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*Press Subsidies and Information in a
Democratic Society*

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Press Subsidies and Information in a Democratic Society

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Abstract

In this paper we analyze how subsidies may affect the quality provision of newspapers in three structures dominating this market: monopolistic structures as is the case for many regional newspapers, duopolistic structures, as is the case for newspaper markets in metropolitan areas or, possibly, nation-wide newspapers, as well as markets with monopolistic competition. We find that frequently used sales subsidies may be counter-productive as they can lead the newspaper to reduce journalistic quality. We conclude that a possibly better way to sustain high levels of journalistic quality would be to invest in the consumption capital of the readers.

1. *Introduction*

Newspapers and other mass media play an important role in the successful working of democratic societies: they provide both news content and a forum for political discussion. Citizens are enabled to participate in the political discourse, which potentially enhances the quality of their political decisions. Newspapers thus also contribute to the political education of their readers. Furthermore, newspapers also serve a watchdog function by helping control the political system.

Due to their role for democratic societies, newspapers are often subsidized. The reasons for governments may obviously be plentiful. To

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name but three possible motivations for subsidies, governments may aim to make newspapers partly independent of economic interests. Or they may try to achieve a certain multitude of opinions. Or they may try to render newspapers cheaper for consumers. The most common form of subsidy is a reduction of Value Added Taxes (VAT).¹

A crucial factor for the effective fulfillment of the democratic tasks of newspapers is an adequate level of journalistic quality, which is defined via objective criteria in the relevant literature. Crudely summarized, these criteria relate to good and diverse information: truth/correctness, relevance, neutrality, impartiality, immediacy, and diversity (Westerdahl (1983)). Being able to profit from this information, however, requires the existence of consumption capital on the side of consumers.² But obviously, the consumption capital differs among members of a given society.

To give but one example how this difference may be categorized, figure 1.1 illustrates the relationship between educational attainment and the stated interest in politics in Germany. The horizontal axis separates respondents according to the highest educational level achieved, the vertical axis shows the share of respondents per educational group stating interest in politics or no interest. It can readily be seen that the share of respondents stating interest in politics increases with the educational attainment, while the share of respondents stating no interest decreases.³

⁴ Because interest in politics is a prerequisite for reading about it, we interpret this finding in such a way that the utility deriving from journalistic quality and thus the willingness to pay for it also rises with the level of education.

The questions we aim to address in the following are in how far differences in consumption capital affect outcomes on the market for news

¹Murschetz (2013) provides a collection of articles dealing with state subsidies for newspapers for different countries.

²See Becker and Stigler (1977) for the initial introduction of the theory of consumption capital.

³The responses are taken from the 2006 wave of the World Values Survey. Replies “Not very interested” and “Not at all interested” were grouped as “Not interested”, replies “Very interested” and “Somewhat interested” were categorized as “Interested”.

⁴It could of course also be the case that the educational system suffers a selection bias, in which case only those interested in politics will make their way through the different educational institutions, possibly because interest in politics correlates with other factors favorable to educational achievement such as interest in abstract thinking.

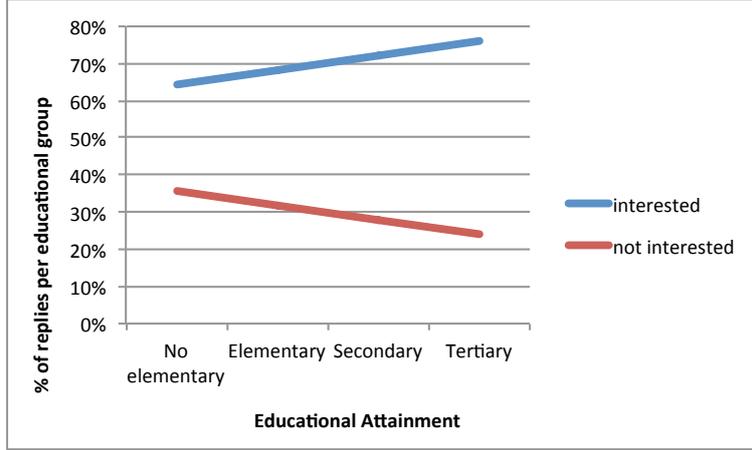


Figure 1.1: Interest in Politics and Educational Attainment in Germany

products, and whether subsidies are a good way to increase journalistic quality provided by firms. To answer these questions, we in the following section specify an abstract model of the market for journalistic quality including subsidies. In section 3 we introduce three different market structures dominating the newspaper market in Germany and analyze how subsidies in theory affect outcomes with respect to journalistic quality. The paper ends with a brief conclusion.

2. The Market for Journalistic Quality

2.1 Market Demand

We introduce differences in individual consumption capital in our model by assuming the following utility function. An individual $n \in [0, N]$ derives utility from reading a single copy of a newspaper of price p^5 and journalistic quality q according to:⁶

$$u_n(p, q) = a + g(q) - nh(q) - p. \quad (2.1)$$

The parameter a defines the level of utility a newspaper without any journalistic (quality) contents. For the sake of simplicity, we assume that all consumers enjoy the same level of utility from such a newspaper, inde-

⁵We assume consumers may buy only one copy of one newspaper, and that this copy is affordable for all potential consumers.

⁶This utility function has been used in Leroch and Wellbrock (2011), where an analysis of a newspaper monopolist is presented.

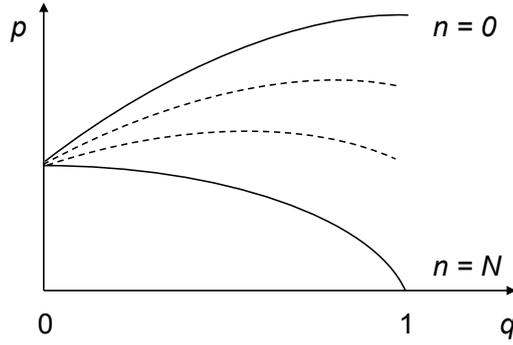


Figure 2.1: Consumption capital and willingness to pay for journalistic quality

pendent of their consumption capital. The function $g(q)$ represents the utility the consumer with the highest amount of consumption capital. Without loss of generality, we assume $g(q)$ to be increasing in q throughout, at decreasing rate. Consumption capital enters the utility function via the term $nh(q)$, where $h(q)$ is function convexly increasing in q . We assume that consumers are ordered according to their individual consumption capital, with $n = 0$ implying the *largest* level of consumption capital, and $n = N$ the lowest. Compared to the case of $n = 0$, reductions in consumption capital hence imply a reduction of utility for any given level of journalistic quality. Further, the lower the consumption capital, the greater this loss in utility. Figure 2.1 illustrates the willingness to pay for journalistic quality of different types of consumers, depending on their consumption capital.

It follows that the size of the *de facto* market is defined by the “marginal consumer” - the consumer who is indifferent between buying a copy and not buying it.⁷ His rank in consumption capital constitutes the number of copies sold because all consumers with higher rank will have a larger willingness to pay, and hence consume the newspaper, too. All other consumers have a lower willingness to pay, rendering newspapers too expensive according to their preferences. Hence, the market demand function is defined as:

$$n = \frac{a + g(q) - p}{h(q)}. \quad (2.2)$$

⁷Note that this does not prohibit the extreme cases of either no consumer buying a copy or all N potential consumers buying a copy.

2.2 Market Supply

We assume that journalistic quality is provided by private firms selling newspapers. Because we consider the case of perfect competition unrealistic, firms are further assumed to have some market power and hence discretion upon the setting of prices. The profit function of a firm i is defined as follows:

$$\pi_i = n_i p(n_i) - k(n_i) - c(q_i) + r(n_i). \quad (2.3)$$

Profits depend on the number of sold copies, n_i , and the price per copy, $p(n_i)$. Two forms of cost occur: First, costs for printing copies, $k(n_i)$, with $k' > 0$ and $k'' > 0$. Second, costs for providing journalistic quality, $c(q_i)$, where $c' > 0$ and $c'' \leq 0$. Firms may also acquire revenues by selling advertisement space. The more copies of a newspaper are sold, the more attractive advertisement space in this paper becomes. We capture this form of income via $r(n_i)$, with $r' > 0$.

For the sake of the argument, assume for the moment that only one firm offers newspapers (we elaborate on this case below). Due to the ranking of individuals we introduced above, we can reformulate the profit function by substituting for the market demand:

$$\pi = \frac{a + g(q) - p}{h(q)} p - k\left(\frac{a + g(q) - p}{h(q)}\right) - c(q) + r\left(\frac{a + g(q) - p}{h(q)}\right). \quad (2.4)$$

Firms maximize profits by selecting both price and quality of their newspapers. The first order conditions of profit maximization hence are specified as follows:

$$\frac{\partial \pi}{\partial p} = \frac{a + g(q) - 2p}{h(q)} - k_p + r_p = 0 \quad (2.5)$$

$$\frac{\partial \pi}{\partial q} = \frac{g_q h p - h_q (a + g(q) - p) p}{h^2(q)} - c_q = 0 \quad (2.6)$$

Because we are not primarily interested in the general level of journalistic quality but rather in the effects of subsidizing policies,⁸ we pause

⁸The reason for not digging deeper into this issue is that we find it hard to construct a meaningful welfare function based on the general functional forms we specified. Similarly, the parameters we chose for this theoretical exercise remain too abstract for a meaningful quantitative analysis. Note, however, that Spence (1975) comes

at this stage and turn towards the analysis of the latter.

2.3 *The Impact of Subsidies*

Given the importance of journalistic quality for the working of a democratic society, raising its level seems worthwhile to consider. At first sight, subsidies appear a promising way to increase the journalistic quality of newspaper firms. Several forms of subsidies can be distinguished, ranging from per copy subsidies over quality subsidies to lump sump payments, to name but a few. In the following, we will focus our analysis on the effect of per copy subsidies. We do so for three reasons. First, they empirically appear to be the most relevant forms of subsidies for newspapers. Second, the introduction of quality-based subsidies are more than prone for (political) dispute over the practical definition of journalistic quality. Third, the analysis of lump-sum subsidies is trivial from a theoretical point of view: all firms yield higher profits, without an incentive to change their behavior.

For the ease of analysis, let us focus on the direct revenues of our single newspaper provider, i.e. those revenues deriving from selling n copies. A per-copy subsidy of s changes the profit function of newspaper provider i to.

$$\pi_i = (p(n_i) + s)n_i. \quad (2.7)$$

We may now analyze how changes in subsidies may induce changes in price and quality.⁹ From the FOC regarding price, it follows that:

$$\pi_{pp}dp + \pi_{pq}dq + \pi_{ps}ds = 0 \quad (2.8)$$

and from the FOC regarding quality:

$$\pi_{pp}dp + \pi_{pq}dq + \pi_{ps}ds = 0. \quad (2.9)$$

Rearranging yields the following Hessian system:

to the conclusion that a monopolist may “under-” or “over-provide” quality from a somewhat welfaristic perspective, depending on the sign of the cross-derivative of the price function with respect to quantity and quality. Formally, our case under consideration is one where a monopolist under-provides quality. But we at this stage regard this point irrelevant for our analysis.

⁹We will drop the subscript indicating an individual firm in the following part of this section to avoid notational clutter.

$$\begin{pmatrix} \pi_{pp} & \pi_{pq} \\ \pi_{pq} & \pi_{qq} \end{pmatrix} \begin{pmatrix} \frac{dp}{ds} \\ \frac{dq}{ds} \end{pmatrix} = \begin{pmatrix} -\pi_{ps} \\ -\pi_{qs} \end{pmatrix}. \quad (2.10)$$

To simplify notation, define the Hessian matrix as H , where

$$H := \begin{pmatrix} \pi_{pp} & \pi_{pq} \\ \pi_{pq} & \pi_{qq} \end{pmatrix}.$$

Because firms will maximize their profits, $\det H > 0$. Applying Cramer's Rule, we may then solve for $\frac{dq}{ds}$, which will always be

$$\frac{dq}{ds} = \frac{\pi_{pp}\pi_{qs} - \pi_{pq}(-\pi_{ps})}{\det H}. \quad (2.11)$$

It holds that $\pi_{qs} = 0$, such that this term simplifies to

$$\frac{dq}{ds} = \frac{-\pi_{pq}(-\pi_{ps})}{\det H}. \quad (2.12)$$

Whether the level of journalistic quality provided by firms increases or decreases now obviously depends on the signs of π_{pq} and π_{ps} . Both terms may depend on the market structure, to which we turn in the following section.

3. *The Role of the Market Structure*

Markets for newspapers are typically characterized by market power. On the one hand, regional newspaper markets are dominated by monopolists (see Blair and Romano (1993), Dewenter (2003), Tag (2009)). On the other hand, newspaper markets in urban regions are predominantly characterized by two major players, rendering this market duopolistic. Finally, nation-wide newspaper markets are often divided among a small group of suppliers. To formally analyze these market structures in terms of their reaction to subsidies, we in the following subsections model newspaper markets as monopolies, duopolies and markets with monopolist competition.

3.1 *Monopoly*

In the case of a monopoly, the profit function (2.7) with the first order conditions (2.8) and (2.9) from above may directly be analyzed. We can

immediately see that $\pi_{pq} = \frac{h'}{h^2}(p+s)$ and $\pi_{ps} = -\frac{1}{h}$, and then yield the following:

$$\frac{dq}{ds} = \frac{-\frac{h'}{h^2}(p+s)(\frac{1}{h})}{detH}. \quad (3.1)$$

Because $detH$ is positive for an interior profit maximizing solution, this term is unambiguously negative under the given assumptions.¹⁰

3.2 Duopoly

For the analysis of duopolistic market structures, call the two existing firms “1” and “2”, offering journalistic qualities q_1 and q_2 at prices p_1 and p_2 , respectively. Further, assume that $q_2 > q_1$. Under the given assumptions, there will hence be an individual who is indifferent between both newspapers. Formally, this individual, call him n_{12} , is defined by:

$$a + g(q_1) - n_{12}h(q_1) - p_1 = a + g(q_2) - n_{12}h(q_2) - p_2,$$

which solves to:

$$n_{12} = \frac{g(q_2) - g(q_1) - (p_2 - p_1)}{h(q_2) - h(q_1)}. \quad (3.2)$$

Individuals of type $n < n_{12}$ prefer higher levels of quality, and hence tend to favor the newspaper of firm 2. We can therefore specify the demand for firm 1 as $(n_0 - n_{12})$, where n_0 is the marginal consumer just willing to buy any newspaper. Formally, $n_0 = \frac{a+g(q_1)-p_1}{h(q_1)}$. The demand for firm 2 is simply defined as n_{12} . We now turn to the analysis of each firm’s optimal choices of price and quality given per-copy subsidies.

Firm 1

Recall that we are primarily interested in the effects of varying subsidies on the provision of journalistic quality. As was found above, the sign of the effect depends on the signs of the two cross-derivatives π_{pq} and π_{ps} . Substituting the demand for newspaper 1 in its profit function, and then forming the first order and cross derivatives, we find that:

¹⁰We are thankful to Maria Rosa Battagion and Alessandro Vaglio for pointing this out. Large parts of the following analysis of duopolistic markets are based on their comment.

$$\pi_{pq} = (p + s) \left(-\frac{h'(q_1)}{(h(q_1))^2} - \frac{h'(q_1)}{(h(q_2) - h(q_1))^2} \right) < 0, \text{ and}$$

$$\pi_{ps} = \frac{\partial n_0}{\partial p_1} + \frac{\partial n_{12}}{\partial p_1}.$$

Hence, π_{ps} will be negative iff $2h(q_1) < h(q_2)$. Using 2.12 from above, we get the following:

$$\frac{dq}{ds} = \frac{-\pi_{pq}(-\pi_{ps})}{\det H} > 0. \quad (3.3)$$

So, if $\pi_{ps} < 0$, it follows that $\frac{dq}{ds} > 0$.

This implies that, given the newspapers provide very different levels of quality, there will be the chance that a subsidy will induce increases in journalistic quality, at least for the firm offering less quality (firm 1 in the given case). In the contrary case of comparatively small differences in quality, the effect of subsidies on journalistic quality will be negative. The two firms will indeed offer different levels of quality, as can be seen by comparison of the FOCs relating to quality. But without further specifications of the functional forms of the demand (more specifically, the functional form of $h(q)$), we do not see how we can say more on this issue.

Firm 2

The demand of the second firm was specified as n_{12} . Applying the same analysis as before, we yield the following two expressions for firm 2:

$$\pi_{pq} = \frac{\partial n_{12}}{\partial q_2} + (p_2 + s) \frac{h'(q_2)}{h(q_2) - h(q_1)} = (p_2 + s) \frac{h'(q_2)}{h(q_2) - h(q_1)} > 0.$$

$$\pi_{ps} = \frac{\partial n_{12}}{\partial p_2} = -\frac{1}{h(q_2) - h(q_1)} < 0.$$

Substituting these terms in 2.12, we yield a negative term for $\frac{dq}{ds}$:

$$\frac{dq}{ds} = \frac{-\pi_{pq}(-\pi_{ps})}{\det H} < 0. \quad (3.4)$$

Hence, an increase in subsidies will lead to a reduction of the journalistic quality provided by firm 2. Given the assumption that firm 2 will provide the higher level of quality as compared to firm 1, this im-

plies that the maximum quality available in the society will be reduced by levying per-copy subsidies. Depending on the difference between the levels of quality provided, firm 1 may or may not reduce its quality level when subsidies increase.

3.3 Monopolistic Competition

Market power in general may be included in the model by assuming that firms have some discretion in setting prices. For the sake of the argument, we employ a static model of monopolistic competition, with an exogenous number of firms setting their prices and quality levels once before, and once after the implementation or change of subsidies. Formally, using the same variables as above, firm i will then maximize its following profits:

$$\pi_i = (p_i(n_i) + s)n_i - k(n_i) - c(q_i). \quad (3.5)$$

Solving the first-order condition with respect to quantity then yields the familiar Lerner-condition stating that prices entail a markup over marginal costs:

$$p = \frac{k' - s}{1 + \frac{1}{\epsilon}}, \quad (3.6)$$

where $\epsilon = \frac{dn}{dp} \frac{p}{n}$ is the price elasticity of demand. It can readily be seen from 3.6 that $\frac{\partial p}{\partial s} = -\frac{1}{1 + \frac{1}{\epsilon}} < 0$.

Using the same approach as in the previous subsections, the first-order condition for profit maximizing with respect to prices is:

$$\frac{\partial \pi_i}{\partial p} = n_i + p \frac{\partial n_i}{\partial p} - \frac{\partial k}{\partial p} = 0, \quad (3.7)$$

which can be solved to yield:

$$n_i = \frac{k'}{1 + \epsilon}. \quad (3.8)$$

It follows from 3.7 that $\frac{\partial^2 \pi_i}{\partial p \partial s} > 0$ and $\frac{\partial^2 \pi_i}{\partial p \partial q} < 0$. Since this result holds for all firms i and demand is unaffected by subsidies, it holds that:

$$\frac{dq}{ds} = \frac{-\pi_{pq}(-\pi_{ps})}{\det H} < 0. \quad (3.9)$$

Hence, firms will reduce the level of quality as subsidies rise.

4. *Conclusion*

Newspapers play an important role for the functioning of a democratic society. The higher their level of journalistic quality, the better they can potentially fulfill this role. It may therefore be desirable to raise the quality level of the press, or at least try to impede its diminution. Providing newspapers with financial resources in the form of subsidies appears promising to achieve this end, at least at first sight.

However, being able to profit from journalistic quality, citizens require a sufficient level of consumption capital. Inasmuch as this consumption capital differs across citizens, some profit more from a given level of journalistic quality, others profit less. Economically speaking, their willingness to pay for quality news also differs.

Providing newspapers with a per-copy subsidy constitutes an incentive for them to increase the number of copies sold. Facing a heterogeneous demand for journalistic quality, they will thus reduce the level of quality in order to attract those readers for which the pre-subsidy level of quality was too high (at given prices). Hence, the good intention to do democracy good may yield the bad outcome of lowering journalistic quality. Apparently, investing in consumption capital is a better way to support democracy - although the effects are obviously more long-term.

References

- Becker, G. S. and Stigler, G. J. (1977). De gustibus non est disputandum. *American Economic Review*, 67:76–90.
- Blair, R. and Romano, R. (1993). Pricing decisions of the newspaper monopolist. *Southern Economic Journal*, 59:721–732.
- Dewenter, R. (2003). Rational addiction to news? habit formation and print media usage. *Universität der Bundeswehr Hamburg*.
- Leroch, M. A. and Wellbrock, C. M. (2011). Saving newspapers with public grants – the effects of press subsidies on the provision of journalistic quality. *Information Economics and Policy*, 23:281–286.
- Murschetz, P., editor (2013). *State Aid for Newspapers*. Springer.
- Spence, M. A. (1975). Monopoly, quality, and regulation. *Bell Journal of Economics*, 6:417–429.
- Tag, J. (2009). Paying to remove advertisements. *Information Economics and Policy*, 21:245–252.
- Westerdahl, J. (1983). Objective news reporting. *Communication Research*, 10:403–424.