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COULD YOU HAND ME THE EFFICIENCY SECTION, PLEASE?
NEWSPAPER CIRCULATION AND LOCAL GOVERNMENT
EFFICIENCY IN NORWAY*

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Abstract

Whenever citizens want their elected officials to employ funds efficiently, they are in need of information in order to establish accountability. We develop an agency model with imperfect monitoring where newspapers provide voters with this information. The model predicts that an informed electorate is more likely to hold an incumbent accountable. Using panel data on Norwegian municipalities we show that increases in local newspaper circulation are associated with higher levels of local government efficiency as measured by an index introduced by the Norwegian authorities.

Keywords: media, newspapers, local government, efficiency, Norway.
JEL: D72, H7.

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1 Introduction

This paper explores whether local newspaper circulation affects public sector efficiency in Norwegian municipalities. In Norway, the central government aims to ensure equal living conditions throughout the country. This includes the provision of welfare services like health care, education and social services in high quality across all municipalities. To this end, central government allocates a budget to each jurisdiction, but municipalities autonomously decide on how these services can be implemented to best match local preferences. Within the municipalities, a locally elected government is responsible for the provision of public services. As this is the most prominent task of local government, voters should mainly consider public service performance when deciding on the reelection of local officials. Thus, elections provide incentives for the latter to perform well because a more efficient use of disposable funds – implying a higher level of services, given the fixed budget – should increase the chances of reelection.

At the municipal level, individuals usually know who is in charge of local services and they can at the same time observe service provision in their day-to-day life. It is, however, likely that they are not perfectly informed about all factors that determine public service provision. In particular, when they cast their ballot, it is essential to know whether factors that are not in control of local government have influenced service provision. If such local or country-wide shocks have been a factor in public service production, voters who are aware of this can judge government performance more accurately.

As local newspapers play an important role in informing voters in Norway, this study strives to examine whether certain newspaper market characteristics can explain differences across municipalities in public service efficiency. We present a stylized model to illustrate how the degree of information in the electorate shapes an incumbent's incentives to behave well. The central prediction of the model is that a larger share of informed voters in the electorate makes the incumbent work harder because external factors are not confounded with incumbent's effort. This prediction is tested using panel data on Norwegian municipalities for the years 2001-2005. Our main variables are an index of public sector efficiency in Norwegian municipalities as introduced by Borge et al. (2008) and three measures of voter information that are based on newspaper circulation at the municipality level. The results support the model's prediction that a more informed electorate induces higher efficiency.

This paper is closely related to the political economy literature that deals with the impact of mass media on policy outcomes. In a theoretical study, Strömberg (2004a) examines competition between media outlets and identifies incentives leading mass media to bias programs in favor of certain groups. His model predicts media to report more on issues concerning large groups, groups that are more attractive to advertising, groups that attach a higher value to information and groups which are easier to reach in terms of distributing news. In the model these groups are better informed and this results in favorable policies towards them. Strömberg (2004b) empirically tests whether better informed voters receive favorable policies. He uses U.S. data on county-level spending by FERA, a major New Deal program in the 1930s, and approximates the share of informed voters by the share of households owning a radio. Counties with a larger share of these households are found

to have received more funds. Besley and Burgess (2002) apply an agency model to show that better informed voters should be more successful in holding governments accountable. They test this prediction using panel data from India and find that – in terms of providing disaster relief – Indian state governments are more responsive when newspaper circulation is higher. Here, higher newspaper circulation serves as a proxy for a more informed electorate. In a Scandinavian setting, Svaleryd and Vlachos (2007) find that increased political competition as well as local media coverage reduce political rents in Sweden.

Additionally, the paper is related to the literature on efficiency in public service provision. Theoretical contributions in this field go back to the work of Niskanen (1971, 1975) as well as Migué and Bélanger (1974). The central aspect of these studies is that bureaucracies strive to allocate funds from a given budget to expenditures that do not raise public service production, thus leading to less efficiency. Hence the interests of bureaucrats collide with the interests of politicians and voters and policy outcomes depend on the interaction of these players.

There is a vast empirical literature on local efficiency, for a survey see De Borger & Kerstens (2000). Many of these studies deal with efficiency in specific parts of the public sector or programs rather than with overall efficiency. In contrast, the index of local public sector efficiency in Norwegian municipalities that we use in this paper provides a measure of global public sector efficiency and was first used by Borge et al. (2008). The authors find that high fiscal capacity and a high degree of party fragmentation lead to low efficiency, whereas increased democratic participation brings along higher efficiency in Norwegian municipalities. The Norwegian efficiency index has also been employed by Revelli and Tovmo (2007), who suggest that local government efficiency in Norway shows a spatial pattern due to yardstick competition.

2 Media and Efficiency: Theoretical Links

In this section of the paper, we theoretically establish how mass media, in our case newspapers, serve as an institution that enhances the accountability of incumbent politicians. As it is essentially the voting behavior of the electorate that determines incumbents' incentives we have to analyze the impact of newspapers on voters. It is quite reasonable to assume that newspapers influence voting decisions because they play a key role in providing voters with information about politicians.

We develop a stylized political economy model of a single constituency with a continuum of voters normalized to unity. There are two periods of time.

Production of a public good

In the first period, an incumbent government provides the public good y according to the production technology

$$y_1 = a_1 + \theta^I + \varepsilon_1. \quad (1)$$

The level of the public good in period 1 results from the incumbent's effort ($a_1 \in [0, \infty)$),

her competence (θ^I) and a temporary shock (ε_1). Subscripts denote the time period and superscript I refers to the incumbent. We assume that competence, θ^I , is a permanent feature of the incumbent.

With regard to Norway, one can think of y as the services that a municipality provides to its citizens. To provide these services, municipal governments are endowed with a fixed budget by the central government. Hence, incumbent politicians cannot raise y by increasing revenues, but effort they exert may affect the level of public services in the following ways:

- *Bargaining between politicians and local public administration.* Administration competes with service production for money from the municipal budget. Local government does have the final say on the allocation of funds, yet the public administration heavily takes part in budgeting (Kalseth & Rattso 1998). Thus, the politicians' bargaining power affects the allocation of funds. If, for example, politicians invested effort to raise their expertise this could increase their bargaining power and, finally, lead to a higher level of services due to resource allocation.
- *Monitoring the administration.* The administration not only takes part in budgeting but also implements political decisions. Once funds are allocated to public service provision, the level of services is higher if these funds are used in an efficient manner. If politicians try harder to monitor the implementation this will raise efficiency and, consequently, the level of services.

The effect of the incumbent's competence θ^I on public good production resembles the effect of effort. θ denotes the exogenously given talent of a politician to influence public good provision. At a given effort level, a more competent politician will provide a higher level of public services. Finally, the shock component ε can be either a local shock or a country-wide shock which affects the level of y .

Information

θ^I and ε_1 are random variables. At the time when the incumbent decides about her effort level, neither she nor the electorate know the realizations of θ^I and ε_1 . Common knowledge are the distributions $\theta \sim N(\bar{\theta}, \sigma_\theta^2)$ and $\varepsilon \sim N(0, \sigma_\varepsilon^2)$.

After the incumbent has chosen effort and the values of θ^I and ε_1 have been realized, all voters observe the level of the public good, y_1 . An exogenously defined share of voters ϕ reads local newspapers for reasons that are independent of politics, e.g., because they care about news on sports, weddings, obituaries, clubs and the like. We assume that newspapers have perfect information about ε_1 and report it.¹ The probability q that a voter i finds the information about ε_1 in the newspaper depends on how much news space s the editors assign to local politics. Thus, $q = q(s)$ and we presume $q(0) = 0$, $q' > 0$ and $q'' < 0$. So the probability that a voter i is informed about ε_1 is $\phi \cdot q(s)$. Given the large electorate, the share of informed voters is also defined by $\phi \cdot q(s)$.

¹The extreme assumption that newspapers perfectly observe ε_1 serves to simplify the analysis. Alternatively, we could assume that newspapers only receive a less noisy signal than voters. This would not substantially change our results.

Let us briefly illustrate this argument about informed voters by an example. Suppose that there is no newspaper published in a municipality but citizens read newspapers that come from contiguous municipalities. If these newspapers bias local coverage in favor of their home municipalities only little space will be allocated to news about our municipality of interest. Still, there can be many readers in this municipality but it is unlikely that they are well informed about local politics. On the other hand, we would expect a more informed electorate if a newspaper market and a municipality coincide geographically.

So we have two groups of voters in the electorate. A share of $\phi \cdot q(s)$ voters are perfectly informed about the shock component ε_1 . Observing y_1 , these voters can clearly distinguish between the shock and the sum of the two components attributed to the incumbent. A share of $1 - \phi \cdot q(s)$ voters only know the distribution of ε_1 and may confound the effect of the shock on y_1 with the impact of a_1 and θ^I .

Timing

Now we have determined what voters know when casting the ballot. Before we examine the incumbent's incentives and the optimal voting behavior, we briefly summarize the game between the incumbent and the electorate. The timing is as follows:

Period 1:

- The incumbent politician chooses effort a without knowing his own competence.
- The values of both the incumbent's competence, θ^I , and the shock, ε_1 , are realized.
- All voters observe y_1 . Additionally, a share $(\phi \cdot q(s))$ of voters learn the value of ε_1 from the newspaper.
- Elections are held. The incumbent faces a challenger whose competence is drawn from a normal distribution with mean $\bar{\theta}$ and variance $\sigma_{\bar{\theta}}^2$.

Period 2:

- The winner of the election chooses effort.
- y_2^I is realized if the incumbent of period 1 still is in office or y_2^C is realized if the challenger has won the election.

The incumbent's incentives

The incumbent knows that the level of y_1 will affect her chances of reelection. She can influence the level of y_1 by choosing a_1 . Effort brings along cost $C(a)$ with $C' > 0$ and $C'' > 0$. At the end of period 1, there is an election where the incumbent faces a randomly drawn challenger. If the incumbent wins, she will receive an exogenous rent $R > 0$ from staying in office. Thus, the incumbent chooses a_1 to maximize

$$p^I(a_1) \cdot R - C(a_1), \tag{2}$$

where p^I denotes the probability that the incumbent is reelected. There is no discounting. The first-order condition is

$$\frac{\partial p^I}{\partial a_1} \cdot R = C'(a_1). \quad (3)$$

The first-order condition shows that the incumbent weighs the expected rent against present cost when she chooses a_1 . She will increase effort as long as the marginal effect on the expected payoff in period 2 is larger than the marginal cost of effort in period 1. In order to analyze how effort affects the probability of reelection, p^I , we have to examine the voting decisions in the electorate.

Optimal voting behavior

All voters receive utility $u = u(y) = y$ from the public good. Each voter cares about y_2 , the level of y in period 2, and about her own ideological position in relation to the incumbent, β_i . β_i is drawn from a uniform distribution with support $[-\beta_0, \beta_0]$. Negative values of β_i imply an ideological bias of voter i in favor of the incumbent, whereas positive values mean a bias in favor of the challenger. Voter i prefers the incumbent if

$$\tilde{y}_{2i}^I \geq \tilde{y}_{2i}^C + \beta_i, \quad (4)$$

where \tilde{y}_{2i}^I and \tilde{y}_{2i}^C denote the expected level of y in period 2 under the incumbent and under the challenger respectively. Voters are rational and expect the competence of the randomly drawn challenger to be $\bar{\theta}$. Furthermore, as there is no incentive to invest effort in period 2 for any politician in office, all voters correctly expect that $a_2^I = a_2^C = 0$. Hence, the expected level of y_2 depends only on the competence of the incumbent politician in period 2 so that

$$\tilde{y}_{2i}^I = \tilde{\theta}_i^I \quad \text{and} \quad \tilde{y}_{2i}^C = \tilde{\theta}_i^C = \bar{\theta}.$$

Consequently, (4) reduces to

$$\tilde{\theta}_i^I \geq \bar{\theta} + \beta_i. \quad (5)$$

The expected competence of the incumbent depends on the information a voter possesses. Voters are rational and update their prior beliefs about competence using Bayes' rule. We have to distinguish informed voters from uninformed voters. In each group, $\tilde{\theta}_i^I$ is the same for every single voter. From now on, $\tilde{\theta}_m^I$ denotes the competence as estimated by informed voters and $\tilde{\theta}_n^I$ labels the competence as estimated by uninformed voters.

As informed voters observe y_1 and, additionally, ε_1 , they expect the incumbent's competence to be

$$\tilde{\theta}_m^I = y_1 - \tilde{a}_1 - \varepsilon_1 = \theta^I + a_1 - \tilde{a}_1, \quad (6)$$

where \tilde{a}_1 denotes effort in period 1 as expected by the voters. Uninformed voters only

observe the value of y_1 and form the expectation

$$\tilde{\theta}_n^I = \frac{\sigma_\varepsilon^2 \bar{\theta} + \sigma_\theta^2 (y_1 - \tilde{a}_1)}{\sigma_\varepsilon^2 + \sigma_\theta^2}. \quad (7)$$

The incumbent wins the election if he gets more than half of all votes cast which we can write as

$$\phi q \cdot \frac{\tilde{\theta}_m^I - \bar{\theta} + \beta_0}{2\beta_0} + (1 - \phi q) \cdot \frac{\tilde{\theta}_n^I - \bar{\theta} + \beta_0}{2\beta_0} \geq \frac{1}{2}. \quad (8)$$

Inserting (6), (7) and (1) and rearranging, we obtain

$$\left[\phi q + (1 - \phi q) \frac{\sigma_\theta^2}{\sigma_\varepsilon^2 + \sigma_\theta^2} \right] \cdot (a_1 - \tilde{a}_1 + \theta - \bar{\theta}) + (1 - \phi q) \frac{\sigma_\theta^2}{\sigma_\varepsilon^2 + \sigma_\theta^2} \cdot \varepsilon_1 \geq 0. \quad (9)$$

The probability of reelection, p^I , is given by the probability that (9) is met.² The left-hand side of (9) is a normal random variable with mean

$$\mu = \left[\frac{(\phi q) \cdot \sigma_\varepsilon^2 + \sigma_\theta^2}{\sigma_\varepsilon^2 + \sigma_\theta^2} \right] \cdot (a_1 - \tilde{a}_1) \quad (10)$$

and variance

$$\sigma^2 = \frac{(\phi q)^2 \cdot \sigma_\varepsilon^2 \sigma_\theta^2 + \sigma_\theta^4}{\sigma_\varepsilon^2 + \sigma_\theta^2}. \quad (11)$$

Now we can compute the probability of reelection as $p^I = 1 - F(0; \mu, \sigma^2)$, where F is the distribution function of the left-hand side of (9).

Equilibrium

The incumbent maximizes her objective function, (2), taking the voters' expectations about effort, \tilde{a}_1 , as given. Taking $p^I = 1 - F(0; \mu, \sigma^2)$ into account, the first-order condition turns into

$$-\frac{\partial F(0; \mu, \sigma^2)}{\partial \mu} \frac{\partial \mu}{\partial a_1} \cdot R = f(0; \mu, \sigma^2) \frac{\partial \mu}{\partial a_1} \cdot R = C'(a_1). \quad (12)$$

An equilibrium with rational expectations requires $a_1 = \tilde{a}_1$. Thus, in equilibrium, $\mu = 0$ and the first-order condition is

$$\frac{1}{\sqrt{2\pi} \cdot \sigma} \cdot \left[\frac{(\phi q) \cdot \sigma_\varepsilon^2 + \sigma_\theta^2}{\sigma_\varepsilon^2 + \sigma_\theta^2} \right] \cdot R = C'(a_1), \quad (13)$$

²To be precise, this condition only holds true for $\bar{\theta} - \beta_0 < \tilde{\theta}_m^I, \tilde{\theta}_n^I < \bar{\theta} + \beta_0$. However, it can be shown that, in equilibrium, p^I is the probability of reelection for all $\tilde{\theta}_m^I, \tilde{\theta}_n^I$.

with $1/(\sqrt{2\pi} \cdot \sigma) = f(0; 0, \sigma)$. The level of effort in period 1 is uniquely defined by

$$a_1 = (C')^{-1} \left(\frac{1}{\sqrt{2\pi}} \cdot \frac{1}{\sqrt{\sigma_\varepsilon^2 + \sigma_\theta^2}} \cdot \frac{(\phi q) \cdot \sigma_\varepsilon^2 + \sigma_\theta^2}{\sqrt{(\phi q)^2 \cdot \sigma_\varepsilon^2 \sigma_\theta^2 + \sigma_\theta^4}} \cdot R \right), \quad (14)$$

where $(C')^{-1}$ is the inverse function of C' .

This result shows that equilibrium effort hinges on the variance of the shock, σ_ε^2 , the variance of competence, σ_θ^2 , the rent, R , and the share of informed voters, $(\phi \cdot q(s))$. As we strive to study how the information in the electorate affects the incentives of the incumbent, we are mainly interested in the impact of ϕ and s on the effort level.

Recalling that C' is strictly increasing we know that $(C')^{-1}$ is strictly increasing, too. So a_1 is higher for larger values of

$$v := \frac{1}{\sqrt{2\pi}} \cdot \frac{1}{\sqrt{\sigma_\varepsilon^2 + \sigma_\theta^2}} \cdot \frac{(\phi \cdot q(s)) \cdot \sigma_\varepsilon^2 + \sigma_\theta^2}{\sqrt{(\phi \cdot q(s))^2 \cdot \sigma_\varepsilon^2 \sigma_\theta^2 + \sigma_\theta^4}} \cdot R.$$

The partial derivatives of v with respect to ϕ and s , respectively, yield

$$\frac{\partial v}{\partial x} > 0 \text{ for } x \in \{\phi, s\}.$$

Now we can state the main message of the model: a larger share of informed voters makes the incumbent work harder. Consequently, for given θ^I and ε_1 , the level of the public good, y_1 , is higher when many voters read newspapers and when newspapers devote more news space, s , to information about the shock, ε_1 .

3 The Norwegian Situation

In the following sections, Norwegian data serve to check, whether the theoretical predictions derived above hold in a real world setting. There are two main reasons why we chose Norway as the subject of examination. First, the federal structure of Norway with a total of more than 400 municipalities makes for an excellent subject for studying the effects of newspapers on relatively comparable small government units. These municipalities are responsible for a vast array of services where they can decide autonomously on how their budget is spent. Even though local government revenues are rather fixed, this leaves a lot of leeway for municipal officials in shaping the public service structure in their municipality.³ Services provided by the municipality include primary and lower secondary education, daycare, care for the elderly, welfare benefits, primary health care and child custody. These services enter into the calculation of the efficiency index (Borge et al. 2008) which we use to evaluate the performance of local governments. The availability

³There is also another tier between the local and the national level. These fylke districts are sizewise somewhat akin to the US counties. Their main responsibilities include secondary education, dental services and public transportation. Since municipalities provide a broader range of services and people tend to identify with their municipality rather than the fylke, we only consider the municipality level.

of such an index is another reason for choosing Norway, as it mitigates the problem of having to come up with an appropriate measure public sector accomplishments.

The most important reason for picking Norway, however, is the very diverse newspaper landscape. Data on more than 150 newspapers are used in this paper. This is a large number considering that Norway has a population of only roughly 4.8 million in 2008 and it also implies that many of these newspapers have a rather local focus. Thus, in a sense the newspaper market reflects the decentralization of the government sector. This is not the only feature of the Norwegian newspaper sector that makes it particular. Until 2004, Norway had the highest per (adult) capita newspaper reach worldwide. As of today it is only surpassed by Japan in that respect (according to World Press Trends, approximately 600 newspapers per 1000 adults were sold in Norway in 2007 on a daily basis). Seven in ten Norwegian households had one or more newspaper subscriptions in 2007. In the large cities, 64 per cent had a newspaper subscription, while the percentage was 75 in more scarcely populated areas.⁴ It seems entirely possible that this ubiquity of newspapers leads to newspapers being especially able to serve the purpose of informing citizens and thus helping to hold local government accountable. The reach of newspapers in Norway is actually even higher than that of television, as can be seen from the top portion of table 1. This may seem particularly puzzling to an observer from the American perspective, where in addition to newspaper circulation being rather low, people often cite local television news as their main source of information. In contrast, while local television does exist in Norway, it is not thought of as being in the neighborhood of newspapers when it comes to serving as a means of information on local issues.

Table 1 also demonstrates that newspaper use does not depend on educational level as much as one may expect. Differences in readership (defined as the percentage of residents that *read* a newspaper on a given day) between the university educated and lower secondary school educated are rather small and have actually decreased in the years 2001-2005, the years that we will be using in the estimations. This is particularly important because it means that the possible confounding of newspaper readership with general interest in politics (as measured by education) is not as big an issue as in other countries. While the gap between educational levels shrunk, the total reach of newspapers is slowly declining, a trend that Norway has in common with other western countries. Finally, the bottom section of table 1 establishes that the municipalities for which the efficiency index is available are comparable to all Norwegian communities when it comes to the reach of regional newspapers (defined as *storby dagsavis* including *Aften*, *lokale dagsavis* and *andre lokalavis* as shown in table 10). Here regional reach is defined as the number of newspapers sold per *household*. All reach variables in the remainder of this paper will have the number of *households* in the municipality as the denominator. We will also use the terms *reach* and *penetration* synonymously.

In what follows, we describe the newspaper data which provides information on the circulation of newspapers in Norwegian municipalities. The efficiency index and its components as well as the controls used in the estimation are also explained in brief.

⁴http://www.ssb.no/medie_en/

Table 1: MEDIA REACH IN NORWAY.

TV reach	2001	2002	2003	2004	2005
age 12+	71	71	71	71	71
Newspaper reach, population	2001	2002	2003	2004	2005
Lower secondary school	70	77	78	74	76
Upper secondary school	83	78	80	78	77
University/college low	85	81	81	81	79
University/college high	86	86	84	87	82
All (9-79 years)	78	77	77	75	74
Newspaper reach, households	2001	2002	2003	2004	2005
regional papers, all	1.037	0.996	0.985	0.978	0.969
N	431	431	431	431	431
regional papers, efficiency available	1.042	0.996	0.982	0.987	0.968
N	359	379	370	361	374

Sources: Statistics Norway, MBA.

3.1 Data Sources and media measures

The data we use was gathered from various sources. While the efficiency indicator and its components were provided by Borge, control variables at the municipality level were obtained from Statistics Norway and the Norwegian Social Science Data Services (NSD). The newspaper data stems mainly from the Norwegian Media Businesses' Association (Mediebedriftenes Landsforening, MBL), whose members include most of the Norwegian newspapers. We add data from the Local Newspaper Association (Landslaget for lokalaviser, LLA) for one specification, as a few newspapers are organised solely in LLA.⁵ Thus, the data can be broken down to three categories: newspaper data, efficiency data and controls.

Newspaper data. The data on newspaper circulation is provided by *Aviskatalogen*, a database maintained by MBL which contains annual information on the circulation of Norwegian newspaper publications at the community level. We categorize the newspapers in the database as follows:

- (a) national newspapers (riksspredte nyhetsaviser)
- (b) regional daily newspapers (storby dagsaviser)
- (c) local daily newspapers (lokale dagsaviser)
- (d) non-daily local newspapers (andre lokalaviser) and
- (e) specialty newspapers (nisjeavisen).

We make use of this classification in order to construct various measures of newspaper reach. In general, reach is defined as follows: $reach_i = \sum_n \frac{circulation_{ni}}{households_i}$, where i denotes municipalities and n newspapers. First off, only the newspapers Dagbladet and Verdens Gang are classified as tabloids. Hence, the variable tabloid penetration (in a given municipality) will be equal to the sum of the reach of these newspapers. The national newspaper reach includes the tabloids and Aftenposten, but not Aften (the local branch of Aftenposten) which is considered a regional newspaper as it extensively covers issues concerning the Oslo region. Specialty newspapers are mostly weekly newspapers such as Fiskeribladet (Fishery Gazette) and Computerworld that cater to special interests. Even though these are also national newspapers, they are included in a category of their own,

⁵Almost all of the LLA members are organized in MBL as well.

due to their highly specialized focus.

The most important definition of newspaper reach for our purposes is regional reach (made up of the above categories (b), (c) and (d)). This variable comprises the reach of all newspapers that mainly convey local/regional information, i.e. in terms of journalistic focus they serve a clearly defined local or regional market (Høst 1999). We believe *regional* reach to best represent the effect of newspaper penetration on local government efficiency.⁶ As can be seen in table 2 and graphically in figure 1, reach and *regional* reach diverge somewhat.⁷ Not all municipalities that have high overall newspaper readership (as in: high reach) display high *regional* reach as well. On the map, this can be blatantly seen in the center area of southern Norway. Theory predicts that only regional newspapers enhance efficiency because the other papers are very limited in the amount of local information they provide, yet checking the maps in the upper portion of figure 2 reveals no clear common pattern of efficiency and regional reach.

The bottom half of figure 2 displays the geographical distribution of two further measures of voter information: regional content and regional congruence. Regional content is essentially the sum of the regional reaches in a community, where the reaches of the newspapers are weighted by the share of their total circulation sold in that municipality, i.e.: $content_i = \sum_n reach_{ni} \cdot \frac{circulation_{ni}}{\sum_i circulation_{ni}}$, where i denotes municipalities and n newspapers. It can be argued that a high reach in itself doesn't mean a lot of information on the community level. It is entirely conceivable that a high percentage of residents in a small community reads the newspaper originating in the nearest city. Yet, if the share of total readers living in that community is small, the newspaper will not devote a whole lot of space to issues concerning that area and thus reach may not appropriately capture the effect we are interested in. The content variable partly solves this problem when one is willing to assume that a newspaper will devote more attention content-wise to those municipalities where it sells most of its circulation. Snyder and Strömberg (2008) provide convincing evidence for this argument. To account for the diverging levels of information contained on the various municipalities (i.e. 'content'), the reach of each and every single newspaper in i is discounted by the $readershare_{ni} = \frac{circulation_{ni}}{\sum_i circulation_{ni}}$. The content variable thus says how many equivalents of newspapers that are exclusively concerned with the municipality under consideration are sold per household.

The third indicator of media influence, *congruence*, was proposed by Snyder and Strömberg (2008). It is supposed to help cope with the possible endogeneity of reach and content due to their possibly being correlated with unobserved municipality or politician characteristics. It is calculated as $congruence_i = \sum_n \frac{circulation_{ni}}{\sum_n circulation_{ni}} \cdot \frac{circulation_{ni}}{\sum_i circulation_{ni}}$, where i denotes municipalities and n newspapers, i.e. it is the sum over the reader shares of newspapers in municipality i weighted by their market shares in that municipality. Intuitively, congruence describes how well the municipalities coincide with the newspaper markets. Put differently, it describes how actively the average newspaper sold in municipality i

⁶The data also enables us to calculate a Herfindahl index of circulation within a given municipality. One may believe that a monopoly newspaper can be bribed into reporting favorably more easily. This is an idea that has been put forward by Besley and Prat (2006). We did not find any effects of newspaper concentration on efficiency and results are not reported in order to economize on space.

⁷The extremely high values of 6.56 and 4.90 for overall reach and national reach occur in the community that harbors Oslo airport.

covers i . That is, a value of unity for congruence would mean that the average newspaper read in municipality i perfectly covers issues from that municipality. This measure differs from the former information measures in that once one is willing to assume exogenously determined geographical media markets, the variable does not depend on the possibly endogenous reach variable (which is perhaps correlated with unobserved interest in local matters).

We will present estimation results for all these measures employing panel data for the period 2001-2005. We are restricted to these years as the dependent variable, efficiency, is available for this time period only.

Efficiency data. Our measure of public sector efficiency is the efficiency index developed by Borge et al. (2008). It relates public service production to disposable revenues. Thus, efficiency increases when higher levels of production are extracted from given revenues.

Production is quantified by an aggregate output measure that was developed by Borge et al. (2001) for the Norwegian authorities (*Produksjonsindeks*). Output comprises 17 indicators of production in the six main municipal service sectors: care for the elderly, primary and lower secondary education (1st to 10th grade), day care, welfare benefits, child custody, and primary health care. The measure then relates output in a municipality to the country-wide population-weighted mean of aggregate output which is set equal to 100. The production index accounts for both quantity and quality aspects of public good provision. Quality of public services is obviously very hard to capture, yet the production index includes indicators such as the share of single rooms in nursing homes in an attempt to do so.⁸

Then, the aggregate output measure is divided by local government revenues. Revenues comprise own tax revenues per capita and block grants per capita from the central government. These revenues are adjusted by an index that describes varying costs of service production across municipalities. This index includes factors such as population size, settlement pattern, the age composition of the population and social factors. Additionally, since the production of public services is labor-intensive, regional differences in the pay roll tax are taken into account to capture labor costs.

In dividing production by revenues, the efficiency index then measures the efficiency of a municipality as a percentage of the country-wide mean efficiency.

In line with Borge et al. (2008) we use the efficiency measure as the dependent variable. We acknowledge that there may be a problem with 'division bias' when local government revenue appears both as a control variable and as the denominator of the efficiency index ((Borjas (1980)). Thus we also estimate an alternative specification which assumes local output to be the dependent variable while controlling for local government revenue. Local output is again defined as the *Produksjonsindeks* on the community level and so this specification merely captures the general idea of efficiency. A positive coefficient on newspaper circulation while holding local government revenue constant then indicates an efficiency enhancing effect of increases in newspaper reach.

Controls. Variables accounting for heterogeneity at the local level are taken from Statis-

⁸The 17 sub-indices and their exact weighting are explained in detail in Borge et al. (2008).

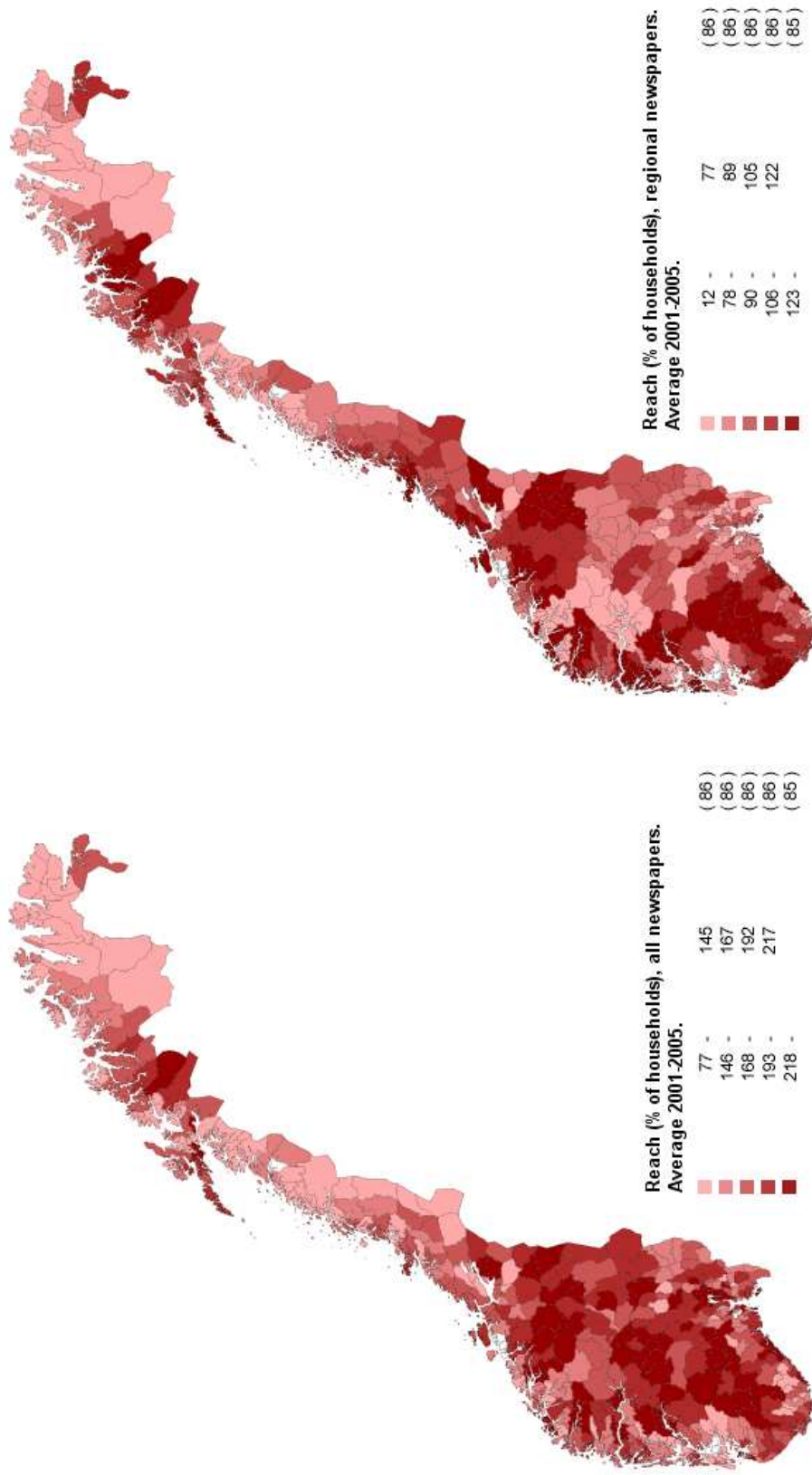


Figure 1: REACH, ALL/REGIONAL NEWSPAPERS (*100).

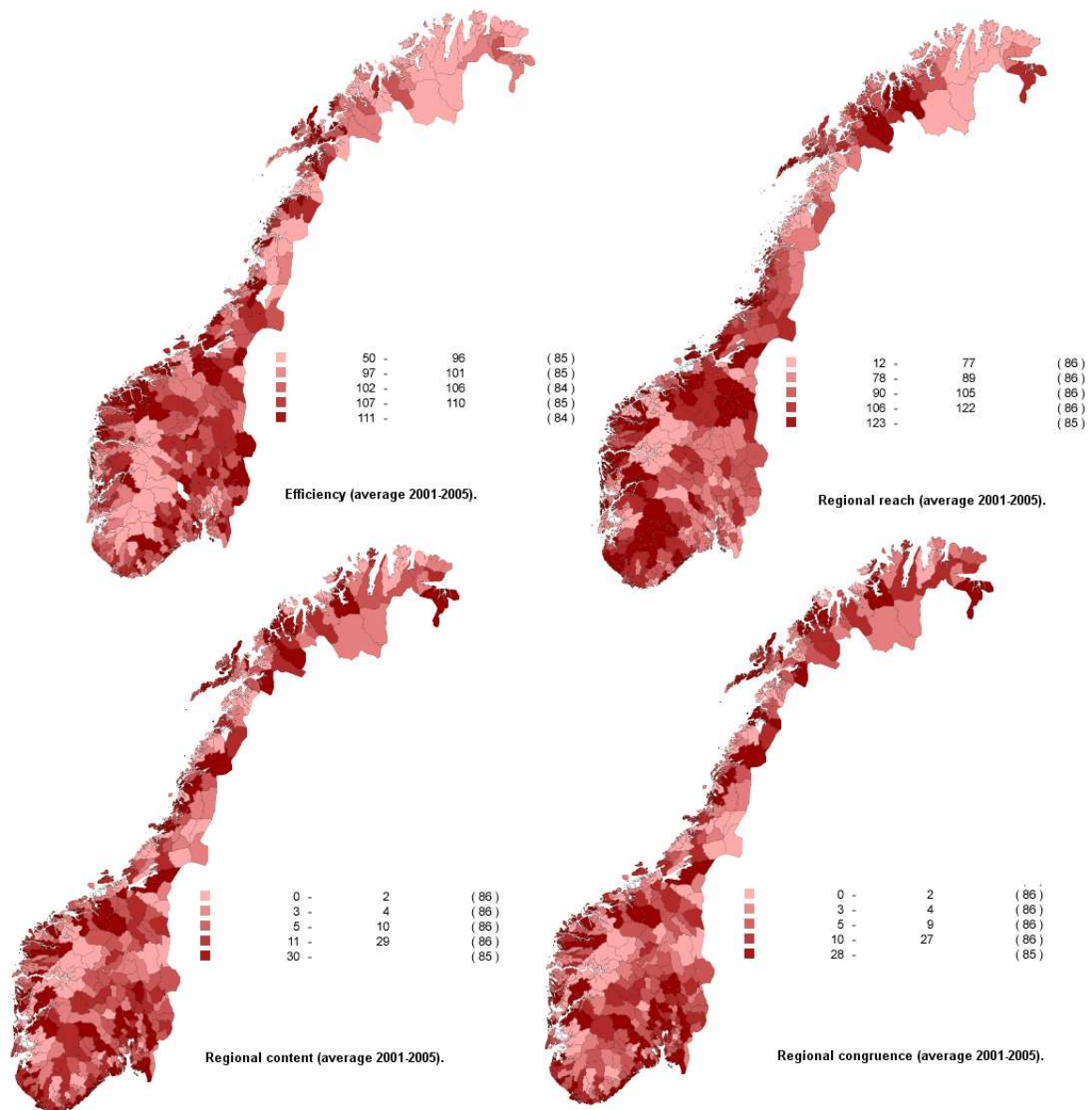


Figure 2: EFFICIENCY, REGIONAL REACH/CONTENT/CONGRUENCE (*100).

tics Norway and the NSD. These various demographic community characteristics include the percentage of the population classified as urban, population, average household size, income level, religious share of the population, the immigrant share and educational level. Political controls are the number of municipality council seats per 1000 inhabitants, the seat share of local lists in the municipal council and the share of votes received by the strongest party in the council.⁹ Finally, the effect of having an election year is captured by year dummies because local elections take place on the same exact date in all Norwegian municipalities.

⁹We also tried including voter turnout as an indicator for unobserved interest in local affairs, yet did not include it, as it turned out to be insignificant.

Table 2 shows summary statistics for all variables.

Table 2: SUMMARY STATISTICS.

	<i>N</i>	Mean	Std. Dev.	Min	Max
newspaper penetration (all)	1843	1.89	0.54	0.34	6.56
regional newspaper penetration	1843	0.99	0.27	0.04	1.83
LLA newspaper penetration	1840	0.06	0.20	0.00	1.69
local newspaper penetration	1843	0.86	0.31	0.03	1.82
tabloid newspaper penetration	1843	0.64	0.36	0.03	4.04
national newspaper penetration	1843	0.78	0.48	0.03	4.90
specialty newspaper penetration	1843	0.12	0.12	0.03	1.02
non-regional newspaper penetration	1843	0.90	0.50	0.09	5.50
regional newspaper content	1843	0.17	0.19	1.6e−05	0.86
regional newspaper congruence	1843	0.15	0.17	2.9e−04	0.85
local public sector efficiency	1843	103.73	10.83	44.92	137.00
local public sector production	1843	109.98	15.73	78.92	188.12
local government revenue	1843	107.46	22.90	84.68	330.22
secondary school pct	1843	57.99	3.95	39.84	67.19
university educated pct	1843	16.50	4.98	7.93	41.97
local list seats in council pct	1843	5.88	11.52	0.00	100.00
local council seats per 1000 inh.	1840	6.12	4.32	0.10	37.57
share largest party	1843	36.10	9.96	18.52	100.00
average gross income (1000 NOK)	1843	211.88	23.47	146.00	299.70
religious population pct	1840	90.65	4.89	2.21	100.00
immigrant population pct	1840	4.08	2.42	0.23	23.01
average household size	1840	2.40	0.18	1.91	3.26
urban population pct	1840	51.42	26.86	0.00	100.00
population (1000)	1840	11.42	30.41	0.35	538.41

Tabloid, national and specialty newspapers overlap, hence they do not add up to non-regional newspaper penetration.

4 Empirical Strategy

This section describes the general estimation strategy and possible pitfalls in estimating the effect of interest. As we have a panel dataset at our disposal, we estimate OLS with time and municipality fixed effects. The dependent variables used are local public sector efficiency and local public sector production. The main explanatory variables are the measures of voter information discussed in the previous section. Thus, the estimation equation is:

$$E_{it} = \theta_1 + \delta \cdot info_{it} + \mathbf{x}_{it}\gamma + c_i + u_{it}, \quad (15)$$

where E_{it} denotes the efficiency (production) level in municipality i in time period t , $info_{it}$ denotes the level of voter information (as captured in our newspaper variables), \mathbf{x}_{it} is a vector of municipality level controls and the unobserved effect c_i is allowed to be correlated with \mathbf{x}_{it} and $info_{it}$.

Exploiting the panel nature of our dataset takes care of the unobserved heterogeneity that is constant over time, yet whenever there are omitted time-varying variables that influence both the newspaper reach in a given municipality and also that municipality's efficiency, $E(u_{it}|\mathbf{x}_{it}, info_{it}, c_i) \neq 0$.

While finding an exogenous variation in newspaper reach (i.e. the use of 2SLS) would be an appropriate strategy, we could not come up with a convincing instrument for reach. In addition to using the arguably exogenous congruence variable in some of the estimations, we believe there are good reasons to have some faith in the results obtained by simple fixed effects estimation:

One time-varying omitted variable driving both readership and local public sector efficiency is newspaper quality. For our purposes this poses no problem as it doesn't matter whether it is newspaper quality or newspaper reach that is ultimately driving efficiency. Suppose readership increases as a result of enhanced newspaper quality. At the same time the increased quality would induce local government to be more efficient, even without increasing reach. Two remarks on this issue are in order: First, increased newspaper quality leads to individuals being more informed for any given level of reach. In a sense, the effect of increased quality is the same as an increase in readership. Second, it may lead us to overestimate the effect of pure readership (the effect if we could hold quality fixed). So we may overestimate this effect but in the end we don't have to distinguish between the two because both are effects of newspapers on local public sector efficiency.¹⁰ In a related argument, unobserved 'political interest' may induce voters to both read more newspapers and at the same time better monitor politicians. As we have stated in section 2, we believe that in the short run, a newspaper's reach is mainly driven by its entertainment value (sports news and the like). Hence, we are confident that the fixed effect takes care of unobserved political interest, at least in a very short panel such as the one at hand.

Aside from unobserved heterogeneity, reverse causality may be an issue. One can easily imagine a slack local government or public administration whose actions lead to very low efficiency and this in turn may lead to a spike in the public's interest in obtaining local information via the local newspapers. Since readership may increase with bad management but not when things are going smoothly (i.e. 'good news is no news'), this implies observing low levels of government efficiency simultaneously with high newspaper readership. Because naïve fixed effects estimation then causes an underestimation of the true (positive) effect of newspaper circulation on government efficiency, we are not too concerned about this issue and would rather interpret our estimates as lower bounds of the true effect.¹¹ In a similar vein, the presence of measurement error would bias our estimates towards zero, corroborating the interpretation of δ as a lower bound on the efficiency enhancing effects.

Another issue worth pointing out is the use of E_{it} and $info_{it}$ in the estimation. One could also think of using $info_{i,t-1}$, i.e. the newspaper reach in the previous year affects government efficiency. This might make sense because while newspapers report on mismanagement right away and politicians will be pressed to react as quickly as possible, on the other hand public budgets may be rather fixed and may perhaps only be altered on an annual basis. However, newspapers also report on the decision making process, and so the pros and cons of a project will be debated in the press and this may lead to efficient decisions right away. More importantly, there is leeway for efficiency gains even when budgets are fixed, mainly by employing these fixed funds in a more efficient manner (e.g. by inducing the public administration to become more efficient without altering budgetary decisions). Another argument for not lagging the newspaper reach variable is that

¹⁰The model in section 2 does not allow for varying degrees of being informed. If such an extension were added, newspaper quality would increase an individual's level of information. Of course, we do not have a newspaper quality measure. In a business economics context, however, reach may even be considered a quality measure.

¹¹The reverse causality case is essentially just another form of unobserved heterogeneity with the omitted variable being the extent of corruption or mismanagement.

it might make more sense for a politician to try and react to mismanagement accusations right away, as people may want to have a 'quick fix' for the problems at hand, while by next year voters may have 'forgotten' or there may be other problems that need urgent attention. Either way, as will be shown in the following sections, the effects on efficiency that we find are rather small, which may well be due to the fact that many government decisions cannot be overturned or reversed in the short run. Thus, our results describe the short-run actions that are actually feasible.

5 Results

As mentioned above, all estimations include municipality and year fixed effects effects. All standard errors are clustered at the panel level (municipality). The top portion of table 3 shows results with media influence measured as the household penetration with regional newspapers. Column (1) displays results when the only variable is household reach. Column (2) adds population and urbanization controls while column (3) adds a variety of other municipality level controls. Finally, column (4) includes local government revenues as a control in order to check whether greater fiscal capacity leads to higher levels of budgetary slack, as suggested by Borge et al. (2008) and Revelli and Tovmo (2007).

The fixed effects estimations suggest that increasing the reach of regional newspapers by one percentage point increases local public sector efficiency by around .025 points. In other words, going from zero reach of regional papers to the average reach would increase efficiency by 2.5 points. To put these numbers into perspective, a one standard deviation increase in reach (.27 points) raises efficiency by roughly .065 standard deviations, a rather small effect. The controls suggest that an increase in total population and urban population share leads to higher levels of efficiency, a result that may point to large communities being able to better exploit economies of scale. Higher shares of immigrant and religious population on the other hand are associated with lower levels of efficiency, possibly pointing to these groups being less interested in local politics. Having said that, it is not very surprising that many community level controls are of low or no significance at all, since the standardization of the efficiency index already accounts for them. When it comes to the political variables, the result that a larger share of seats in the municipal parliament being taken by local lists is associated with higher efficiency is in line with the notion that these parties are not tied to national party politics, that is, they are assumed to exclusively have local issues on their agenda. The share of votes for the strongest party also bears a positive coefficient, which is in line with Borge et al. (2008) who find that a higher fragmentation of the local council lowers efficiency. This may be due to the fact that a stronger party may accelerate the decision-making processes (and thus save resources) as there is not as much need for negotiations with other parties.¹² The single largest predictor of efficiency is local revenue. In line with Borge et al. (2008) and

¹²At the same time, a negative coefficient wouldn't have been too surprising, either, as a larger share may make it easier to extract rents. In this respect, the positive coefficient on seats per capita is also a bit surprising as it may lead to more need for negotiation. On the other hand a larger number of seats may make it harder to form a rent-extracting cartel.

Revelli and Tovmo (2007) higher revenue decreases efficiency, presumably via budgetary slack (e.g. via exaggerated levels of public employment, low effort, or increased salaries). The magnitude of the effect is also in the ballpark of what these studies find. Part of this negative effect may be induced whenever communities use additional income for improving public service quality. Because improved quality of public services is hard to capture in the index, this may lead to a downward bias in the coefficient.

In the bottom portion of table 3 the main explanatory variable is now regional newspaper content. This variable is the sum of household reaches of all newspapers in a community, where the reach is weighted by the respective reader share of the newspaper in the municipality under consideration. Again, the reader share is supposed to approximate the share of articles in the newspaper that is concerned with issues in the respective municipality. The results from the content estimations, too, back the idea of better informed voters being able to force their local politicians to provide them with local services more efficiently. An increase in content by one standard deviation (.19) increases efficiency by around .1 standard deviations.

Because the inclusion of the local government revenue variable on both sides of the equation (as a control variable and as the denominator of the efficiency index) might lead to biased estimates, we also estimate our model with local government production as the dependent variable. Estimation of the model with revenue included on both sides of the equation only leads to unbiased estimates, as long as there is no measurement error. In the presence of measurement error in the revenue variable, however, the coefficient of revenue will be biased towards -1 (see, e.g. Borjas, 1980). Especially with an index variable such as the revenue index, measurement error is almost certainly an issue. Thus, we put a somewhat larger amount of trust in these estimates, as shown in table 4. The top part again displays results for households reach as the main explanatory variable. Regional newspaper content is used in the estimations shown in the bottom part. Here, the results imply that an increase in household reach (penetration) and reach weighted by reader share (content) both lead to higher levels of public sector production. This holds true when local government revenue is controlled for (columns (4)). A one standard deviation increase in content increases production by .065 standard deviations, whereas the effect is .05 standard deviations for household reach. Overall the results are very similar to those presented in table 3.

5.1 Robustness checks and 'placebo' tests

As a first check of the validity of our results, we use three other measures of local information in table 5. The first is regional newspaper reach including small newspapers registered with the LLA. As we could not obtain data on the geographical distribution of the circulation of these newspapers, all sold newspapers are assigned to the municipality where the newspaper's headquarters is located. This variable also shows a significant positive effect on efficiency and production. As the assignment of the LLA circulation to only one community quite possibly leads to biased estimates (especially in the case of the content and the congruence variable that will be used further on in this section), we refrain from using it in the further estimations. The second media measure is local

Table 3: DEPENDENT VARIABLE IS LOCAL PUBLIC SECTOR EFFICIENCY.

	(1)		(2)		(3)		(4)	
regional newspaper penetration	2.9713*	(1.659)	3.1854*	(1.646)	3.1453**	(1.527)	2.5064**	(1.141)
local government revenue							-0.5255***	(0.075)
secondary school pct					-0.9964***	(0.336)	-0.3257	(0.287)
university educated pct					-0.8505	(0.602)	-0.1793	(0.520)
local list seats in council pct					0.0541	(0.039)	0.0538*	(0.028)
local council seats per 1000 inh.					0.6126**	(0.289)	0.4064	(0.261)
share largest party					0.0719**	(0.034)	0.0587**	(0.028)
average gross income					0.1660***	(0.053)	0.0936**	(0.045)
religious population pct					-0.0435*	(0.026)	-0.0360*	(0.019)
immigrant population pct					-0.9743***	(0.331)	-0.4834*	(0.271)
average household size			0.0895	(3.403)	-0.6141	(3.301)	-3.3208	(2.861)
urban population pct			0.2014***	(0.065)	0.1732***	(0.060)	0.1190**	(0.054)
population (1000)			0.5071**	(0.231)	0.4534**	(0.204)	0.1674	(0.195)
year fixed effects	Yes		Yes		Yes		Yes	
<i>N</i>	1843		1840		1840		1840	

	(1)		(2)		(3)		(4)	
regional newspaper content	7.6835***	(2.887)	7.9884***	(2.905)	6.1616**	(2.806)	5.2712**	(2.671)
local government revenue							-0.5262***	(0.075)
secondary school pct					-0.9483***	(0.336)	-0.2857	(0.285)
university educated pct					-0.8696	(0.607)	-0.1925	(0.524)
local list seats in council pct					0.0534	(0.039)	0.0532*	(0.028)
local council seats per 1000 inh.					0.6090**	(0.290)	0.4024	(0.263)
share largest party					0.0720**	(0.034)	0.0588**	(0.028)
average gross income					0.1681***	(0.053)	0.0950**	(0.045)
religious population pct					-0.0415	(0.026)	-0.0346*	(0.019)
immigrant population pct					-0.9574***	(0.331)	-0.4684*	(0.271)
average household size			0.8999	(3.315)	0.3355	(3.206)	-2.5853	(2.831)
urban population pct			0.1982***	(0.065)	0.1710***	(0.060)	0.1172**	(0.054)
population (1000)			0.5025**	(0.224)	0.4507**	(0.199)	0.1658	(0.192)
year fixed effects	Yes		Yes		Yes		Yes	
<i>N</i>	1843		1840		1840		1840	

All estimations include municipality fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: DEPENDENT VARIABLE IS LOCAL PUBLIC SECTOR PRODUCTION.

	(1)		(2)		(3)		(4)	
regional newspaper penetration	1.9708	(1.429)	2.8601**	(1.385)	2.8462**	(1.353)	2.9527**	(1.382)
local government revenue							0.0876**	(0.038)
secondary school pct					0.0749	(0.320)	-0.0369	(0.321)
university educated pct					0.4769	(0.596)	0.3650	(0.585)
local list seats in council pct					0.0690**	(0.031)	0.0690**	(0.030)
local council seats per 1000 inh.					0.3557	(0.381)	0.3901	(0.375)
share largest party					0.0469	(0.031)	0.0491	(0.031)
average gross income					0.0622	(0.056)	0.0743	(0.055)
religious population pct					-0.0333**	(0.016)	-0.0346**	(0.016)
immigrant population pct					-0.3626	(0.294)	-0.4444	(0.297)
average household size			-6.6942**	(3.044)	-6.3848**	(3.120)	-5.9335*	(3.132)
urban population pct			0.0779	(0.056)	0.0782	(0.057)	0.0872	(0.058)
population (1000)			-0.0134	(0.211)	0.0129	(0.214)	0.0606	(0.213)
year fixed effects	Yes		Yes		Yes		Yes	
<i>N</i>	1843		1840		1840		1840	

	(1)		(2)		(3)		(4)	
regional newspaper content	4.8270	(3.131)	5.4724*	(3.056)	5.0134*	(2.995)	5.1601*	(2.961)
local government revenue							0.0867**	(0.038)
secondary school pct					0.1173	(0.318)	0.0081	(0.319)
university educated pct					0.4578	(0.600)	0.3462	(0.589)
local list seats in council pct					0.0682**	(0.031)	0.0682**	(0.030)
local council seats per 1000 inh.					0.3538	(0.383)	0.3879	(0.377)
share largest party					0.0471	(0.031)	0.0493	(0.031)
average gross income					0.0645	(0.056)	0.0765	(0.055)
religious population pct					-0.0313**	(0.016)	-0.0324**	(0.016)
immigrant population pct					-0.3488	(0.295)	-0.4294	(0.298)
average household size			-5.8849*	(3.017)	-5.4984*	(3.079)	-5.0170	(3.080)
urban population pct			0.0749	(0.056)	0.0761	(0.057)	0.0850	(0.058)
population (1000)			-0.0218	(0.207)	0.0090	(0.211)	0.0559	(0.210)
year fixed effects	Yes		Yes		Yes		Yes	
<i>N</i>	1843		1840		1840		1840	

All estimations include municipality fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: DEPENDENT VARIABLES ARE PRODUCTION (1) AND EFFICIENCY (2).

	(1) production	(2) efficiency
<i>other measures of local information</i>		
regional newspaper (+LLA) penetration	2.9875** (1.374)	2.6068** (1.143)
local newspaper penetration	2.8406** (1.369)	2.5363** (1.137)
regional newspaper congruence	4.6003 (3.606)	5.0277 (3.304)
<i>variables unrelated to local information</i>		
tabloid newspaper penetration	-1.7474 (1.914)	0.7474 (1.165)
national newspaper penetration	-0.9259 (1.416)	0.9623 (0.909)
specialty newspaper penetration	-6.1193 (8.615)	-0.9168 (6.960)
non-regional newspaper penetration	-0.9868 (1.374)	0.8756 (0.896)
neighbors' regional penetration (fylke)	1.7995 (3.478)	0.5736 (2.922)

All specifications are as in column (4) of the base regressions. All estimations include municipality fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code).
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

newspaper reach. These are the newspapers contained in regional reach minus the storby dagsavis, which have a significantly larger radius of operation (i.e. they are indeed more regional papers than they are local papers). The magnitude and significance of the effect is very similar to the earlier results. The final measure we would expect to exhibit a positive impact on efficiency (production) is regional congruence, as defined in section 3.1. As expected, this variable has a positive coefficient that implies going from a situation where the average newspaper sold in municipality i contains virtually no information on i to a situation where the average sold newspaper is completely focused on i increases efficiency by roughly 5 points. The effect is, however, not statistically significant. In other robustness checks we find that the results hold when we exclude all observations where reach or content changed by more than 10 percentage points from one year to the next. Following Borge, we also excluded all communities with efficiency levels below 80 and above 120. This actually leads to slightly larger coefficients of regional reach, content and congruence as well as slightly higher significance levels.

In five additional specifications ('placebo tests', reported in the bottom part of table 5) we use measures of media penetration which we would suspect not to have an influence on either efficiency or production. The first four of these variables are the household reach of tabloid newspapers, national newspapers, specialty newspapers as well as all newspapers excluding those that make up regional reach. As the results in table 5 show, none of these media measures significantly impacts public sector performance. This is in line with the idea that only media that actually carries information on municipal affairs is suited to pressure politicians into using their funds more efficiently and none of the above newspaper groups conveying much local content. The final measure is the average reach of regional papers in the other municipalities that are part of municipality i 's fylke

(county). Changes in neighboring communities' voter information should not have an effect on efficiency in municipality i .¹³ All of these measures combined provide tentative evidence that the media effect is actually very closely related to the local nature of the newspapers being read.

5.2 Municipality size, centrality and media effects

Three reasons suggest that the effect of newspapers on government efficiency may depend on municipality population or urbanization. First, many smaller or non-urban communities are rather sparsely populated and newspapers might therefore play a more important role in distributing information than in larger communities. Whenever voters in less populous (less urban) places rely more on newspapers for information on the community this implies a larger media effect on efficiency. Second, a larger part of the news may be taken up by local politics in smaller communities, as there is much less going on that the newspapers can actually pick up on (i.e. there is less 'news competition').¹⁴ If a larger share of the news is made up of local politics in the less populated or non-urban communities, we would expect the effect of newspapers on efficiency and production to be larger there. A third argument comes from Rattsø and Kalseth (1998) who find that it is the smaller jurisdictions that overspend the most (as in spending more money on public services than the more efficient municipalities). In a similar vein, Sørensen (1984) finds that 'financial stress', measured as the ratio of expenditure growth compared to the growth of tax revenues is positively correlated with centrality. This could mean that the smaller or non-central municipalities have the largest potential for efficiency increases whenever public pressure increases.

Table 6: CENTRAL MUNICIPALITIES EXCLUDED.

	(1) production		(2) efficiency	
regional newspaper penetration	4.6923**	(2.165)	4.0004**	(1.777)
regional newspaper content	15.6465**	(6.264)	13.5676**	(5.567)
regional newspaper congruence	10.0089	(6.793)	9.0051	(6.467)

Municipalities classified as *central* by *Statistics Norway* excluded (N=1356 remaining). All specifications are as in column (4) of the base regressions. All estimations include municipality fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6 shows estimation results when those municipalities are excluded which have been classified as 'central' by *Statistics Norway*. This leaves us with about 75% of the original sample. With the same reasoning we exclude communities with more than 10,000 inhabitants from the estimations in table 7. The cutoff point is chosen as it marks the 75th percentile of municipality population and 10,000 is at the same time about the average

¹³Such effects may actually arise through some sort of yardstick competition. That is, more informed voters in the neighboring municipality receive more efficient politics and yardstick competition may then induce higher levels of efficiency in municipality i .

¹⁴This also means that it takes a much larger scandal to make the news in Oslo or Bergen than it does in some small municipality up north.

population of a Norwegian municipality (the median population is below 5,000). As both tables show, the effects are in general much larger in the smaller Norwegian communities. In the non-central municipalities the reach effect is more than 50% larger than in the full sample and the content effect even triples. Also, the coefficient on congruence doubles, yet it is still not statistically significant. When considering municipalities that harbor a population below 10,000, the results are very similar. Now, content and congruence are highly significant and the effects are rather large. Finally, table 8 excludes all municipalities that are classified as central and at the same time have a population above 10,000. This leaves more than 85% of the observations that are in the full sample. Again, all coefficients are statistically significant and of a larger magnitude than in the full sample.¹⁵ Taken together, the newspaper effect seems to be especially important in these rural communities.

Table 7: LARGE MUNICIPALITIES EXCLUDED.

	(1) production		(2) efficiency	
regional newspaper penetration	3.9655**	(1.676)	3.5771**	(1.393)
regional newspaper content	10.9711***	(3.825)	9.2288***	(2.726)
regional newspaper congruence	14.8288***	(4.659)	12.9027***	(3.551)

Municipalities with population above 10,000 excluded (N=1354 remaining). All specifications are as in column (4) of the base regressions. All estimations include municipality and year fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: CENTRAL MUNICIPALITIES ABOVE 10,000 IN POPULATION EXCLUDED.

	(1) production		(2) efficiency	
regional newspaper penetration	4.0453**	(1.576)	3.6142***	(1.304)
regional newspaper content	11.0027***	(3.462)	10.3156***	(2.662)
regional newspaper congruence	10.5758**	(4.659)	9.7713**	(4.108)

Municipalities with population above 10,000 and at the same time classified as 'central' are excluded (N=1588 remaining). All specifications are as in column (4) of the base regressions. All estimations include municipality and year fixed effects. Standard errors in parentheses allow for clustering on the panel variable (municipality code). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Conclusion

This paper set out to explore whether newspaper circulation affects public sector efficiency in Norwegian municipalities. We develop a model illustrating that a more informed electorate provides incentives for incumbent politicians to behave well. Since newspapers are assumed to serve as a source of information for voters, their circulation in a jurisdiction should have an impact on policy outcomes.

¹⁵As a robustness check, we excluded all municipalities with a population below 1,000. This leads to slightly higher precision in the estimations.

We test this theoretical prediction using panel data on Norwegian municipalities, where the main variables are public sector efficiency and various measures of electorate information based on newspaper circulation. The results of the empirical analysis support our theoretical argument that a larger share of informed voters goes with larger efficiency. We find a particularly strong effect of the newspaper variables in small and non-central municipalities.

Regarding the overall rather small effects, we believe that one important reason may be that while voters care about efficiency in general, the weighting in the production index, or its sub-indices even, most likely do not perfectly mirror varying local preferences across municipalities. The production index serves as a monitoring device for the central government, yet, using indicator weights for particular services which rely on country-wide mean values, it cannot perfectly take into account differing preferences across municipalities. An important implication of our results then is that monitoring local politics via newspapers may provide an essential complement to monitoring by the central government. As local newspapers cater to local preferences, they are an important institution when it comes to ensuring the accountability of local governments.

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Appendix

Table 9: DESCRIPTION OF VARIABLES.

Variable	Description
<i>Aviskatalogen data</i>	
newspaper penetration	Percent of households reading a newspaper. values > 100 denote more than one paper on average.
tabloids	Dagbladet, Verdens Gang.
regional newspapers	Storby dagsaviser (including Aften), lokale dagsaviser, andre lokalaviser as shown in table 10. Parentheses after riksspredte nyhetsaviser and storby dagsaviser indicate that these papers are sometimes classified differently. This alternative classification is not used.
national newspapers	Riksspredte nyhetsaviser as in table 10.
specialty newspapers	Nisjeaviser as shown in table 10.
content	The newspaper penetration in municipality i , weighted by the share of newspaper i 's total sales occurring in that municipality.
congruence	Content of a newspaper weighted by the newspaper's market share in the municipality.
<i>LLA data</i>	
LLA newspapers	Local newspapers not included in the Aviskatalogen. Regionally disaggregated circulation data not available, the full circulation is assigned the paper's home municipality
<i>Local gov't data</i>	
local public sector efficiency	Official efficiency index, developed by Borge et al. (2008)
local public sector production	Official production index, developed by Borge et al. (2001)
local government revenue	Official revenue index
<i>NSD regional data</i>	
secondary school pct	% of population over 16 years whose highest degree is secondary
university educated pct	% of population over 16 years whose highest degree is tertiary
<i>KOSTRA variables (ssb.no)</i>	
local list seats in council pct	Percent of seats in the municipal council taken by non-national parties (only one election in the period under consideration: 2003)
local council seats per 1000 inh.	Municipalities set the number of seats, as long as lower limit is kept
share largest party	vote share of the largest party in the municipal council
average gross income (1000 NOK)	Per taxpayer
religious population pct	Percent of residents registered with the state church
immigrant population pct	none
average household size	none
urban population pct	none
population (1000)	none

Table 10: NEWSPAPERS BY CLASSIFICATION.

Newspaper	classification
DAGBLADET, alm. dager	riksspredte nyhetsaviser
DAGBLADET, Fredagsmagasin	riksspredte nyhetsaviser
DAGBLADET, lørdag	riksspredte nyhetsaviser
DAGBLADET, Magasinet	riksspredte nyhetsaviser
DAGBLADET, søndag	riksspredte nyhetsaviser
DAGBLADET, Søndagsmagasin	riksspredte nyhetsaviser
VG - VERDENS GANG, alm. dager	riksspredte nyhetsaviser
VG - VERDENS GANG, lørdag	riksspredte nyhetsaviser
VG - VERDENS GANG, søndag	riksspredte nyhetsaviser
AFTENPOSTEN, morgenutgaven	riksspredte nyhetsaviser (storby dagsaviser)
AFTENPOSTEN, morgenutgaven lørdag	riksspredte nyhetsaviser (storby dagsaviser)
AFTENPOSTEN, søndag	riksspredte nyhetsaviser (storby dagsaviser)
AFTEN	storby dagsaviser (riksspredte nyhetsaviser)
ADRESSEAVISEN	storby dagsaviser
BERGENS TIDENDE	storby dagsaviser
BERGENSAVISEN	storby dagsaviser
DAGSAVISEN	storby dagsaviser
ROGALANDS AVIS	storby dagsaviser
STAVANGER AFTENBLAD	storby dagsaviser
AGDERPOSTEN	lokale dagsaviser
AKERSHUS AMTSTIDENDE	lokale dagsaviser
ALTAPOSTEN	lokale dagsaviser
AURA AVIS	lokale dagsaviser
AVISA NORDLAND	lokale dagsaviser
BLADET VESTERÅLEN	lokale dagsaviser
BRØNNØYSUNDS AVIS	lokale dagsaviser
BUDSTIKKA	lokale dagsaviser
DRAMMENS TIDENDE	lokale dagsaviser
EIDSVOLL ULLENSAKER BLAD	lokale dagsaviser
FÆDRELANDSVENNEN	lokale dagsaviser
FARSUNDS AVIS	lokale dagsaviser
FINNMARK DAGBLAD	lokale dagsaviser
FINNMARKEN	lokale dagsaviser
FIRDA	lokale dagsaviser
FREDRIKSSTAD BLAD	lokale dagsaviser
FREMOVER	lokale dagsaviser
GJENGANGEREN	lokale dagsaviser
GLÅMDALEN	lokale dagsaviser
GUDBRANDSDØLEN DAGNINGEN	lokale dagsaviser
HADELAND	lokale dagsaviser
HALDEN ARBEIDERBLAD	lokale dagsaviser
HAMAR ARBEIDERBLAD	lokale dagsaviser
HARSTAD TIDENDE	lokale dagsaviser
HAUGESUNDS AVIS	lokale dagsaviser
HELGELAND ARBEIDERBLAD	lokale dagsaviser
LAAGENDALSPOSTEN	lokale dagsaviser
LINDESNES	lokale dagsaviser
LOFOTPOSTEN	lokale dagsaviser
MOSS AVIS	lokale dagsaviser
NAMDALSAVISA	lokale dagsaviser
NORDLYS	lokale dagsaviser
OPPLAND ARBEIDERBLAD	lokale dagsaviser
ØSTLANDETS BLAD	lokale dagsaviser
ØSTLANDS-POSTEN	lokale dagsaviser
ØSTLENDINGEN	lokale dagsaviser
PORSGRUNNS DAGBLAD	lokale dagsaviser
RANA BLAD	lokale dagsaviser
RINGERIKES BLAD	lokale dagsaviser
RJUKAN ARBEIDERBLAD	lokale dagsaviser
ROMERIKES BLAD	lokale dagsaviser

Table 10: NEWSPAPERS BY CLASSIFICATION (CONTINUED).

Newspaper	classification
ROMSDALS BUDSTIKKE	lokale dagsaviser
SANDEFJORDS BLAD	lokale dagsaviser
SARPSBORG ARBEIDERBLAD	lokale dagsaviser
SMAALENENES AVIS	lokale dagsaviser
SØR-TRØNDELAG	lokale dagsaviser
SUNNHORDLAND	lokale dagsaviser
SUNNMØRSPOSTEN	lokale dagsaviser
TELEMARKSAVISA	lokale dagsaviser
TELEN	lokale dagsaviser
TIDENS KRAV	lokale dagsaviser
TØNSBERGS BLAD	lokale dagsaviser
TROMS FOLKEBLAD	lokale dagsaviser
TROMSØ	lokale dagsaviser
TRØNDER-AVISA	lokale dagsaviser
VALDRES	lokale dagsaviser
VARDEN	lokale dagsaviser
AGDER (Flekkefjords Tidende)	andre lokalaviser
ÅNDALSNES AVIS	andre lokalaviser
ANDØYPOSTEN	andre lokalaviser
ARBEIDETS RETT	andre lokalaviser
ÅSANE TIDENDE	andre lokalaviser
ASKØYVÆRINGEN	andre lokalaviser
AUST AGDER BLAD	andre lokalaviser
BØMLO-NYTT	andre lokalaviser
BYAVISA TØNSBERG	andre lokalaviser
BYGDANYTT	andre lokalaviser
BYGDEBLADET RANDABERG og RENNESØY	andre lokalaviser
BYGDEPOSTEN	andre lokalaviser
DALANE TIDENDE	andre lokalaviser
DEMOKRATEN	andre lokalaviser
DRIVA	andre lokalaviser
EIKER AVIS	andre lokalaviser
EIKERBLADET	andre lokalaviser
FANAPOSTEN	andre lokalaviser
FINNMARKSPOSTEN	andre lokalaviser
FIRDA TIDEND	andre lokalaviser
FIRDAPOSTEN	andre lokalaviser
FJORDABLADET	andre lokalaviser
FJORDENES TIDENDE	andre lokalaviser
FJORDINGEN	andre lokalaviser
FOSNA-FOLKET	andre lokalaviser
FRAMTID I NORD	andre lokalaviser
GJESDALBUEN	andre lokalaviser
GRIMSTAD ADRESSETIDENDE	andre lokalaviser
HALDEN DAGBLAD	andre lokalaviser
HALLINGDØLEN	andre lokalaviser
HAMAR DAGBLAD	andre lokalaviser
HARAMSNYTT	andre lokalaviser
HARDANGER FOLKEBLAD	andre lokalaviser
HELGELANDS BLAD	andre lokalaviser
HITRA-FRØYA	andre lokalaviser
HORDALAND	andre lokalaviser
HORDALAND FOLKEBLAD	andre lokalaviser
INDRE AKERSHUS BLAD	andre lokalaviser
INNHERREDS FOLKEBLAD OG VERDALINGEN	andre lokalaviser
JÆRBLADET	andre lokalaviser
JARLSBERG AVIS	andre lokalaviser
KRAGERØ BLAD VESTMAR	andre lokalaviser
KVINNHERINGEN	andre lokalaviser
LEVANGER-AVISA	andre lokalaviser
LIERPOSTEN	andre lokalaviser
LILLESANDS-POSTEN	andre lokalaviser
LOFOT-TIDENDE	andre lokalaviser

Table 10: NEWSPAPERS BY CLASSIFICATION (CONTINUED).

Newspaper	classification
LOKALAVISA SØR-ØSTERDAL	andre lokalaviser
LOKALAVISEN OPPEGÅRD	andre lokalaviser
MALVIK-BLADET	andre lokalaviser
MØRE-NYTT	andre lokalaviser
MOSS DAGBLAD	andre lokalaviser
NORDDALEN	andre lokalaviser
NORDHORDLAND	andre lokalaviser
NORDSTRANDS BLAD	andre lokalaviser
NYE TROMS	andre lokalaviser
OPDALINGEN	andre lokalaviser
ØYENE	andre lokalaviser
RAKKESTAD AVIS	andre lokalaviser
RAUMNES	andre lokalaviser
RINGSAKER BLAD	andre lokalaviser
RØYKEN OG HURUMS AVIS	andre lokalaviser
SALTENPOSTEN	andre lokalaviser
SANDE AVIS	andre lokalaviser
SANDNESPOSTEN	andre lokalaviser
SETESDØLEN	andre lokalaviser
SØGNE OG SOGNDALEN BUDSTIKKE	andre lokalaviser
SOLABLADET	andre lokalaviser
SØR-VARANGER AVIS	andre lokalaviser
STJØRDALENS BLAD	andre lokalaviser
STRANDBUEN	andre lokalaviser
STRILEN	andre lokalaviser
SVELVIKSPOSTEN	andre lokalaviser
TRØNDERBLADET	andre lokalaviser
TVEDESTRANDSPOSTEN	andre lokalaviser
VARINGEN	andre lokalaviser
VENNESLA TIDENDE	andre lokalaviser
VEST-TELEMARK BLAD	andre lokalaviser
VESTERAALENS AVIS	andre lokalaviser
VESTLANDSNYTT	andre lokalaviser
VESTNYTT	andre lokalaviser
VIGGA	andre lokalaviser
VIKEBLADET VESTPOSTEN	andre lokalaviser
YTRE SOGN AVIS	andre lokalaviser
YTRINGEN	andre lokalaviser
ARBEIDERAvisa	nisjeaviser
ÁVVIR	nisjeaviser
COMPUTERWORLD	nisjeaviser
DAG OG TID	nisjeaviser
DAGBLADET Sportsmagasin	nisjeaviser
DAGENMAGAZINET	nisjeaviser
DAGENS NÆRINGSLIV	nisjeaviser
DAGENS NÆRINGSLIV, lørdag	nisjeaviser
FINANSAVISEN	nisjeaviser
FISKAREN	nisjeaviser
FISKERIBLADET	nisjeaviser
KLASSEKAMPEN	nisjeaviser
KORSETS SEIER	nisjeaviser
MORGENBLADET	nisjeaviser
NATIONEN	nisjeaviser
NY TID	nisjeaviser
SOGN AVIS	nisjeaviser
STALL-SKRIKET	nisjeaviser
TIPS	nisjeaviser
UKEAVISEN LEDELSE	nisjeaviser
UTROP	nisjeaviser
VÅRT LAND, fredag - lørdag	nisjeaviser
VÅRT LAND, mandag - torsdag	nisjeaviser