE SHIMBUN morning	0.14	0.29	0.14	0.14	0.29	0.29	0.14	0.14																																					
100	KOBE SHIMBUN morning + evening	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.24																																					
102	NIHONKAI SHIMBUN	0.25		0.08		0.25		0.17																																						
103	SANIN CHUO SHIMPO	0.28		0.09		0.28		0.09																																						
104	THE SANYO SHIMBUN morning	0.44		0.22		0.44		0.22																																						
105	THE SANYO SHIMBUN morning + evening	0.24		0.00		0.24		0.00																																						
106	THE CHUGOKU SHIMBUN morning	0.24	0.08	0.16	0.00	0.24	0.08	0.16																																						
107	THE CHUGOKU SHIMBUN morning + evening	0.17	0.00	0.17	0.00	0.17	0.00	0.17																																						
108	TOKUSHIMA SHIMBUN morning	0.33		0.17		0.33		0.17																																						
109	TOKUSHIMA SHIMBUN morning + evening	0.17		0.17		0.33		0.17																																						
110	SHIKOKU SHIMBUN	0.32		0.21		0.32		0.21																																						
111	EHIME SHIMBUN	0.30		0.20		0.30		0.20																																						
112	KOCHI SHIMBUN morning	0.32		0.16		0.32		0.16																																						
113	KOCHI SHIMBUN morning + evening	0.15		0.15		0.15		0.15																																						
114	THE NISHINIPPON SHIMBUN morning	0.16	0.12	0.12	0.08	0.16	0.12	0.04																																						
115	THE NISHINIPPON SHIMBUN morning + evening	0.13	0.13	0.00	0.00	0.13	0.13	0.00																																						
116	SAGA SHIMBUN	0.12	0.12	0.00	0.00	0.12	0.00	0.00																																						
117	NAGASAKI SHIMBUN	0.17		0.08		0.17		0.00																																						
118	KUMAMOTO NICHINICHI SHIMBUN morning	0.16		0.16		0.16		0.00																																						
119	KUMAMOTO NICHINICHI SHIMBUN morning + evening	0.11		0.00		0.11		0.00																																						
120	OITA GODO SHIMBUN morning + evening	0.10	0.10	0.10	0.10	0.10	0.10	0.00																																						
122	MIYAZAKI NICHINICHI SHIMBUN (THE MIYANICHI)	0.14		0.14		0.21		0.00																																						
123	MINAMINIPPON SHIMBUN morning	0.13		0.13		0.13		0.00																																						
124	MINAMINIPPON SHIMBUN morning + evening	0.11		0.11		0.11		0.00																																						
126	THE OKINAWA TIMES morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																						
128	THE RYUKYU SHIMPO morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																						
	NONE																																													
	fraction of switchers that choose NONE when price rises	0.09	0.06	0.09	0.06	0.10	0.07	0.10	0.00	0.13	0.11	0.27	0.11	0.17	0.18	0.17	0.17	0.31	0.10	0.09	0.13	0.00	0.11	0.08	0.06	0.10	0.27	0.17	0.13	0.33	0.13	0.00	0.13	0.00	0.00	0.00	0.10	0.10	-0.13	-0.09	0.09	0.07	0.08	0.13	0.08

Table A1. Cont'd. 2007 Elasticity of Demand with Respect to Price (arc elasticities based on five percent increase in price of row new

Id. No.	Newspaper	KOBE SHIMBUN morning	KOBE SHIMBUN morning + evening	NIHONKAI SHIMBUN	SANIN CHUO SHIMPO	THE SANYO SHIMBUN morning	THE SANYO SHIMBUN morning + evening	THE CHUGOKU SHIMBUN morning	THE CHUGOKU SHIMBUN morning + evening	TOKUSHIMA SHIMBUN morning	TOKUSHIMA SHIMBUN morning + evening	SHIKOKU SHIMBUN	EHIME SHIMBUN	KOCHI SHIMBUN morning	KOCHI SHIMBUN morning + evening	THE NISHINIPPON SHIMBUN morning	THE NISHINIPPON SHIMBUN morning + evening	SAGA SHIMBUN	NAGASAKI SHIMBUN	KUMAMOTO NICHINICHI SHIMBUN morning	KUMAMOTO NICHINICHI SHIMBUN morning +	OITA GODO SHIMBUN morning + evening	MIYAZAKI NICHINICHI SHIMBUN (THE MIYAI	MINAMINIPPON SHIMBUN morning	MINAMINIPPON SHIMBUN morning + evening	THE OKINAWA TIMES morning + evening	THE RYUKYU SHIMPO morning + evening
1	THE ASAHI SHIMBUN morning	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
2	THE ASAHI SHIMBUN morning + evening	0.01	0.01					0.00	0.00							0.02	0.00	0.00					0.01			0.00	0.00
13	MAINICHI SHIMBUN morning	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00
14	MAINICHI SHIMBUN morning + evening	0.02	0.02					0.00	0.00							0.02	0.02	0.00					0.02			0.00	0.00
25	YOMIURI SHIMBUN morning	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
26	YOMIURI SHIMBUN morning + evening	0.03	0.01					0.01	0.00							0.03	0.01	0.00					0.03			0.00	0.00
49	SANKEI SHIMBUN morning	0.02	0.02	0.02	0.04	0.02	0.02	0.04	0.02	0.02	0.02	0.04	0.04	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	SANKEI SHIMBUN morning + evening	0.00	0.00																								
54	HOKKAIDO SHIMBUN morning																										
55	HOKKAIDO SHIMBUN morning + evening																										
56	TOO NIPPO morning + evening																										
58	DAILY TOHOKU																										
59	THE IWATE NIPPO morning + evening																										
61	THE KAHOKU SHIMPO morning																										
62	THE KAHOKU SHIMPO morning + evening																										
63	AKITA SAKIGAKE SHIMPO morning + evening																										
65	YAMAGATA SHIMBUN morning + evening																										
67	FUKUSHIMA MINPO																										
68	FUKUSHIMA MINYU																										
69	THE IBARAKI SHIMBUN																										
70	SHIMOTSUKE SHIMBUN																										
71	THE JOMO SHINBUN																										
74	THE TOKYO SHIMBUN morning																										
75	THE TOKYO SHIMBUN morning + evening																										
76	KANAGAWA SHIMBUN																										
77	NIIGATA NIPPO morning																										
78	NIIGATA NIPPO morning + evening																										
79	KITANIPPON SHIMBUN morning																										
82	THE HOKKOKU SHIMBUN morning																										
81	THE HOKKOKU SHIMBUN morning + evening																										
83	THE HOKURIKU CHUNICHI SHIMBUN morning																										
84	THE HOKURIKU CHUNICHI SHIMBUN morning + evening																										
85	FUKUI SHIMBUN																										
86	THE NIKKAN KENMIN FUKUI																										
87	YAMANASHI NICHINICHI SHIMBUN																										
88	SHINANO MAINICHI SHIMBUN morning																										
89	SHINANO MAINICHI SHIMBUN morning + evening																										
90	GIFU SHIMBUN morning																										
91	GIFU SHIMBUN morning + evening																										
92	SHIZUOKA SHIMBUN morning + evening																										
94	THE CHUNICHI SHIMBUN morning																										
95	THE CHUNICHI SHIMBUN morning + evening																										
97	KYOTO SHIMBUN morning																										
98	KYOTO SHIMBUN morning + evening																										
99	KOBE SHIMBUN morning	-1.73	0.29																								
100	KOBE SHIMBUN morning + evening	0.24	-2.44																								
102	NIHONKAI SHIMBUN			-0.68				0.00																			
103	SANIN CHUO SHIMPO				-1.20																						
104	THE SANYO SHIMBUN morning					-1.56	0.44																				
105	THE SANYO SHIMBUN morning + evening					0.24	-2.14																				
106	THE CHUGOKU SHIMBUN morning				0.00			-1.57	0.31																		
107	THE CHUGOKU SHIMBUN morning + evening							0.52	-1.91																		
108	TOKUSHIMA SHIMBUN morning									-1.49	0.66																
109	TOKUSHIMA SHIMBUN morning + evening									0.50	-1.83																
110	SHIKOKU SHIMBUN											-1.27															
111	EHIME SHIMBUN												-1.21														
112	KOCHI SHIMBUN morning													-1.43	0.79												
113	KOCHI SHIMBUN morning + evening													0.61	-1.67												
114	THE NISHINIPPON SHIMBUN morning															-1.55	0.23	0.19	0.12	0.08	0.08	0.08	0.00				
115	THE NISHINIPPON SHIMBUN morning + evening															0.64	-2.04										
116	SAGA SHIMBUN															0.59		-1.29									
117	NAGASAKI SHIMBUN															0.17			-1.00								
118	KUMAMOTO NICHINICHI SHIMBUN morning															0.31				-1.56	0.94						
119	KUMAMOTO NICHINICHI SHIMBUN morning + evening															0.22				0.56	-1.45						
120	OITA GODO SHIMBUN morning + evening															0.10						-1.32					
122	MIYAZAKI NICHINICHI SHIMBUN (THE MIYANICHI)															0.00							-0.70				
123	MINAMINIPPON SHIMBUN morning																							-1.38	1.00		
124	MINAMINIPPON SHIMBUN morning + evening																							0.74	-1.38		
126	THE OKINAWA TIMES morning + evening																									-1.22	0.91
128	THE RYUKYU SHIMPO morning + evening																									0.92	-1.22
	NONE																										
	fraction of switchers that choose NONE when price rises	0.25	0.10	0.25	0.23	0.29	0.22	0.15	0.18	0.00	0.09	0.08	0.08	0.00	0.00	0.13	0.06	0.00	0.17	0.10	0.15	0.23	0.60	0.09	0.15	0.17	0.17

Table A2. 2007 Elasticity of Demand with Respect to Pages of Content per Month (Arc Elasticities Based on Five Percent Increase in Pages of Content of Row Newspaper)

Id. No.	Newspaper	THE ASAHI SHIMBUN morning	THE ASAHI SHIMBUN morning + evening	MAINICHI SHIMBUN morning	MAINICHI SHIMBUN morning + evening	YOMIURI SHIMBUN morning	YOMIURI SHIMBUN morning + evening	SANKEI SHIMBUN morning	SANKEI SHIMBUN morning + evening	HOKKAIDO SHIMBUN morning	HOKKAIDO SHIMBUN morning + evening	TOO NIPPO morning + evening	DAILY TOHOKU	THE IWATE NIPPO morning + evening	THE KAHOKU SHIMPO morning	THE KAHOKU SHIMPO morning + evening	AKITA SAKIGAKE SHIMPO morning + evening	YAMAGATA SHIMBUN morning + evening	FUKUSHIMA MINPO	FUKUSHIMA MINYU	THE IBARAKI SHIMBUN	SHIMOTSUKE SHIMBUN	THE JOMO SHINBUN	THE TOKYO SHIMBUN morning	THE TOKYO SHIMBUN morning + evening	KANAGAWA SHIMBUN	NIIGATA NIPPO morning	NIIGATA NIPPO morning + evening	KITANIPPON SHIMBUN morning	THE HOKKOKU SHIMBUN morning	THE HOKKOKU SHIMBUN morning + evening	THE HOKURIKU CHUNICHI SHIMBUN morning	THE HOKURIKU CHUNICHI SHIMBUN morning + evening	FUKUI SHIMBUN	THE NIKKAN KENMIN FUKUI	YAMANASHI NICHINICHI SHIMBUN	SHINANO MAINICHI SHIMBUN morning	SHINANO MAINICHI SHIMBUN morning + evening	GIFU SHIMBUN morning	GIFU SHIMBUN morning + evening	SHIZUOKA SHIMBUN morning + evening	THE CHUNICHI SHIMBUN morning	THE CHUNICHI SHIMBUN morning + evening	KYOTO SHIMBUN morning	KYOTO SHIMBUN morning + evening
1	THE ASAHI SHIMBUN morning	0.41	-0.03	-0.04	-0.02	-0.06	-0.02	-0.02	-0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00
2	THE ASAHI SHIMBUN morning + evening	-0.06	0.42	-0.04	-0.04	-0.06	-0.05	-0.01	0.00	-0.01	0.00												-0.01	0.00	-0.01	-0.04	-0.02	0.01										0.00	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01
13	MAINICHI SHIMBUN morning	-0.07	-0.03	0.43	-0.02	-0.06	-0.03	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00
14	MAINICHI SHIMBUN morning + evening	-0.06	-0.06	-0.04	0.46	-0.06	-0.06	-0.02	-0.02	0.00	0.00												0.00	0.00	0.00	-0.04	-0.02	0.00										0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00
25	YOMIURI SHIMBUN morning	-0.07	-0.03	-0.04	-0.02	0.41	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	0.00	-0.02	-0.01	0.00	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.01	0.00
26	YOMIURI SHIMBUN morning + evening	-0.05	-0.06	-0.04	-0.03	-0.05	0.43	-0.01	-0.01	0.00	0.00												0.00	0.00	0.00	-0.03	-0.01	0.00				0.00	0.00	0.00	0.00	0.00		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	SANKEI SHIMBUN morning	-0.05	-0.02	-0.05	-0.02	-0.05	-0.02	0.44	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00
50	SANKEI SHIMBUN morning + evening	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	0.40																																		0.00		-0.07	-0.07
54	HOKKAIDO SHIMBUN morning	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.28	-0.09		0.00																																	
55	HOKKAIDO SHIMBUN morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-0.19	0.29		0.00																																	
56	TOO NIPPO morning + evening	0.00		0.00		0.00		0.00				0.34	-0.11																																	
58	DAILY TOHOKU	0.00		0.00		0.00		0.00				-0.16	0.33																																	
59	THE IWATE NIPPO morning + evening	-0.10		0.00		-0.10		0.00						0.29																																
61	THE KAHOKU SHIMPO morning	0.00		0.00		0.00		0.00							0.43	-0.14																													
62	THE KAHOKU SHIMPO morning + evening	0.00		0.00		0.00		0.00							-0.16	0.31																													
63	AKITA SAKIGAKE SHIMPO morning + evening	-0.09		-0.09		-0.09		0.00									0.26																												
65	YAMAGATA SHIMBUN morning + evening	-0.09		0.00		-0.09		0.00										0.27																												
67	FUKUSHIMA MINPO	-0.14		-0.14		0.00		0.00											0.42	0.00																										
68	FUKUSHIMA MINYU	-0.14		-0.14		-0.14		0.00											-0.14	0.27																										
69	THE IBARAKI SHIMBUN	-0.22	-0.22	-0.22	-0.22	-0.22	-0.22	0.00													0.22			-0.22																					
70	SHIMOTSUKE SHIMBUN	0.00	0.00	0.00	0.00	0.00	0.00	0.00														0.45		0.00																					
71	THE JOMO SHINBUN	-0.21	0.00	0.00	0.00	0.00	-0.21	0.00															0.41	-0.21																					
74	THE TOKYO SHIMBUN morning	-0.05	-0.05	-0.04	-0.04	-0.05	-0.05	-0.02													-0.02	-0.02	0.00	0.38	-0.04	-0.02																			
75	THE TOKYO SHIMBUN morning + evening	-0.08	-0.08	-0.04	-0.04	-0.08	-0.08	-0.04																-0.12	0.40	-0.04																			
76	KANAGAWA SHIMBUN	0.00	0.00	0.00	0.00	0.00	0.00	0.00																-0.19	0.00	0.37																			
77	NIIGATA NIPPO morning	0.00		0.00		0.00		0.00																			0.45	-0.15																	
78	NIIGATA NIPPO morning + evening	-0.16		0.00		0.00		0.00																			-0.16	0.32																	
79	KITANIPPON SHIMBUN morning	-0.21		-0.21		-0.21	-0.21	-0.21																					0.21															
82	THE HOKKOKU SHIMBUN morning	0.00		-0.27		-0.27	-0.27	-0.27																						0.55	-0.27	-0.27	-0.27										
81	THE HOKKOKU SHIMBUN morning + evening	-0.29		-0.29		-0.29	-0.29	0.00																						-0.29	0.59	0.00	-0.29										
83	THE HOKURIKU CHUNICHI SHIMBUN morning	0.00		0.00		0.00	0.00	0.00																						-0.25	-0.25	0.25	-0.25										
84	THE HOKURIKU CHUNICHI SHIMBUN morning + eve	-0.28		0.00		0.00	-0.28	0.00																						-0.28	0.00	0.00	0.56										
85	FUKUI SHIMBUN	0.00		0.00		0.00		0.00																										0.38	-0.19									
86	THE NIKKAN KENMIN FUKUI	-0.12		0.00		-0.12		0.00																										-0.12	0.24									
87	YAMANASHI NICHINICHI SHIMBUN	0.00	0.00	0.00	0.00	0.00	0.00	0.00																												0.42								
88	SHINANO MAINICHI SHIMBUN morning	-0.17		0.00		-0.17		0.00																													0.33	-0.17							
89	SHINANO MAINICHI SHIMBUN morning + evening	0.00		0.00		0.00		0.00																													0.00	0.36							
90	GIFU SHIMBUN morning	0.00	0.00	0.00	0.00	0.00		0.00																															0.45	0.00					
91	GIFU SHIMBUN morning + evening	0.00	0.00	0.00	0.00	0.00		0.00																															-0.17	0.35					
92	SHIZUOKA SHIMBUN morning + evening	0.00	0.00	0.00	0.00	0.00		0.00																																	0.41	0.00	0.00		
94	THE CHUNICHI SHIMBUN morning	-0.08	-0.04	-0.04	-0.04	-0.08	-0.04	-0.04	0.00																									0.00	-0.04	0.00	0.00	0.00	-0.04	-0.04	-0.04	0.40	-0.04	0.00	0.00
95	THE CHUNICHI SHIMBUN morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00																												0.00			0.00	0.00	0.00	-0.17	0.44	-0.09	0.00
97	KYOTO SHIMBUN morning	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11																																	-0.11		0.34	-0.11
98	KYOTO SHIMBUN morning + evening	-0.19	-0.19	0.00	0.00	-0.19	-0.19	0.00	0.00																																	0.00		-0.19	0.38
99	KOBE SHIMBUN morning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																				
100	KOBE SHIMBUN morning + evening	0.00	0.00	0.00	0.00	-0.24	0.00	-0.24	0.00																																				
102	NIHONKAI SHIMBUN	-0.08		-0.08		-0.08		-0.08																																					
103	SANIN CHUO SHIMPO	-0.09		-0.09		-0.09		-0.09																																					
104	THE SANYO SHIMBUN morning	0.00		0.00		0.00		0.00																																					
105	THE SANYO SHIMBUN morning + evening	-0.24		-0.24		-0.24		-0.24																																					
106	THE CHUGOKU SHIMBUN morning	-0.08	0.00	-0.08	0.00	-0.08	0.00	-0.08																																					
107	THE CHUGOKU SHIMBUN morning + evening	-0.17	0.00	0.00	0.00	0.00	0.00	0.00																																					
108	TOKUSHIMA SHIMBUN morning	0.00		0.00		0.00		0.00																																					
109	TOKUSHIMA SHIMBUN morning + evening	0.00		0.00		0.00		0.00																																					
110	SHIKOKU SHIMBUN	-0.11		-0.11		-0.11		-0.11																																					
111	EHIME SHIMBUN	0.00		0.00		-0.10		0.00																																					
112	KOCHI SHIMBUN morning	0.00		0.00		0.00		0.00																																					
113	KOCHI SHIMBUN morning + evening	0.00		0.00		0.00		0.00																																					
114	THE NISHINIPPON SHIMBUN morning	-0.04	-0.04	0.00	0.00	-0.04	0.00	0.00																																					
115	THE NISHINIPPON SHIMBUN morning + evening	-0.13	0.00	-0.13	-0.13	0.00	-0.13	0.13																																					
116	SAGA SHIMBUN	-0.12	-0.12	-0.12	0.00	-0.12	0.00	0.00																																					
117	NAGASAKI SHIMBUN	-0.08		-0.08		-0.08		0.00																																					
118	KUMAMOTO NICHINICHI SHIMBUN morning	0.00		0.00		0.00		0.00																																					
119	KUMAMOTO NICHINICHI SHIMBUN morning + eveni	0.00		0.00		0.00		0.00																																					
120	OITA GODO SHIMBUN morning + evening	-0.10	-0.10	0.00	0.00	-0.10	-0.10	0.00																																					
122	MIYAZAKI NICHINICHI SHIMBUN (THE MIYANICHI	0.00		0.00		0.00		0.00																																					
123	MINAMINIPPON SHIMBUN morning	0.00		0.00		0.00		0.00																																					
124	MINAMINIPPON SHIMBUN morning + evening	0.00		0.00		0.00		0.00																																					
126	THE OKINAWA TIMES morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																					
128	THE RYUKYU SHIMPO morning + evening	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																					

Table A2 Cont'd. 2007 Elasticity of Demand with Respect to Pages of Content per Month (Arc Elasticities Based on Five Percent Increase in Pages of Content of Row

Id. No.	Newspaper	KOBE SHIMBUN morning	KOBE SHIMBUN morning + evening	NIHONKAI SHIMBUN	SANIN CHUO SHIMPO	THE SANYO SHIMBUN morning	THE SANYO SHIMBUN morning + evening	THE CHUGOKU SHIMBUN morning	THE CHUGOKU SHIMBUN morning + evening	TOKUSHIMA SHIMBUN morning	TOKUSHIMA SHIMBUN morning + evening	SHIKOKU SHIMBUN	EHIME SHIMBUN	KOCHI SHIMBUN morning	KOCHI SHIMBUN morning + evening	THE NISHINIPPON SHIMBUN morning	THE NISHINIPPON SHIMBUN morning + evening	SAGA SHIMBUN	NAGASAKI SHIMBUN	KUMAMOTO NICHINICHI SHIMBUN morning	KUMAMOTO NICHINICHI SHIMBUN morning +	OITA GODO SHIMBUN morning + evening	MIYAZAKI NICHINICHI SHIMBUN (THE MIYA	MINAMINIPPON SHIMBUN morning	MINAMINIPPON SHIMBUN morning + evening	THE OKINAWA TIMES morning + evening	THE RYUKYU SHIMPO morning + evening
1	THE ASAHI SHIMBUN morning	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	THE ASAHI SHIMBUN morning + evening	0.00	0.00					0.01	0.00							-0.01	-0.01	-0.01				-0.01				-0.01	0.01
13	MAINICHI SHIMBUN morning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	MAINICHI SHIMBUN morning + evening	0.00	0.00					0.00	0.00							0.00	0.00	0.00				0.00				0.00	0.00
25	YOMIURI SHIMBUN morning	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
26	YOMIURI SHIMBUN morning + evening	0.00	0.00					0.00	0.00							0.00	0.00	-0.01				0.00				0.00	0.00
49	SANKEI SHIMBUN morning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	SANKEI SHIMBUN morning + evening	-0.07	0.00																								
54	HOKKAIDO SHIMBUN morning																										
55	HOKKAIDO SHIMBUN morning + evening																										
56	TOO NIPPO morning + evening																										
58	DAILY TOHOKU																										
59	THE IWATE NIPPO morning + evening																										
61	THE KAHOKU SHIMPO morning																										
62	THE KAHOKU SHIMPO morning + evening																										
63	AKITA SAKIGAKE SHIMPO morning + evening																										
65	YAMAGATA SHIMBUN morning + evening																										
67	FUKUSHIMA MINPO																										
68	FUKUSHIMA MINYU																										
69	THE IBARAKI SHIMBUN																										
70	SHIMOTSUKE SHIMBUN																										
71	THE JOMO SHINBUN																										
74	THE TOKYO SHIMBUN morning																										
75	THE TOKYO SHIMBUN morning + evening																										
76	KANAGAWA SHIMBUN																										
77	NIIGATA NIPPO morning																										
78	NIIGATA NIPPO morning + evening																										
79	KITANIPPON SHIMBUN morning																										
82	THE HOKKOKU SHIMBUN morning																										
81	THE HOKKOKU SHIMBUN morning + evening																										
83	THE HOKURIKU CHUNICHI SHIMBUN morning																										
84	THE HOKURIKU CHUNICHI SHIMBUN morning + evening																										
85	FUKUI SHIMBUN																										
86	THE NIKKAN KENMIN FUKUI																										
87	YAMANASHI NICHINICHI SHIMBUN																										
88	SHINANO MAINICHI SHIMBUN morning																										
89	SHINANO MAINICHI SHIMBUN morning + evening																										
90	GIFU SHIMBUN morning																										
91	GIFU SHIMBUN morning + evening																										
92	SHIZUOKA SHIMBUN morning + evening																										
94	THE CHUNICHI SHIMBUN morning																										
95	THE CHUNICHI SHIMBUN morning + evening																										
97	KYOTO SHIMBUN morning																										
98	KYOTO SHIMBUN morning + evening																										
99	KOBE SHIMBUN morning	0.43	0.00																								
100	KOBE SHIMBUN morning + evening	-0.24	0.49																								
102	NIHONKAI SHIMBUN			0.17				0.00																			
103	SANIN CHUO SHIMPO				0.28																						
104	THE SANYO SHIMBUN morning					0.44	0.00																				
105	THE SANYO SHIMBUN morning + evening					0.00	0.24																				
106	THE CHUGOKU SHIMBUN morning				0.00			0.31	-0.08																		
107	THE CHUGOKU SHIMBUN morning + evening							-0.17	0.35																		
108	TOKUSHIMA SHIMBUN morning									0.33	0.00																
109	TOKUSHIMA SHIMBUN morning + evening									-0.17	0.33																
110	SHIKOKU SHIMBUN											0.21															
111	EHIME SHIMBUN												0.30														
112	KOCHI SHIMBUN morning													0.32	0.00												
113	KOCHI SHIMBUN morning + evening													-0.15	0.30												
114	THE NISHINIPPON SHIMBUN morning															0.35	-0.04	-0.04	0.00	0.00	0.00	0.00	0.00				
115	THE NISHINIPPON SHIMBUN morning + evening															-0.25	0.38										
116	SAGA SHIMBUN															-0.24		0.24									
117	NAGASAKI SHIMBUN															0.00			0.17								
118	KUMAMOTO NICHINICHI SHIMBUN morning															0.00				0.31	-0.16						
119	KUMAMOTO NICHINICHI SHIMBUN morning + evening															-0.11				-0.11	0.22						
120	OITA GODO SHIMBUN morning + evening															-0.10						0.20					
122	MIYAZAKI NICHINICHI SHIMBUN (THE MIYANICHI)															0.00							0.14				
123	MINAMINIPPON SHIMBUN morning																							0.38	-0.13		
124	MINAMINIPPON SHIMBUN morning + evening																							-0.11	0.32		
126	THE OKINAWA TIMES morning + evening																									0.20	-0.20
128	THE RYUKYU SHIMPO morning + evening																									-0.20	0.20

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Table 1. 2007 Circulation and penetration rates, sample newspapers

Id. No.	Newspaper	circulation 2007	pene-tration	Okinawa	Kagoshima	Miyazaki	Oita	Kumamoto	Nagasaki	Saga	Fukuoka	Kochi	Ehime	Kagawa	Tokushima	Yamaguchi	Hiroshima	Okayama	Shimane	Tottori	Wakayama	Nara	Hyogo	Osaka	Kyoto	Shiga	Mie	Aichi	Shizuoka	Gifu	Nagano	Yamanashi	Fukui	Ishikawa	Toyama	Niigata	Kanagawa	Tokyo	Chiba	Saitama	Gumma	Tochigi	Ibaraki	Fukushima	Yamagata	Akita	Miyagi	Iwate	Aomori	Hokkaido
1	THE ASAHI SHIMBUN morning	4,478,447	8.4%	0.3	3.5	10.2	9.9	6.3	10.9	7.2	11.0	3.2	11.3	15.0	4.9	25.3	11.1	10.9	9.9	8.0	16.3	8.4	7.9	3.4	7.3	17.4	14.1	5.7	7.4	5.9	7.7	9.5	4.7	3.0	2.8	8.5	10.5	6.4	12.7	14.4	12.7	11.3	18.7	10.2	17.1	9.2	10.1	7.7	4.5	3.9
2	THE ASAHI SHIMBUN morning + evening	3,588,260	6.8%	0.3			1.3			0.3	5.6					1.4					7.8	20.1	14.5	17.6	11.1	6.2	3.6	3.7	0.2	2.4		0.7						15.0	13.3	9.6	7.8	0.7	1.0	1.9							2.0
13	MAINICHI SHIMBUN morning	2,510,628	4.7%	0.1	1.4	6.2	6.8	2.8	8.4	7.3	11.7	1.5	5.4	6.2	1.4	22.5	2.9	4.0	5.9	4.6	13.9	13.3	4.1	2.4	5.0	12.0	7.7	2.4	2.7	2.5	2.3	3.5	1.4	0.6	0.5	3.3	3.3	3.5	6.6	8.3	7.6	6.7	12.3	6.1	6.8	3.4	1.8	3.0	1.7	2.1
14	MAINICHI SHIMBUN morning + evening	1,463,199	2.8%	0.1			0.5				3.9					1.1					4.7	14.1	6.5	13.1	4.3	2.1	1.5	1.1	1.7	0.7		0.3						2.3	3.2	1.8	1.9	0.4	0.4	0.6							0.6
25	YOMIURI SHIMBUN morning	6,163,453	11.6%	0.1	4.3	7.3	11.8	7.9	11.9	10.8	14.8	3.1	12.9	15.1	3.2	28.2	12.4	11.3	14.8	12.6	21.9	8.9	9.8	4.6	8.3	23.7	8.7	3.3	4.1	2.9	8.6	12.5	5.1	4.0	22.4	13.8	12.1	6.4	22.5	28.4	33.2	27.7	40.9	9.9	16.7	9.3	8.3	11.9	5.2	8.9
26	YOMIURI SHIMBUN morning + evening	3,868,988	7.3%	0.1			0.6				4.6					1.3					7.8	15.4	14.2	20.1	9.7	5.1			2.5			0.3		0.3	1.0		16.3	17.3	13.3	10.3	0.5	0.7	1.5							2.4
49	SANKEI SHIMBUN morning	1,567,455	3.0%	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.4	1.5	2.8	0.6	0.0	1.6	1.8	1.1	1.3	12.3	13.4	3.4	7.1	1.8	4.3	1.5	0.1	1.7	0.1	0.9	1.9	0.8	0.3	0.2	1.4	3.2	6.0	5.2	3.7	4.3	6.1	6.9	1.1	0.9	0.8	1.2	0.9	0.6	0.0
50	SANKEI SHIMBUN morning + evening	633,154	1.2%																		2.4	8.9	2.8	13.1	1.1	0.8																								
54	HOKKAIDO SHIMBUN morning	564,517	1.1%																																														21.8
55	HOKKAIDO SHIMBUN morning + evening	639,634	1.2%																																														24.3
56	TOO NIPPO moming + evening	255,976	0.5%																																												26.4	
58	DAILY TOHOKU	107,369	0.2%																																												18.3	
59	THE IWATE NIPPO morning + evening	231,437	0.4%																																												46.6		
61	THE KAHOKU SHIMPO morning	391,485	0.7%																																												43.1		
62	THE KAHOKU SHIMPO morning + evening	109,871	0.2%																																											12.1		
63	AKITA SAKIGAKE SHIMPO morning + evening	260,884	0.5%																																											62.4		
65	YAMAGATA SHIMBUN morning + evening	211,003	0.4%																																										53.5			
67	FUKUSHIMA MINPO	303,626	0.6%																																									41.4			
68	FUKUSHIMA MINYU	201,876	0.4%																																								27.3			
69	THE IBARAKI SHIMBUN	123,136	0.2%																																							11.3			
70	SHIMOTSUKE SHIMBUN	321,807	0.6%																																						43.8			
71	THE JOMO SHINBUN	310,175	0.6%																																					41.7			
74	THE TOKYO SHIMBUN morning	304,619	0.6%																																	1.1	1.2	2.4	2.2	2.9	0.9	3.1							
75	THE TOKYO SHIMBUN morning + evening	280,889	0.5%																																	1.5	3.0	0.7	0.7										
76	KANAGAWA SHIMBUN	218,041	0.4%																																	5.7													
77	NIIGATA NIPPO morning	439,570	0.8%																																53.2													
78	NIIGATA NIPPO morning + evening	55,784	0.1%																																6.5													
79	KITANIPPON SHIMBUN morning	250,201	0.5%																															65.7													
81	THE HOKKOKU SHIMBUN morning + evening	258,466	0.5%																														19.6															
82	THE HOKKOKU SHIMBUN morning	84,808	0.2%																														50.6															
83	THE HOKURIKU CHUNICHI SHIMBUN morning	93,152	0.2%																														19.0															
84	THE HOKURIKU CHUNICHI SHIMBUN morning + evening	10,238	0.0%																														2.3															
85	FUKUI SHIMBUN	209,144	0.4%																													78.2															
86	THE NIKKAN KENMIN FUKUI	40,165	0.1%																													15.1															
87	YAMANASHI NICHINICHI SHIMBUN	208,133	0.4%																												63.3															
88	SHINANO MAINICHI SHIMBUN morning	432,739	0.8%																											54.3															
89	SHINANO MAINICHI SHIMBUN morning + evening	52,492	0.1%																											6.5															
90	GIFU SHIMBUN morning	146,283	0.3%																										20.2															
91	GIFU SHIMBUN morning + evening	31,070	0.1%																										4.3															
92	SHIZUOKA SHIMBUN morning + evening	717,229	1.4%																									51.3																	
94	THE CHUNICHI SHIMBUN morning	2,124,288	4.0%																						10.8	42.6	44.9	7.6	50.1	5.9		3.3															
95	THE CHUNICHI SHIMBUN morning + evening	650,297	1.2%																							6.0	18.2	2.5	6.7																	
97	KYOTO SHIMBUN morning	192,119	0.4%																						12.2	12.6																				
98	KYOTO SHIMBUN morning + evening	317,881	0.6%																						27.5	3.8																				
99	KOBE SHIMBUN morning	307,099	0.6%																				24.7																						
100	KOBE SHIMBUN morning + evening	254,782	0.5%																				11.2																						
102	NIHONKAI SHIMBUN	175,497	0.3%																	75.7																									
103	SANIN CHUO SHIMPO	180,878	0.3%																62.4																										
104	THE SANYO SHIMBUN morning	394,612	0.7%															49.9																											
105	THE SANYO SHIMBUN morning + evening	72,015	0.1%															9.5																											
106	THE CHUGOKU SHIMBUN morning	644,166	1.2%													9.3	48.3		2.6																											
107	THE CHUGOKU SHIMBUN morning + evening	73,628	0.1%														5.7																												
108	TOKUSHIMA SHIMBUN morning	200,102	0.4%												63.1																													
109	TOKUSHIMA SHIMBUN morning + evening	54,622	0.1%												17.3																													
110	SHIKOKU SHIMBUN	208,307	0.4%											52.0																													
111	EHIME SHIMBUN	318,391	0.6%										51.6																															
112	KOCHI SHIMBUN morning	84,657	0.2%								24.2																																	
113	KOCHI SHIMBUN morning + evening	143,219	0.3%								41.1																																	
114	THE NISHINIPPON SHIMBUN morning	679,137	1.3%			0.9	3.7	3.5	13.8	20.6	22.7																																	
115	THE NISHINIPPON SHIMBUN morning + evening	175,518	0.3%								8.2																																	
116	SAGA SHIMBUN	141,023	0.3%							46.7																																		
117	NAGASAKI SHIMBUN	190,034	0.4%						31.5																																			
118	KUMAMOTO NICHINICHI SHIMBUN morning	274,491	0.5%					38.2																																				
119	KUMAMOTO NICHINICHI SHIMBUN morning + evening	90,269	0.2%					12.3																																				
120	OITA GODO SHIMBUN morning + evening	234,159	0.4%				46.6																																					
122	MIYAZAKI NICHINICHI SHIMBUN (THE MIYANICHI)	232,578	0.4%			44.3																																					
123	MINAMINIPPON SHIMBUN morning	362,219	0.7%		46.2																																						
124	MINAMINIPPON SHIMBUN morning + evening	26,034	0.0%		3.3																																						
126	THE OKINAWA TIMES morning + evening	206,569	0.4%	38.8																																							
128	THE RYUKYU SHIMPO morning + evening	205,465	0.4%	37.9																																							
	Total	41,353,459		532,688	775,541	489,832	495,120	712,952	601,788	302,591	2,104,652	346,228	618,521	401,497	314,289	633,395	1,198,083	758,762	272,241	222,832	420,679	540,542	2,267,661	3,779,054	1,085,362	487,389	701,695	2,774,999	1,397,457	724,887	798,841	328,309	266,948	431,925	379,768	831,390	3,774,373	6,060,432	2,454,027	2,781,143	745,233	730,557	1,079,882	736,288	394,212	415,863	883,414	497,023	562,919	2,599,764
	All Japan number of households	53,101,635																																														
	Penetration Rate		77.9%	77.6	58.6	68.9	81.3	70.9	76.5	93.0	82.6	73.4	82.6	91.0	90.6	89.2	81.9	87.4	96.5	102.2	87.1	102.5	99.0	81.2	88.2	98.7	85.5	79.2	81.6	95.6	86.2	91.9	108.6	99.7	92.5	86.6	71.0	60.3	74.7	77.6	103.9	98.5	97.2	96.0	95.0	85.1	76.6	70.1	56.7	65.9

Table 2. Random-parameter logit estimate of utility function

Variable			Parameter	s.e.	z
Subscription price (yen per mo.) p_j		Mean of random coefficient α	-0.00073	0.00003	-23.8
		s.d. in subscription price random coefficient σ	0.00031	0.00005	7.0
		β:			
ln pages of content per month	$\ln k_j$		-0.143	0.057	-2.5
	$\ln k_j$	× Household annual income =			
		less than 1 million yen	-0.055	0.020	-2.8
		1million yen up to 2 million yen	-0.097	0.016	-5.9
		2 million yen up to 3 million yen	-0.050	0.015	-3.4
		3 million yen up to 4 million yen	-0.005	0.014	-0.4
		4 million yen up to 5 million yen	0.028	0.014	1.9
		5 million yen up to 6 million yen	0.039	0.015	2.6
		6 million yen up to 7 million yen	0.075	0.016	4.7
		7 million yen up to 8 million yen	0.096	0.017	5.5
		8 million yen up to 9 million yen	0.080	0.019	4.2
		9 million yen up to 10 million yen	0.084	0.019	4.3
		10 million yen up to 12 million yen	0.129	0.021	6.1
		12 million yen up to 15 million yen	0.153	0.027	5.7
		15 million yen up to 20 million yen	0.135	0.031	4.3
		20 million yen up to 30 million yen	0.113	0.053	2.1
		30 million yen or more	0.191	0.087	2.2
	$\ln k_j$	× Age, head of household =			
		up to 24 yrs.	0.271	0.050	5.4
		25 yrs to 44 yrs	0.400	0.056	7.2
		45 yrs to 64 yrs	0.603	0.057	10.5
		65 yrs or more	0.755	0.059	12.7
Morning-and-Evening subscription to National newspaper		× Household annual income =			
		less than 1 million yen	0.176	0.133	1.3
		1million yen up to 2 million yen	0.233	0.105	2.2
		2 million yen up to 3 million yen	0.309	0.073	4.2
		3 million yen up to 4 million yen	0.394	0.063	6.3
		4 million yen up to 5 million yen	0.287	0.062	4.6
		5 million yen up to 6 million yen	0.290	0.063	4.6
		6 million yen up to 7 million yen	0.359	0.063	5.7
		7 million yen up to 8 million yen	0.516	0.067	7.8
		8 million yen up to 9 million yen	0.495	0.077	6.5
		9 million yen up to 10 million yen	0.625	0.073	8.6
		10 million yen up to 12 million yen	0.656	0.069	9.5
		12 million yen up to 15 million yen	0.771	0.080	9.7
		15 million yen up to 20 million yen	0.844	0.102	8.3
		20 million yen up to 30 million yen	0.969	0.176	5.5
		30 million yen or more	1.089	0.217	5.0

Variable			Parameter	s.e.	z
Morning-and-Evening subscription to Local or Bloc newspaper	×	Household annual income =			
		less than 1 million yen	-0.187	0.192	-1.0
		1million yen up to 2 million yen	0.487	0.116	4.2
		2 million yen up to 3 million yen	0.553	0.079	7.0
		3 million yen up to 4 million yen	0.438	0.071	6.2
		4 million yen up to 5 million yen	0.365	0.075	4.9
		5 million yen up to 6 million yen	0.465	0.076	6.1
		6 million yen up to 7 million yen	0.447	0.079	5.6
		7 million yen up to 8 million yen	0.452	0.089	5.1
		8 million yen up to 9 million yen	0.699	0.102	6.9
		9 million yen up to 10 million yen	0.659	0.103	6.4
		10 million yen up to 12 million yen	0.495	0.101	4.9
		12 million yen up to 15 million yen	0.651	0.130	5.0
		15 million yen up to 20 million yen	0.727	0.171	4.3
		20 million yen up to 30 million yen	0.754	0.305	2.5
		30 million yen or more	1.267	0.300	4.2
Participates in local festivals and holiday events	×	Asahi	-0.647	0.030	-21.4
		Mainichi	-1.266	0.040	-31.9
		Yomiuri	-0.339	0.029	-11.9
		Sankei	-1.808	0.066	-27.4
Head of household highest education level is college or above	×	Asahi	0.272	0.036	7.6
		Mainichi	-0.471	0.048	-9.9
		Yomiuri	-0.152	0.039	-3.9
		Sankei	-1.028	0.079	-13.0
Asahi, Mainichi, Yomiuri	×	Th. Km from Tokyo, squared	-0.010	0.000	-41.3
Sankei	×	Th. Km from Osaka, squared	-0.056	0.002	-26.8
Chunichi	×	Th. Km from Aichi, squared	-0.211	0.021	-10.1
Chugoku	×	Th. Km from Hiroshima, squared	-0.932	0.064	-14.6
Nishi Nippon	×	Th. Km from Fukuoka, squared	-0.664	0.043	-15.5

n=27,778
Chi squared [65 d.f.]= 132,971
Log likelihood function= -51,966
Restricted log likelihood= -118,451
Inf.Cr.AIC=104062 AIC/N = 3.745

Table 3. Regression estimates relating newspaper ad pricing to circulation.

OLS estimates of

[22] $$p_a = f_a\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} + \bar{c}\psi^{-1}\left(1-\frac{1}{\xi_a}\right)^{-1} s + \epsilon$$

where $p_a = p_{am}$ or p_{ae}, and $s = \begin{cases} s_1 + s_2\,, & if\ p_a = p_{am} \\ s_2\ \ \ \ \ , & if\ p_a = p_{ae} \end{cases}$

	Ad rate for legal notice (per cm)	Advertising rate for display ad per page of ads (=15 dan)		
		1-dan rate	5-dan rate	15-dan rate
Intercept	8,184,111	2,455,071	2,205,316	1,944,448
s.e.	669,478	387,169	367,110	330,189
Number of subscribers	10.35	6.26	5.96	5.37
s.e	0.38	0.22	0.21	0.19
R-Square	0.89	0.90	0.90	0.90
n=96				

Note. The sample includes observations for each edition of each newspaper: morning and evening editions, national and local papers.

Table 4. GMM estimate of two-equation system, based on 1-dan, 5-dan and 15-dan rate for display ad.

Equation 1—Advertising price per page of ads: $p_a = \gamma_0 + \gamma_1 s$

Equation 2—Demand for advertising: $\ln a = \beta_0 + \xi_a \, ln(\gamma_0/s + \gamma_1) + \beta_1 \ln AvgIncome + \beta_2 \, PcntCollege$

Instruments for *s*: (1) pages of content per month, (2) newspaper home prefecture number of households if bloc newspaper or local newspaper, (3) dummy=1 if national newspaper, and =0 if not.

Variable		Parameter		1-dan rate		5-dan rate		15-dan rate	
				p_a	$\ln a$	p_a	$\ln a$	p_a	$\ln a$
	Intercept	γ_0		1,464,644		1,232,950		1,030,722	
			s.e	171,192		160,970		143,329	
s	Number of subscribers	γ_1		6.46		6.23		5.67	
			s.e	0.39		0.38		0.35	
	Intercept	β_0			28.01		29.08		33.75
			s.e		28.50		26.07		25.24
$ln(\gamma_0/s + \gamma_1)$	Nat. log of advertising rate for display ad per page of ads per subscriber as predicted by ad price equation	ξ_a			-1.30		-1.27		-1.27
			s.e		0.54		0.53		0.55
$\ln AvgIncome$	Nat. log of subscriber average household income	β_1			-2.81		-3.02		-3.80
			s.e		4.79		4.39		4.25
$PcntCollege$	Percent of subscribers college educated	β_2			-5.06		-4.71		-3.75
			s.e		5.89		5.50		5.35
	Number of observations			63		60		60	

Table 5. Parameters of Newspaper Pricing and Content, (Based on Tbl. 2 Mixed-Logit Estimates of Utility)

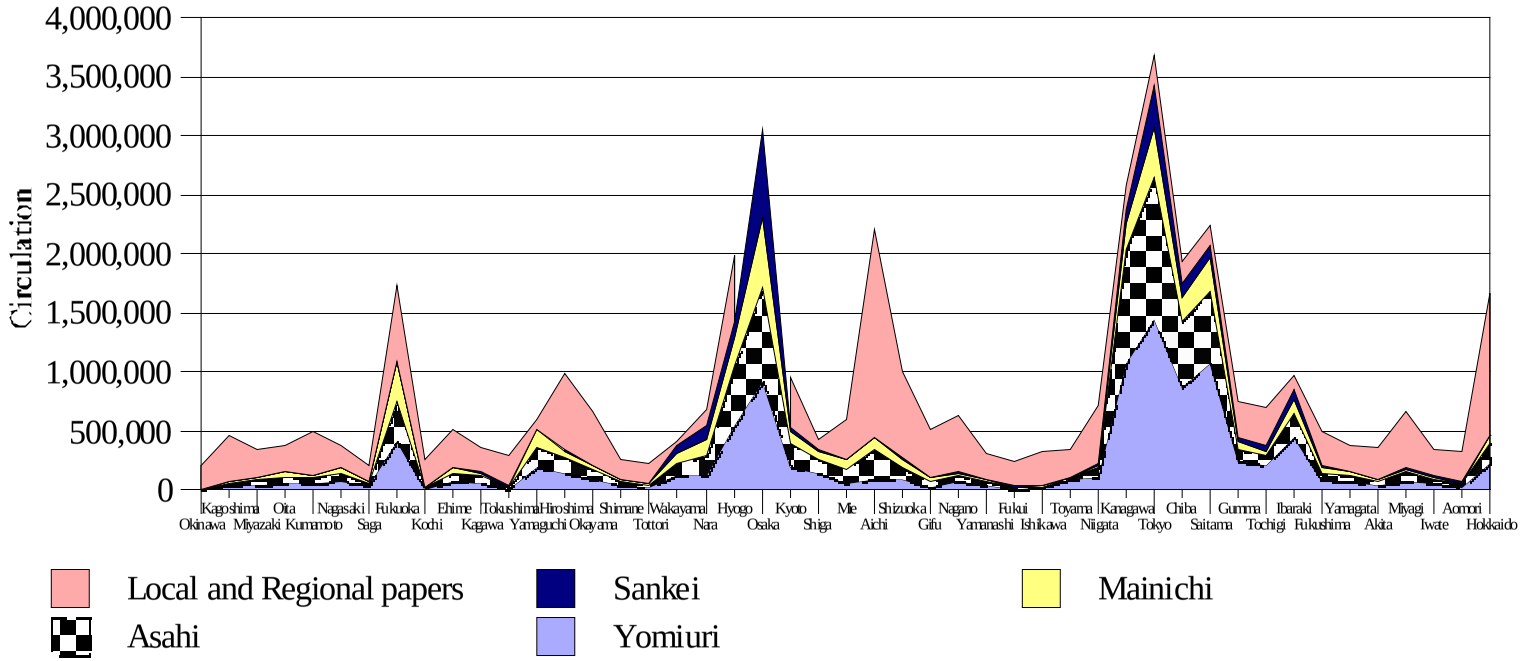
ID no.	Newspaper	m-e	p_{s1}, p_{s2}	s_1, s_2	k_m	k_e	$\frac{p_{s2}s_2}{p_{s1}s_1}$	Elasticity and Cross-Elasticity w.r.t Subscription Price				Nash		Cartel		Cartel of high pricers only		Elasticity and Cross-Elasticity w.r.t Pages of Content				$\frac{(f_k+\bar{c}s_1)k_m}{p_{s1}s_1}$	$\frac{(f_k+\bar{c}s_2)(k_m+k_e)}{p_{s2}s_2}$
								ξ_1	ξ_{12}	ξ_2	ξ_{21}	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	θ_1	θ_{12}	θ_{21}	θ_2		
1	THE ASAHI SHIMBUN morning		3,007	4,478,447	595		1.05	1.81	0.15			0.62		7.44		1.98		0.41	-0.03			0.22	
2	THE ASAHI SHIMBUN morning + evening	x	3,925	3,588,260		200	1.05			2.15	0.24		0.51		3.95		1.26			-0.06	0.42		0.20
13	MAINICHI SHIMBUN morning		3,007	2,510,628	546		0.76	1.88	0.1			0.57		8.58		2.20		0.43	-0.02			0.23	
14	MAINICHI SHIMBUN morning + evening	x	3,925	1,463,199		184	0.76			2.25	0.17		0.48		5.93		1.68			-0.04	0.46		0.21
25	YOMIURI SHIMBUN morning		3,007	6,163,453	595		0.82	1.81	0.14			0.61		5.64		1.58		0.41	-0.03			0.23	
26	YOMIURI SHIMBUN morning + evening	x	3,925	3,868,988		351	0.82			2.16	0.23		0.51		3.48		1.12			-0.05	0.43		0.20
49	SANKEI SHIMBUN morning		2,950	1,567,455	576		0.41	1.89	0.07			0.56		7.38		1.98		0.44	-0.02			0.23	
50	SANKEI SHIMBUN morning + evening	x	3,925	633,154		227	0.41			2.27	0.20		0.47		3.82		1.26			-0.07	0.40		0.16
54	HOKKAIDO SHIMBUN morning		3,007	564,517	608		1.48	1.52	0.66			1.12		4.46		2.09		0.28	-0.09			0.09	
55	HOKKAIDO SHIMBUN morning + evening	x	3,925	639,634		254	1.48			1.84	0.58		0.82		3.15		1.49			-0.19	0.29		0.17
56	TOO NIPPO morning + evening	x	3,000	255,976	532	161				1.26			0.80		7.35						0.34		0.27
58	DAILY TOHOKU		2,600	107,369	460			1.48				0.68		11.44				0.33				0.22	
59	THE IWATE NIPPO morning + evening	x	3,007	231,437	471	141				1.14			0.88		9.43						0.29		0.25
61	THE KAHOKU SHIMPO morning		3,007	391,485	613		0.37	1.59	0.58			0.75		3.92		1.60		0.43	-0.14			0.25	
62	THE KAHOKU SHIMPO morning + evening	x	3,925	109,871		134	0.37			1.86	0.47		1.18		9.26		3.34			-0.16	0.31		0.08
63	AKITA SAKIGAKE SHIMPO morning + evening	x	3,007	260,884	572	123				1.04			0.96		9.31						0.26		0.25
65	YAMAGATA SHIMBUN morning + evening	x	3,007	211,003	442	144				1.16			0.87		10.15						0.27		0.23
67	FUKUSHIMA MINPO		2,905	303,626	586			1.40				0.72		5.83				0.42				0.30	
68	FUKUSHIMA MINYU		2,905	201,876	606			1.51				0.66		8.12				0.27				0.18	

ID no.	Newspaper	m-e	p_{s1}, p_{s2}	s_1, s_2	k_m	k_e	$\frac{p_{s2}s_2}{p_{s1}s_1}$	Elasticity and Cross-Elasticity w.r.t Subscription Price				Nash		Cartel		Cartel of high pricers only		Elasticity and Cross-Elasticity w.r.t Pages of Content				$\frac{(f_k+\bar{c}s_1)k_m}{p_{s1}s_1}$	$\frac{(f_k+\bar{c}s_2)(k_m+k_e)}{p_{s2}s_2}$
								ξ_1	ξ_{12}	ξ_2	ξ_{21}	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	θ_1	θ_{12}	θ_{21}	θ_2		
69	THE IBARAKI SHIMBUN		2,905	123,136	534			1.78				0.56		7.41				0.22				0.12	
70	SHIMOTSUKE SHIMBUN		2,950	321,807	522			1.82				0.55		3.46				0.45				0.25	
71	THE JOMO SHINBUN		2,950	310,175	675			1.86				0.54		3.50				0.41				0.22	
74	THE TOKYO SHIMBUN morning		2,550	304,619	592		1.18	1.51	0.2			0.83		41.64				0.38	-0.04			0.23	
75	THE TOKYO SHIMBUN morning + evening	x	3,250	280,889		203	1.18			1.94	0.36		0.59		16.14					-0.12	0.40		0.21
76	KANAGAWA SHIMBUN		3,100	218,041	562			1.85				0.54		5.56				0.37				0.20	
77	NIIGATA NIPPO morning		3,007	439,570	600		0.17	1.64	0.6			0.70		3.13		1.35		0.45	-0.15			0.26	
78	NIIGATA NIPPO morning + evening	x	3,925	55,784		155	0.17			1.9	0.48		1.85		16.81		5.85			-0.16	0.32		-0.03
79	KITANIPPON SHIMBUN morning		2,987	250,201	747			1.65				0.61		4.73				0.21				0.13	
81	THE HOKKOKU SHIMBUN morning + evening	x	3,925	84,808		141	0.43			2.35	0.29		0.51		3.57		2.39			-0.29	0.59		-0.22
82	THE HOKKOKU SHIMBUN morning		3,007	258,466	728		0.43	1.62	0.54			0.83		9.58		1.05		0.55	-0.27			0.39	
83	THE HOKURIKU CHUNICHI morning		2,905	93,152	715		0.15	1.77	0.25			0.59		10.98				0.25	-0.25			0.15	
84	THE HOKURIKU CHUNICHI morning + evening	x	3,870	10,238		166	0.15			2.29	0.29		0.88		64.80					0.00	0.56		-0.48
85	FUKUI SHIMBUN		2,650	209,144	600			1.51				0.70		5.66		0.66		0.38				0.26	
86	THE NIKKAN KENMIN FUKUI		2,100	40,165	628			1.10				0.91		55.35				0.24				0.22	
87	YAMANASHI NICHINICHI SHIMBUN		3,007	208,133	570			1.68				0.59		6.25				0.42				0.25	
88	SHINANO MAINICHI morning		3,007	432,739	722		0.16	1.67	0.5			0.69		2.73		1.24		0.33	-0.17			0.23	
89	SHINANO MAINICHI morning + evening	x	3,925	52,492		146	0.16			1.8	0.54		1.77		13.69		4.98			0.00	0.36		-0.10
90	GIFU SHIMBUN morning		2,900	146,283	610		0.25	1.82	0.45			0.60		9.60				0.45	0.00			0.22	
91	GIFU SHIMBUN morning + evening	x	3,370	31,070		156	0.25			1.91	0.35		1.10		43.72					-0.17	0.35		0.39

ID no.	Newspaper	m-e	p_{s1}, p_{s2}	s_1, s_2	k_m	k_e	$\frac{p_{s2}s_2}{p_{s1}s_1}$	Elasticity and Cross-Elasticity w.r.t Subscription Price				Nash		Cartel		Cartel of high pricers only		Elasticity and Cross-Elasticity w.r.t Pages of Content				$\frac{(f_k+\bar{c}s_1)k_m}{p_{s1}s_1}$	$\frac{(f_k+\bar{c}s_2)(k_m+k_e)}{p_{s2}s_2}$
								ξ_1	ξ_{12}	ξ_2	ξ_{21}	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	θ_1	θ_{12}	θ_{21}	θ_2		
92	SHIZUOKA SHIMBUN morning + evening	x	2,900	717,229	517	154				1.49			0.67		3.02						0.41		0.28
94	THE CHUNICHI SHIMBUN morning		3,000	2,124,288	612		0.40	1.78	0.2			0.61		3.14		1.14		0.40	-0.04			0.20	
95	THE CHUNICHI SHIMBUN morning + evening	x	3,925	650,297		215	0.40			2.18	0.35		0.60		3.35		1.19			-0.17	0.44		0.20
97	KYOTO SHIMBUN morning		3,007	192,119	585		2.16	1.82	0.23			0.66		8.00		2.74		0.34	-0.11			0.03	
98	KYOTO SHIMBUN morning + evening	x	3,925	317,881		172	2.16			2.31	0.19		0.46		2.59		1.05			-0.19	0.38		0.14
99	KOBE SHIMBUN morning		3,007	307,099	587		1.08	1.73	0.29			0.65		4.63		1.74		0.43	0.00			0.16	
100	KOBE SHIMBUN morning + evening	x	3,925	254,782		185	1.08			2.44	0.24		0.48		2.75		1.09			-0.24	0.49		0.24
102	NIHONKAI SHIMBUN		1,995	175,497	597			0.68				1.48		19.78				0.17				0.25	
103	SANIN CHUO SHIMPO		2,855	180,878	529			1.20				0.83		10.84				0.28				0.23	
104	THE SANYO SHIMBUN morning		3,007	394,612	661		0.24	1.56	0.44			0.68		2.99		1.26		0.44	0.00			0.30	
105	THE SANYO SHIMBUN morning + evening	x	3,925	72,015		136	0.24			2.14	0.24		1.06		9.21		3.08			0.00	0.24		0.25
106	THE CHUGOKU SHIMBUN morning		3,007	644,166	624		0.15	1.57	0.31			0.70		3.37		1.37		0.31	-0.08			0.18	
107	THE CHUGOKU SHIMBUN morning + evening	x	3,925	73,628		162	0.15			1.91	0.52		1.29		9.84		3.38			-0.17	0.35		0.08
108	TOKUSHIMA SHIMBUN morning		3,007	200,102	544		0.36	1.49	0.66			0.84		6.85		2.33		0.33	0.00			0.19	
109	TOKUSHIMA SHIMBUN morning + evening	x	3,925	54,622		185	0.36			1.83	0.50		1.39		16.94		5.26			-0.17	0.33		0.46
110	SHIKOKU SHIMBUN		3,007	208,307	601			1.27				0.79		8.57				0.21				0.17	
111	EHIME SHIMBUN		3,000	318,391	592			1.21				0.83		6.20				0.30				0.25	
112	KOCHI SHIMBUN morning		3,000	84,657	647		2.13	1.43	0.79			1.56		16.90				0.32	0.00			0.19	
113	KOCHI SHIMBUN morning + evening	x	3,770	143,219		177	2.13			1.67	0.61		0.95		8.52					-0.15	0.30		0.28
114	THE NISHINIPPON morning		3,007	679,137	563		0.34	1.55	0.23			0.75		6.58		1.84		0.35	-0.04			0.20	

ID no.	Newspaper	m-e	p_{s1}, p_{s2}	s_1, s_2	k_m	k_e	$\frac{p_{s2}s_2}{p_{s1}s_1}$	Elasticity and Cross-Elasticity w.r.t Subscription Price				Nash		Cartel		Cartel of high pricers only		Elasticity and Cross-Elasticity w.r.t Pages of Content				$\frac{(f_k+\bar{c}s_1)k_m}{p_{s1}s_1}$	$\frac{(f_k+\bar{c}s_2)(k_m+k_e)}{p_{s2}s_2}$
								ξ_1	ξ_{12}	ξ_2	ξ_{21}	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	$\frac{1}{\lambda_1}$	$\frac{1}{\lambda_2}$	θ_1	θ_{12}	θ_{21}	θ_2		
115	THE NISHINIPPON morning + evening	x	3,925	175,518		182	0.34			2.04	0.64		0.74		5.43		1.87			-0.25	0.38		0.19
116	SAGA SHIMBUN		2,905	141,023	605			1.29				0.77		9.18				0.24				0.19	
117	NAGASAKI SHIMBUN		3,000	190,034	577			1.00				1.00		10.20				0.17				0.17	
118	KUMAMOTO NICHINICHI morning		3,007	274,491	621		0.37	1.56	0.94			0.95		3.74				0.31	-0.16			0.20	
119	KUMAMOTO NICHINICHI morning + evening	x	3,364	90,269		167	0.37			1.45	0.56		2.35		13.81					-0.11	0.22		
120	OITA GODO SHIMBUN morning + evening	x	3,466	234,159	461	205				1.32			0.76		6.55						0.20		0.15
122	MIYAZAKI NICHINICHI		2,905	232,578	654							1.42		9.21				0.14					
123	MINAMINIPPON SHIMBUN morning		3,007	362,219	591		0.09	1.38	1			1.25		4.38				0.38	-0.13				
124	MINAMINIPPON SHIMBUN morning + evening	x	3,567	26,034		154	0.09			1.38	0.74		11.33		52.31					-0.11	0.32		
126	THE OKINAWA TIMES morning + evening	x	3,160	206,569	456	137				1.22			1.22		0.18		0.18				0.20		0.24
128	THE RYUKYU SHIMPO morning + evening	x	3,160	205,465	454	134				1.22			1.22		0.18		0.18				0.20		0.24
	MEAN			590,764	585	175	0.66	1.56	0.42	1.80	0.40	0.78	1.29	9.17	11.97	1.66	2.26	0.34	-0.08	-0.13	0.35	0.21	0.16
	S.D.			1,094,598	70.6	45	0.61	0.27	0.27	0.43	0.17	0.26	1.95	9.94	15.12	0.53	1.70	0.10	0.08	0.08	0.10	0.06	0.18

Figure 1. Morning circulation in 2007 of Japan's national, local and regional newspapers in each prefecture, ranging from west (Okinawa) to east (Hokkaido).



Source: Chou-Mai-Yomi-Kei VS chihoushi no shea arasoi, dokusen nyuushu, tadoufuken ichiran (Asahi Mainchi Yomiuri Nikkei vs regional newspapers, rivalry for shares and monopolization, summary of number of copies issued in each prefecture), *Facta*, July 2007. http://facta.co.jp/article/200707008.html

Figure 2. Marginal value of pages of content per month, based on mixed-logit estimate of utility function.

Average marginal value of pages of content per month, per subscriber, for each edition (morning, and morning-and-evening), of each newspaper

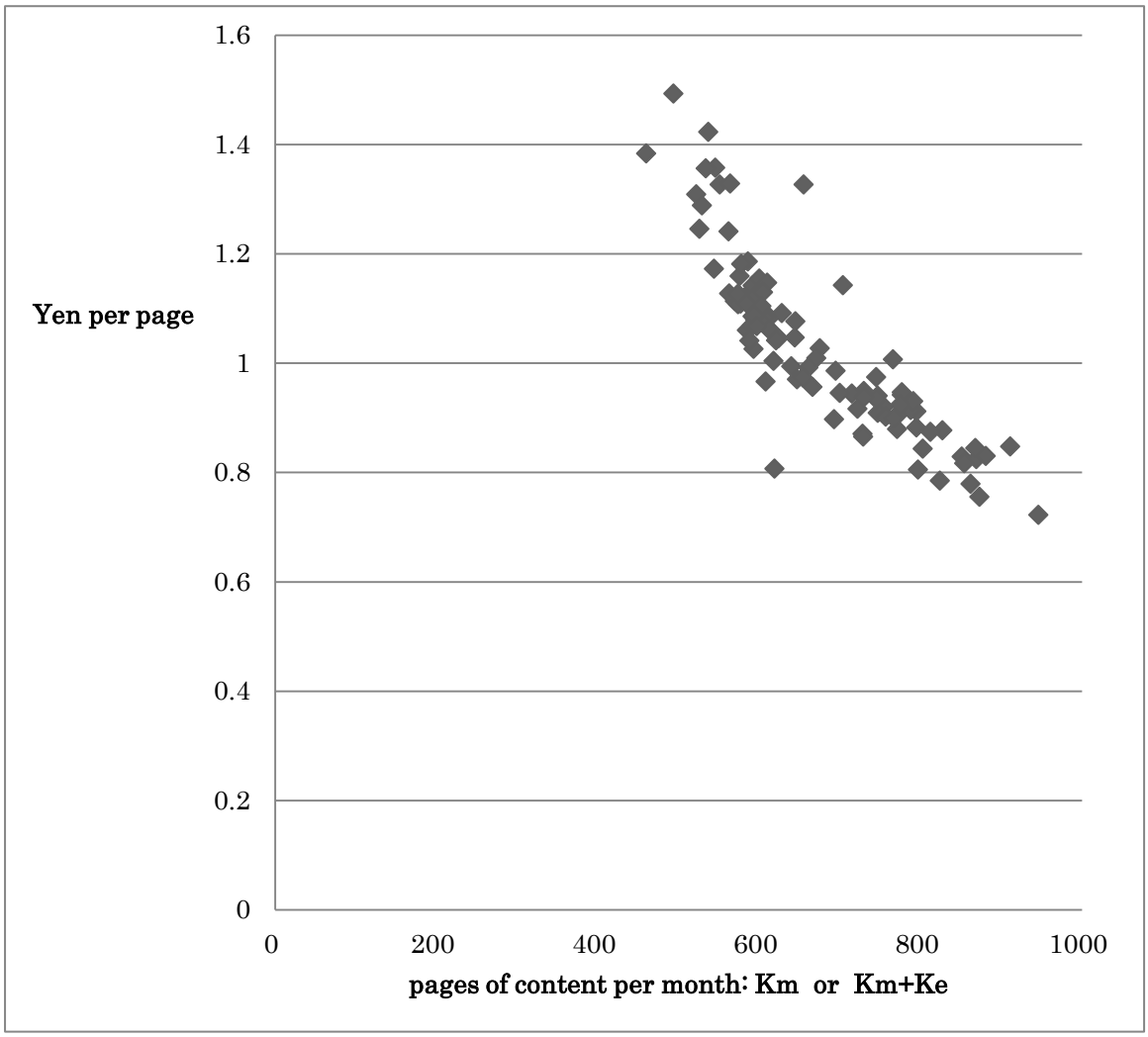


Figure 3. Cost of distributing newspapers to morning-only subscribers, based on price-cost margins implied by Nash pricing of subscriptions

Constructed from:

[26] $$c_{0m} = \left(1 - \frac{1}{\lambda_1}\right) p_{s1} - \bar{c}(a_m + k_m) + \frac{\psi p_{am} a_m}{(s_1 + s_2)} ,$$

with $\bar{c} = 1$ and $\psi = 0.85$.

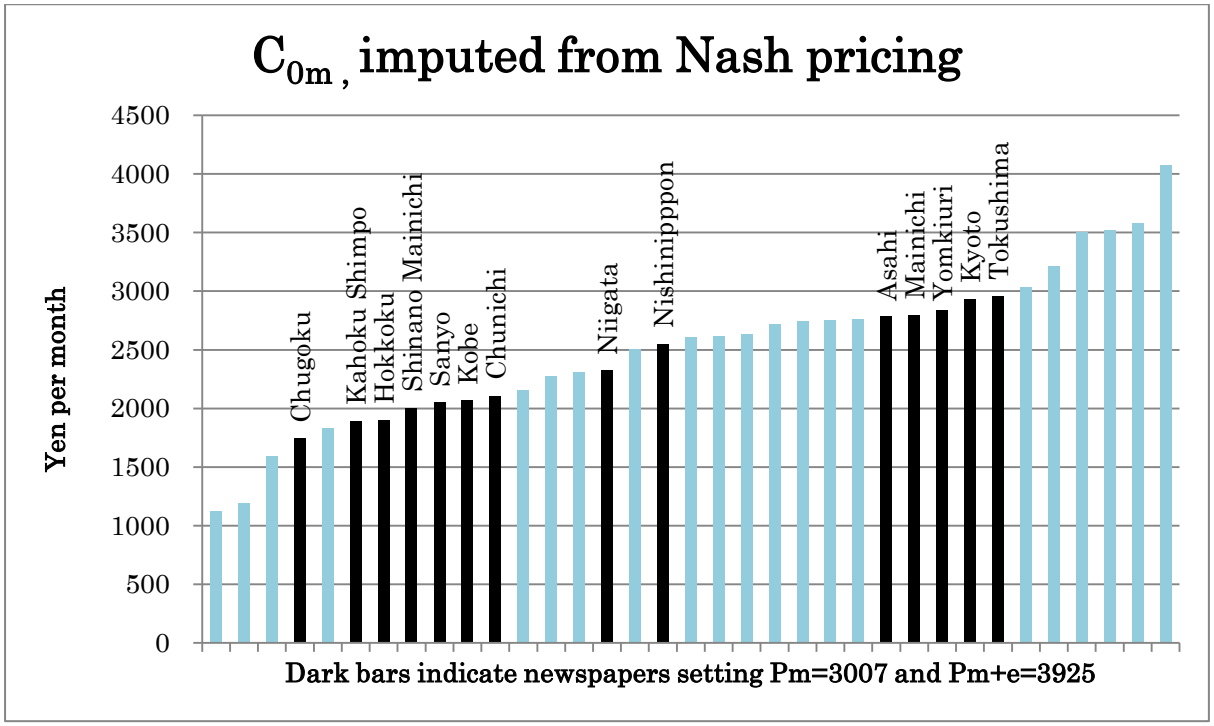


Figure 4. Cost of distributing newspapers to morning-and-evening subscribers, based on price-cost margins implied by Nash pricing of subscriptions

Constructed from:

[27] $$c_{0m} + c_{0e} = \left(1 - \frac{1}{\lambda_2}\right) p_{s2} - \bar{c}(a_m + k_m + a_e + k_e) + \frac{\psi p_{am} a_m}{(s_1 + s_2)} + \frac{\psi p_{ae} a_e}{s_2}$$

with $\bar{c} = 1$ and $\psi = 0.85$.