Competition and Ideological Diversity:
Historical Evidence from US Newspapers

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Supplemental Appendix

A Evidence on the Performance of the Model and Solver

Supplemental appendix tables A.1 and A.2 evaluate the fit of the model to the reduced-form regressions presented in the paper. To evaluate model fit, we repeatedly simulate data from the estimated model and run the same regression on the simulated data that we run on the empirical samples. We average coefficients and standard errors across simulation replications.

Supplemental appendix figure A.1 evaluates the fit of the entry model. The figure shows the relationship between market size and number of papers in the real data and data simulated from the estimated model.

The next six tables evaluate the numerical and econometric behavior of our estimators. In baseline estimates reported in the paper, we constrain all standard deviations and the parameter Γ_s to be positive. We choose starting values either at zero or at a value (typically one) reflecting the expected order of magnitude of the parameter. We maximize the likelihood using KNITRO's active-set algorithm for unconstrained problems (Byrd et al. 2006). We approximate the integrals in the likelihood equations using sparse grid integration with Gaussian kernel and accuracy 3 (Heiss and Winschel 2008; Skrainka and Judd 2011). The experiments below maintain the same settings except where stated.

Supplemental appendix tables A.3 and A.4 present evidence on the robustness of our model solution to alternative starting values. We repeatedly draw starting values uniformly on a range centered roughly at the main estimated parameters. The tables report the minimum and maximum starting value used for each parameter. In the case of demand estimation, the solver converged from all 20 starts to within 10^{-3} of a standard error of our estimated parameters. In the case of supply estimation, in 17 cases the solver converged to within 10^{-3} of a standard error of our estimated parameters. In three cases, the solver reported convergence at economically implausible parameter values (extremely high values for variance parameters) with likelihood far below the likelihood at our estimated parameters.

Supplemental appendix tables A.5 and A.6 present evidence on the accuracy of the numerical integrals in our likelihood approximation. In each case, we show estimates of our model using accuracy one below or one above the accuracy used in computing the main estimates. The main estimates are shown in the first column for comparison.

Supplemental appendix tables A.7 and A.8 report Monte Carlo sampling experiments for our estimator. In each case, we repeatedly simulate data from our model (with estimated parameter values) and re-estimate the model on the simulated data. The difference between the parameters used to simulate the data and those estimated can be taken as an estimate of the finite-sample bias of the estimator. The standard deviation of estimated parameters across replications is a parametric bootstrap standard error, which can be compared to asymptotic standard errors to evaluate the quality of the asymptotic approximation to the sampling distribution of the parameters.

B Robustness of Descriptive Evidence

Supplemental appendix table B.1 presents additional evidence on the robustness of our key descriptive demand patterns. Specification (1) shows that the effect of household ideology is present when we control carefully for the configuration of the choice set. Specification (2) shows that the effect of proxies for the choice set survives using county fixed effects to control carefully for household characteristics.

Supplemental appendix table B.2 presents additional evidence on the effect of household ideology and the choice set on circulation. Models are OLS regressions of the log(circulation) of a newspaper in a given town on interactions between newspaper and town characteristics. All specifications include newspaper and town fixed effects, so models can be interpreted as estimates of homogeneous (IIA) logit models with unobservable newspaper quality and unobservable town-specific outside option quality. The baseline specification includes interactions between newspaper affiliation, the Republican vote share, and the numbers of Republican and Democratic newspapers available in the town. The second specification adds interactions between newspaper affiliation and a rich set of town demographics, as well as interactions between the Republican vote share and two non-political newspaper characteristics. We find that Republican newspapers do relatively better in towns with more Republican voters and fewer Republican newspapers. In the model with controls, we find that Republican papers do relatively better in towns with more Democratic newspapers (though this coefficient is not statistically significant).

Supplemental appendix table B.3 shows our key descriptive demand patterns for towns with below- and above-median population. For both groups of towns we find greater relative demand for Republican news in places with more Republican consumers and fewer competing Republican papers. For towns with above-median population we find that there is greater relative demand for Republican papers in places with more Democratic newspapers; for towns with below-median population this effect is wrong-signed and statistically insignificant.

Supplemental appendix table B.4 produces a descriptive analysis of the determinants of newspaper affiliation using our full panel of newspapers, which differs from the sample used in the body of the paper in that it includes newspapers that entered and exited prior to 1924. Column (1) parallels the main descriptive regression in the paper. Quantitatively, the specification in the appendix table shows a similar effect of household ideology and a smaller effect of incumbent affiliation. The latter difference is likely due to the fact that the sample in supplemental appendix table B.4 includes incumbents not present in 1924, who are likely to be smaller, less successful newspapers. Column (2) instruments for our main measure of household ideology with the Republican share of the two-party vote in the presidential election prior to the newspaper's entry. The fact that coefficients do not change much when we do this corroborates the evidence in Gentzkow et al. (2011) that reverse causality from newspaper affiliation to voting behavior was not a major factor during our period of study. Column (3) includes the lag vote share as a control. Conditional on the average Republican vote share, the lag vote share is correlated with newspaper affiliations, but including it in the model has only a small effect on the explanatory power of the model as measured by the R^2. This finding is consistent with extant evidence that political preferences were highly spatially persistent during the period we study (Glaeser and Ward 2006) and supports our use of the average vote share as the observable proxy for ideology in formal estimation.

C Extensions to Descriptive Analysis

Supplemental appendix tables C.1 and C.2 present evidence on the correlation in affiliation choices and circulation patterns across neighboring markets and towns.

Supplemental appendix table C.3 presents evidence on the effect of ownership on newspapers' affiliation choice. We estimate a random-effects logit model of newspaper affiliation choice, allowing for an owner-specific random effect and controlling for the Republican share of the two-party vote and the number of Democratic and Republican incumbent newspapers at the time of entry. We restrict attention to newspapers that are part of a multi-newspaper chain. We estimate that the owner-specific random effect accounts for an economically and statistically significant 52 percent of the residual variance.

Supplemental appendix table C.4 presents evidence on whether a given newspaper changes its content over time in response to changes in voter ideology or the competitive landscape. We follow Gentzkow et al. (2011) in measuring the orientation of a newspaper's content by the relative frequency with which the newspaper mentions the Republican presidential ticket. Qualitatively, we find that a newspaper's content becomes more Republican as voters become more Republican, consistent with a simple model of product positioning. The evidence on competitive effects is more mixed: Republicans move to the right when more Democratic papers enter, but Democratic papers do not move to the left as Republicans enter. (If anything, they do the opposite.) None of these findings is statistically significant and the confidence intervals on all parameters are too large to rule out interesting magnitudes.

Supplemental appendix table C.5 presents evidence on changes in newspaper circulation over time in response to changes in consumer ideology and the presence of substitutes. The first column presents a regression of the change in relative circulation of Republican papers on the Republican share of the vote and the change in the number of Republican and Democratic newspapers in the market. This specification is analogous to our descriptive model of town-level circulation, but is estimated on our panel of newspaper markets. For various reasons—measurement error in circulation prior to the introduction of the Audit Bureau of Circulations, idiosyncratic variation in the vote share, and endogenous price responses by newspapers—we do not expect these regressions to be exactly comparable to those we present from our cross-sectional data in the body of the paper. Nevertheless, it is comforting that the qualitative patterns hold up reasonably well in the panel.

The second column of supplemental appendix table C.5 shows results for the simulated analogue of the regression in the first column. In each market and year we simulate circulation for each newspaper, incorporating the determination of subscription prices in equilibrium, and taking the number of newspapers of each affiliation as given. We assume that the true ideology ρ_m in the market is equal to the contemporaneous Republican vote share, an assumption that almost certainly overstates the true economic content of year-to-year changes in voting patterns. We run the same regression on the simulated data that we run on the observed data in the first column. The effect of changes in the number of competitors is comparable between the two columns, although it is more symmetric in the simulated data than in the observed data. The effect of changes in ideology is larger in the simulated data than in the observed data, an intuitive finding given that our simulations very likely overstate the economic information in year-to-year changes in voting patterns.

Supplemental appendix table C.6 presents evidence on the effect of entries and exits of newspapers on total market circulation. Column (1) presents a regression of the change (between adjacent presidential elections) in the log of total circulation in the market on the change in the number of newspapers. Column (2) presents an analogue of column (1) in which we assume circulation does not change for any continuing newspaper. Column (2) can be thought of as capturing the expected value of the coefficient in column (1) if there were no substitution effects. Column (3) allows the effect of the change in the number of newspapers to accumulate over two presidential election cycles instead of one–say, due to an entering newspaper needing time to build up a subscriber base. Columns (4) and (5) estimate analogues of columns (1) and (3) using data simulated from our model as in supplemental appendix table C.5.

Supplemental appendix table C.7 provides publication information for each of the readership survey reports that we use in our analysis.

Supplemental appendix table C.8 presents evidence from our detailed readership survey data on the relationship between overlap and newspaper affiliation. For each pair of newspapers in the sample, we compute the number of readers that would overlap between the two newspapers in a model in which newspaper demand is completely separable across newspapers, so that the fraction of readers who read any two newspapers is simply the product of the fraction reading each individual newspaper. We then compute the ratio of the observed number of overlapping readers to the number predicted under this benchmark model. We find that this ratio is greater for pairs of newspapers that share an affiliation than for those that do not, although the power of exercise is limited by the very small sample size.

D Additional Sensitivity Analysis for Structural Model

Omitting Unobservables from the Model

Supplemental appendix table D.1 presents estimates of select parameters from our baseline model and from an alternative model in which we assume there is no unobservable town- or market-level heterogeneity in consumer ideology. Consistent with the findings we report in the paper, we find that key demand parameters are sensitive to excluding unobservable heterogeneity from the model, whereas key supply parameters are less so.

Allowing for Politically Independent Consumers

In this section we show how to estimate the fraction of consumers who are politically independent and how to allow for the presence of these consumers in our demand model.

We estimate the fraction independent using variation over time in the presidential vote, and using variation over time in the difference between the presidential and congressional votes. These approaches are familiar from analyses of aggregate election returns (Chapin 1912; Millspaugh 1918; Burnham 1965), though they raise well-known issues of ecological inference (Eldersveld 1952; Cowart 1974).

We assume that in each county c fraction δ_c of consumers are independents and fraction $(1-\delta_c)$ are partisans. Of partisans, fraction ρ_c are Republican and fraction $(1-\rho_c)$ are Democrats. Let $\delta = \mathrm{E}(\delta_c)$ be the overall fraction independent in the population.

In each year y there is a presidential election and a congressional election. We observe the fraction Z_{cy} of the (two-party) vote that goes to Republicans in the presidential election and the corresponding fraction $Z^{'}_{cy}$ for the congressional election.

Partisans always vote with their party. Only independents change over time or across offices. Let r_{cy} be the fraction of independents that vote Republican in the presidential election in county c at year y. Let $r^{'}_{cy}$ be the corresponding fraction for the congressional election. Then $Z_{cy} = (1-\delta_c)\rho_c + \delta_c r_{cy}$ and $Z^{'}_{cy} = (1-\delta_c)\rho_c + \delta_c r^{'}_{cy}$.

The key identifying assumptions for our approach will be that the variance of r_{cy} and of $r^{'}_{cy}$ and the covariance of r_{cy} and $r^{'}_{cy}$ are identical across all counties c. With these assumptions we get the following relations which motivate two plug-in estimators for δ_c:

$$\frac{\delta\sqrt{\mathrm{Var}(Z_{cy}|c)}}{\mathrm{E}\sqrt{\mathrm{Var}(Z_{cy}|c)}} = \delta_c$$

$$\frac{\delta\sqrt{\mathrm{Var}\left(Z_{cy}-Z^{\prime}_{cy}|c\right)}}{\mathrm{E}\sqrt{\mathrm{Var}\left(Z_{cy}-Z^{\prime}_{cy}|c\right)}} = \delta_c.$$

The first equation says that we can measure δ_c in a county c using the variance in the presidential vote share. The second equation says that we can measure δ_c using the variance in the difference between the presidential and congressional vote shares.

We implement these two measures as follows. We estimate δ as 0.217, the share of split-ticket votes in Rhode Island in 1906 (Millspaugh 1918). We estimate sample analogues of the remaining statistics using the Republican share of the two-party vote in the presidential and House elections in each county from 1868-1928, obtained from the sources described in the paper.

In supplemental appendix table D.2, we present summary results from estimating our demand and supply model on our full sample, and on subsamples consisting of towns and markets in below- or above-median counties according to the estimated fraction independent. Consistent with intuition, our findings regarding market underprovision of diversity are stronger in the sample with fewer independent consumers and weaker in the sample with more. Our main qualitative conclusions remain unchanged.

In supplemental appendix table D.3, we show the effect of allowing for the presence of politically independent consumers on our estimated demand system. Formally we allow that household i in market m has type $\theta_{im} \in \{D, I, R\}$ where I represents political independence. An independent household's mean utility for a single newspaper does not depend on the newspaper's affiliation:

$$u^{I}_{m}(B) = \sum_{j\in B}\left(\frac{\overline{\beta}+\underline{\beta}}{2} - \alpha p_{jm}\right) - g_s(B)\Gamma_s - g_d(B)\Gamma_d.$$

We assume that in each market and town there is an exogenous fraction of independent households. All parameters of demand are assumed to be the same for both independent and partisan households.

The first column of the table repeats our demand estimates for our baseline model. The second and third columns present estimates from models that allow for the presence of politically independent households, measured as described above. Allowing for politically independent households leads us to estimate a larger gap between $\overline{\beta}$ and $\underline{\beta}$ than in the baseline model. This is intuitive because partisans are now assumed to represent less than the full population, and hence must be correspondingly more partisan in their tastes for news in order to match the empirical facts.

Extension to Multiple Dimensions of Differentiation

In this section, we assess the sensitivity of our findings to the presence of unmodeled dimensions of horizontal differentiation. We simulate data from a model in which newspapers choose two horizontal characteristics—political affiliation and time of publication—and we estimate our baseline supply model (with affiliation choice only) on the simulated data to evaluate how well the restricted model's counterfactual simulations approximate those in the data generating model.

Define the "Morning Evening" (ME) model as follows. Denote a newspaper's political affiliation by $\tau_{jm} \in \{R,D\}$ and its time of publication by $\tilde{\tau}_{jm} \in \{M,E\}$. Each newspaper thus chooses an attribute $(\tau_{jm}, \tilde{\tau}_{jm}) \in \{R,D\} \times \{M,E\}$. Household utility for reading a bundle of newspapers B is given by

$$u_{im}(B) = \sum_{j \in B} \left(\tilde{\beta} \mathbf{1}_{\tilde{\tau}_{jm}=M} + \underline{\beta} \mathbf{1}_{\theta_{im} \neq \tau_{jm}} + \overline{\beta} \mathbf{1}_{\theta_{im}=\tau_{jm}} - \alpha p_{jm} \right) - g_s(B)\Gamma_s - g_d(B)\Gamma_d - h(B)\tilde{\Gamma} + \varepsilon_{im}(B).$$

Here we preserve notation from the paper and add the following new elements: the number $h(B)$ of distinct two-newspaper subsets of bundle B such that the two newspapers have the same time of day, the mean utility $\tilde{\beta}$ of a morning paper relative to an evening paper, and the diminishing utility $\tilde{\Gamma}$ from reading multiple papers at the same time of day. As in the baseline model, newspapers choose their types sequentially, subject to an iid type-1 extreme value attribute-specific cost shock $\xi_{jm}(\tau_{jm}, \tilde{\tau}_{jm})$.

We simulate data from the supply-side of the ME model. We set all parameters inherited from the baseline model to their estimated values. We set $\tilde{\beta} = -0.04$ and $\tilde{\Gamma} = 0.4$, which allows us to roughly match the observed shares of morning-morning, morning-evening, and evening-evening configurations among two-newspaper markets in our data.

We then estimate our baseline supply model on the simulated data, ignoring the choice of morning-evening, and fixing demand parameters at the values reported in the paper.

In table D.4 we compare the counterfactual predictions of the ME model to those of the baseline model estimated on data simulated from the ME model. Although the baseline model is misspecified, it makes qualitative predictions similar to those of the data-generating model, though with somewhat different quantitative predictions.

Out-of-Sample Performance

Supplemental appendix table D.5 presents evidence on the fit of our model to the empirical means of subscription prices across market configurations. The model predicts that, conditional on the number of newspapers, the affiliations of the newspapers are not strongly related to the mean subscription price. That prediction is consistent with the data. The model also predicts that markets with more newspapers will have higher subscription prices due to more intense advertising competition. That prediction also holds in the observed data, though more weakly than in data simulated from the model.

Supplemental appendix figure D.1 and table D.6 compare features of the US newspaper market as predicted by our model against observed attributes of the US Newspaper Panel introduced in Gentzkow et al. (2011). We use our baseline model to simulate the number of daily papers and the number of markets with diverse papers in 1924. We simulate 1868 by assuming that the only change in model parameters between 1868 and 1924 is in a decline in marginal cost MC driven entirely by changes in paper and ink prices. To estimate the percentage difference in MC between these two periods, we multiply the 1924 variable cost share of newsprint and ink, estimated to be 26.5 percent from the Inland Press data, by the percentage difference in the real price of newsprint between the two periods, which is 233 percent higher in 1868 compared to 1924, from Gentzkow et al. (2006).

Additional Counterfactual Analysis

In supplemental appendix table D.7 we show how the differences between the baseline case and the social optimum depend on the maximum number of firms we permit to enter each market. In the first two columns we reproduce results from the body of the paper, which allow as many as 6 firms per market. In the second two columns we allow only a maximum of 3 papers per market. Both cases show that market equilibrium falls well short of the socially optimal total surplus and diversity of readership.

Supplemental appendix table D.8 shows the results of implementing a fixed cost subsidy on welfare and diversity. We base our counterfactual on a real policy: a fixed cost subsidy in Sweden which favors a local market's "second papers" (i.e., papers with lower circulation than the largest paper in the market; see Gustafsson et al. 2009). We model this by assuming that second and subsequent entrants receive a subsidy of K_F dollars, though we note that in our model second entrants need not be smaller in circulation. The surplus-maximizing fixed cost subsidy amounts to a payment of $\$12,639$ per year to the average second or subsequent entrant, or approximately 15 percent of pre-subsidy revenue. The Swedish fixed cost subsidy also amounts to roughly 15 percent of pre-subsidy revenue (Gustafsson et al. 2009).

Supplemental appendix figure D.2 illustrates in more detail our finding that there are too few diverse markets in equilibrium. The plot shows the number of diverse markets in our baseline simulations and in simulations from a counterfactual in which the social planner chooses all endogenous post-entry variables, as a function of the size of the partisan majority in the market. The gap between the baseline model and the social-planner benchmark is greatest in markets with similar numbers of R and D consumers. In more partisan markets, diversity is less common, and the gap between the baseline model and the social-planner benchmark is small.

E Ideological Diversity of News Media in a Model of Voting

In this section we specify a model of voting in which voter welfare improves when the news media are ideologically diverse, but the ideological configuration of the news market does not affect expected partisan vote shares.

Let $\omega \in \{D,R\}$ be a binary state of the world with $\Pr(\omega = R) = \frac{1}{2}$. There is a unit mass of voters i each of whom must make a binary choice $v_i \in \{D,R\}$ under imperfect information about the state ω. Voter i's utility from vote v is

$$u_i(v) = (2\mathbf{1}_{v=R} - 1)\,\theta_i + \mathbf{1}_{v=\omega}$$

where $\mathbf{1}$ is the indicator function and $\theta_i \sim Unif\left[-\frac{1}{2}, \frac{1}{2}\right]$ is a preference parameter. The voter has both intrinsic ideology and a preference for voting for the "right" party.

There is an exogenous and known market configuration with 0, 1, or 2 newspapers. Each newspaper j has a binary type $\tau_j \in \{D, R\}$. Newspapers receive a common signal s whose distribution depends on ω. Each newspaper then makes a report r_j that depends on the signal s and the type τ_j. Let $\tau \in \{\emptyset, D, R, DR, DD, RR\}$ denote the configuration of the market and let r denote the set of all reports.

Reporting strategies are as follows. With probability $\frac{1}{2}$, $s = \omega$ and $r_j = s \forall j$. With probability $\frac{1}{2}$, $s = 0$ and $r_j = \tau_j \forall j$. We can think of this as corresponding to a signal structure in which sometimes there is very clear evidence in favor of one side or the other, in which case newspapers are bound to report it, but sometimes the evidence is ambiguous, in which case newspapers may exercise discretion.

Suppose that all voters see the reports r of all newspapers. Then it is easy to verify that the fraction of voters who vote for party R is equal to $\Pr(\omega = R|r)$. Moreover, by the law of iterated expectations, $\mathrm{E}(\Pr(\omega = R|r)) = \frac{1}{2}$ regardless of the number or types of the newspapers τ.

Let $U(\tau)$ denote the average voter's expected utility as a function of the market configuration τ. It is straightforward to verify that $U(RD) > U(RR) = U(DD) = U(R) = U(D) > U(\emptyset)$. Having one newspaper is superior to having no newspaper, but because reporting strategies differ only by type, having two newspapers of the same type is equivalent to having one, and having two newspapers of different types is better than having only one newspaper.

In fact we can go further: configuration *RD* is preferred by all voters to any particular one-type configuration, strictly so for a positive mass of voters, and any particular one-type configuration is preferred by all voters to no newspaper, again strictly for a positive mass of voters.

It is also easy to show that voters with $\theta_i > 0$ prefer $\tau = R$ in expectation to $\tau = D$, whereas voters with $\theta_i < 0$ prefer $\tau = D$ to $\tau = R$, and voters with $\theta_i \in \left\{-\frac{1}{2}, 0, \frac{1}{2}\right\}$ are indifferent. That is, voters in this model exhibit a preference for newspapers whose "bias" conforms to their own ideology. The reason is intuitive: voters with high θ_i will only vote for party D if there is very strong evidence that $\omega = D$, which arrives only if $r_j = D$ and $\tau_j = R$.

Finally, to show how these results generalize, consider a more abstract setting with a state of the world and a population of voters who make a decision. Voters' payoffs depend on their decisions and on the state of the world (payoff functions may differ for different voters). Before making a decision every voter sees the reports of all newspapers. Newspapers base their reports on a common signal whose distribution is a function of the true state. There are two types of newspapers, and reporting strategies may differ across but not within newspaper types. The Republican vote share is some function of voters' decisions that is linear in the posterior mean of the state of the world. For technical ease, suppose that the state space, signal space, reporting space, and voter action space are all finite.

It is easy to see that the model outlined above is a special case of this more abstract model. It is also easy to show in general that (i) all voters at least weakly prefer *RD* to *R* or *D*, (ii) all voters regard *RR* as welfare-equivalent to *R* and *DD* as welfare-equivalent to *D*, and (iii) the Republican vote share is independent of the market configuration.

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Supplemental Appendix Table A.1: Fit of Demand Model

Dependent variable: Average log(circ) of R papers - Average log(circ) of D papers

	(obs)	(sim)
Republican vote share	0.9510	1.2264
	(0.1980)	(0.1556)
Number of Republican papers	-0.0360	-0.0370
	(0.0136)	(0.0038)
Number of Democratic papers	0.0174	0.0361
	(0.0154)	(0.0034)
R^2	0.0127	0.0220
Number of counties	1219	1580
Number of observations	4294	4016

Notes: Both columns show results from OLS estimates. Results in the first column are from the demand estimation sample. Results in the second column are averaged over 5 simulations from our estimated model. Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868-1928.

Supplemental Appendix Table A.2: Fit of Supply Model

Dependent variable: Dummy for newspaper choosing R affiliation

	(obs)	(sim)
Republican vote share	2.3356	2.0384
	(0.0611)	(0.0287)
Number of Republican papers	-0.1525	-0.1018
	(0.0342)	(0.0296)
Number of Democratic papers	0.1260	0.0425
	(0.0297)	(0.0227)
R^2	0.3819	0.3838
Number of markets	950	951
Number of newspapers	1338	1402

Notes: Both columns show results from OLS estimates. Results in the first column are from the supply estimation sample. Results in the second column are averaged over 5 simulations from our estimated model. Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868-1928.

Supplemental Appendix Table A.3: Sensitivity of Demand Model Estimates to Starting Values

	Range of Starting Values	
Parameter	Minimum	Maximum
α	0.170	0.248
$\underline{\beta}$	-1.066	-0.013
$\overline{\beta}$	0.511	1.733
Γ_s	0.210	1.389
Γ_d	-0.568	0.444
σ_ζ	0.277	1.798
μ_ν^{town}	-0.802	0.784
σ_ν^{town}	0.112	0.751
μ_ρ^0	-1.048	0.848
μ_ρ^1	1.209	2.910

Notes: The table reports the actual start value ranges of our 20 randomly drawn starting values.

Supplemental Appendix Table A.4: Sensitivity of Supply Model Estimates to Starting Values

	Range of Starting Values	
Parameter	Minimum	Maximum
a_l	1.811	11.307
σ_ξ	0.259	4.776
μ_ν^{mkt}	-1.938	1.837
σ_ν^{mkt}	0.010	23.957
μ_κ^0	-0.720	9.486
μ_κ^1	-1.761	1.848
σ_κ	0.138	6.055

Notes: The table reports the actual start value ranges of our 20 randomly drawn starting values.

Supplemental Appendix Table A.5: Sensitivity of Demand Model Estimates to Accuracy of Numerical Integral

Parameter	Baseline Accuracy	Lower Accuracy	Higher Accuracy
α	0.1798	0.1791	0.1797
$\underline{\beta}$	-0.2906	-0.2761	-0.2877
$\overline{\beta}$	0.8137	0.7974	0.8104
Γ_s	0.5645	0.5671	0.5654
Γ_d	0.3004	0.3104	0.3025
σ_ζ	0.7017	0.7022	0.7018
μ_ν^{town}	0.0466	0.0479	0.0469
σ_ν^{town}	0.2783	0.2691	0.2763
μ_ρ^0	-0.0714	-0.0760	-0.0725
μ_ρ^1	1.9952	1.9858	1.9943
Quadrature Accuracy	3	2	4

Notes: The first column reports the main estimates from the paper. The second and third columns report estimates using quadrature accuracy one below and one above that used to compute the main estimates, respectively.

Supplemental Appendix Table A.6: Sensitivity of Supply Model Estimates to Accuracy of Numerical Integration

Parameter	Baseline Accuracy	Lower Accuracy	Higher Accuracy
a_l	7.4447	7.4345	7.4417
σ_ξ	0.2277	0.2288	0.2279
μ_ν^{mkt}	-0.0114	-0.0113	-0.0113
σ_ν^{mkt}	0.1523	0.1454	0.1505
μ_κ^0	8.7354	8.7363	8.7358
μ_κ^1	-0.6448	-0.6449	-0.6448
σ_κ	0.3607	0.3608	0.3607
Quadrature Accuracy	3	2	4

Notes: The first column reports the main estimates from the paper. The second and third columns report estimates using quadrature accuracy one below and one above that used to compute the main estimates, respectively.

Supplemental Appendix Table A.7: Monte Carlo Experiments for Demand Model

Parameter	Baseline estimate	Average estimate across simulations	Asymptotic standard errors	Bootstrap standard errors
α	0.1798	0.1799	0.0032	0.0039
$\underline{\beta}$	-0.2906	-0.2869	0.0676	0.0819
$\overline{\beta}$	0.8137	0.8102	0.0759	0.0920
Γ_s	0.5645	0.5700	0.0669	0.0595
Γ_d	0.3004	0.2991	0.0469	0.0572
σ_ζ	0.7017	0.6993	0.0077	0.0089
μ_ν^{town}	0.0466	0.0571	0.0422	0.0537
σ_ν^{town}	0.2783	0.2702	0.0135	0.0083
μ_ρ^0	-0.0714	-0.0921	0.0850	0.1134
μ_ρ^1	1.9952	1.9927	0.0336	0.0326

Notes: The table reports the results of Monte Carlo experiments in which we first simulate 20 datasets from our model at the parameter values shown in the first column, then re-estimate our model on each simulated dataset.

Supplemental Appendix Table A.8: Monte Carlo Experiments for Supply Model

Parameter	Baseline estimate	Average estimate across simulations	Asymptotic standard errors	Bootstrap standard errors
a_l	7.4447	7.3657	1.2626	1.2431
σ_ξ	0.2277	0.2290	0.0298	0.0139
μ_ν^{mkt}	-0.0114	-0.0081	0.0184	0.0168
σ_ν^{mkt}	0.1523	0.1470	0.0684	0.0396
μ_κ^0	8.7354	8.7225	0.4860	0.3937
μ_κ^1	-0.6448	-0.6435	0.0618	0.0542
σ_κ	0.3607	0.3582	0.0345	0.0286

Notes: The table reports the results of Monte Carlo experiments in which we first simulate 20 datasets from our model at the parameter values shown in the first column, then re-estimate our model on each simulated dataset.

Supplemental Appendix Table B.1: Additional Evidence on the Demand for Partisanship

Dependent variable: Average log(circ) of R papers - Average log(circ) of D papers

	(1)	(2)
Republican vote share	0.9430	
	(0.2053)	
Number of Republican papers		-0.1322
		(0.0210)
Number of Democratic papers		0.1148
		(0.0273)
Fixed effects for:		
Choice set configuration	X	
County		X
R^2	0.0237	0.5684
Number of counties	1219	1219
Number of towns	4294	4294

Notes: Data are from the demand estimation sample. The dependent variable is the difference in mean log circulation of Republican and Democrat newspapers. Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868-1928. Fixed effects for choice set configuration are unique fixed effects for each possible combination of (Number of Republican papers, Number of Democratic papers). Standard errors in parentheses are clustered at the county level.

Supplemental Appendix Table B.2: Additional Evidence on the Determinants of Newspaper Demand

Dependent variable: log(circulation)		
	(1)	(2)
Republican newspaper ×		
Republican vote share	0.9089	0.9618
	(0.2614)	(0.2677)
Number of Republican papers	-0.0429	-0.0438
	(0.0156)	(0.0154)
Number of Democratic papers	-0.0010	0.0070
	(0.0231)	(0.0215)
%White		1.1133
		(0.4321)
%Illiterate		-0.3655
		(1.3745)
%21+ Years		-0.7937
		(0.6742)
%Male		-0.7309
		(1.4314)
%In 2.5k+ pop city		0.3576
		(0.1105)
%Foreign born		-0.8312
		(0.6132)
%Employed		-1.0979
		(0.6624)
%Church members		0.3329
		(0.1924)
Republican vote share ×		
Morning paper		0.0777
		(0.2304)
Long paper (16+ pages)		-0.1337
		(0.2760)
Newspaper fixed effects?	X	X
Town fixed effects?	X	X
R^2	0.6717	0.6732
Number of counties	2742	2706
Number of newspaper-towns	30740	30655

Notes: The unit of observation is the newspaper-town. Independent variables are characteristics of counties (interacted with a dummy for whether the newspaper has a Republican affiliation) and characteristics of newspapers (interacted with town-level Republican vote share). Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868-1928. Fraction white, illiterate, age 21+, male, and living in cities of 2.5k+ in county are from the 1920 Census. Fraction foreign-born and employed in county are from the 1940 Census. Fraction church members is from the 1950 Census. Newspaper publication time (morning vs. evening) is measured in 1924. “Long” papers are characterized as those which have at least 16 pages (the median) as of the most recent year of measurement prior to 1924. Standard errors in parentheses are clustered by county.

Supplemental Appendix Table B.3: Demand for Partisanship by Town Population

Dependent variable: Average log(circ) of R papers - Average log(circ) of D papers

	Town population: Below median	Town population: Above median
Republican vote share	0.6212	1.2242
	(0.2203)	(0.2678)
Number of Republican papers	-0.0491	-0.0314
	(0.0190)	(0.0171)
Number of Democratic papers	-0.0209	0.0281
	(0.0221)	(0.0193)
R^2	0.0092	0.0185
Number of counties	863	911
Number of towns	2147	2147

Notes: Data are from the demand estimation sample described in the paper. The dependent variable is the difference in mean log circulation of Republican and Democrat newspapers. Republican vote share is the average Republican share of the two-party vote in the county in presidential elections from 1868-1928. Standard errors in parentheses are clustered at the county level.

Supplemental Appendix Table B.4: Panel Evidence on Determinants of Newspaper Affiliation

Dependent variable: Dummy for newspaper choosing Republican affiliation

	(1)	(2)	(3)
Republican vote share	2.1344	2.2346	1.9400
	(0.0568)	(0.0711)	(0.1028)
Number of Republican incumbents	-0.0771	-0.0823	-0.0767
	(0.0129)	(0.0134)	(0.0128)
Number of Democratic incumbents	0.0634	0.0698	0.0635
	(0.0125)	(0.0129)	(0.0125)
Lag Republican vote share			0.2048
			(0.0870)
Instrument with lag vote share?		X	
R^2	0.2865	0.2859	0.2876
Number of markets	1338	1338	1338
Number of newspapers	3179	3179	3179

Notes: Data are from US Newspaper Panel from 1872-1928. The unit of analysis is the newspaper. Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868-1928. Lag Republican vote share is the Republican share of the two-party vote in the presidential election prior to the entry of the newspaper. The sample excludes newspapers for which data on Republican share of the two-party vote in the election prior to entry is unavailable. Model (1) is an OLS regression. Model (2) is a 2SLS regression in which the lag vote share is used as an instrument for the Republican vote share. All models include fixed effects for the year of entry (the first presidential election year in which the newspaper is present in the panel). The number of Republican/Democratic incumbents is the number of newspapers of each affiliation present in the year of entry. Standard errors in parentheses are clustered at the market level.

Supplemental Appendix Table C.1: Affiliation Choices in Own and Neighboring Markets

Share of second entrants choosing R affiliation

	Second Entrant in:	
	Own Market	Neighboring Market
First Entrant's Affiliation:		
Democratic	0.48	0.31
Republican	0.51	0.64
Number of markets	269	

Notes: Data are from the cross-section of daily newspaper markets in 1924 defined in the body of the paper. The table includes all markets with at least two newspapers in which the neighboring market has at least one newspaper.

Supplemental Appendix Table C.2: Circulation Patterns in Own and Neighboring Towns

Average log(circ) of R papers - Average log(circ) of D papers

	Circulation in:	
	Own Town	Neighboring Town
Available Newspapers in Town:		
Majority Democratic	0.0293	0.0177
Majority Republican	0.0248	0.0306
Number of towns	1986	

Notes: Data are from the cross-section of news-reading towns in 1924 defined in the body of the paper. The table includes all pairs of towns with at least one newspaper of each affiliation in each town, excluding towns with an equal number of Democratic and Republican newspapers.

Supplemental Appendix Table C.3: Evidence on the Role of Ownership in Determining Affiliation

Dependent variable: Dummy for newspaper choosing R affiliation	
Ownership proportion of total variance	0.5199
	(0.2347)
p-value (H_0 : Ownership proportion of total variance = 0)	0.0221
Number of newspapers	109
Number of owners	31

Notes: Unit of analysis is the newspaper. Estimates are from a random-effects logit model with a random effect for the newspaper's owner. Estimates are for the sample of newspapers that belong to a multi-newspaper chain as of 1932. The model includes as covariates the average Republican share of the two-party vote in presidential elections from 1868-1928 and the number of Republican/Democratic incumbents as of the newspaper's entry.

Supplemental Appendix Table C.4: Evidence on Changes in a Given Newspaper's Content Over Time

Dependent variable: Change in share of mentions to Republican candidate

Newspaper Affiliation:	Democratic	Republican
Change in		
Republican share of two-party vote	0.0799	0.3282
	(0.1751)	(0.2170)
Number of Democratic papers	-0.0152	0.0991
	(0.0615)	(0.0605)
Number of Republican papers	0.0565	-0.0136
	(0.0876)	(0.0496)
R^2	0.3737	0.4416
Number of newspapers	37	63
Number of newspaper-years	116	226

Notes: Unit of analysis is the newspaper-year. Data are from presidential election years 1868-1928. All models include election-year fixed effects. The dependent variable is the change in the Republican share of mentions of either the Republican or Democratic presidential or vice-presidential candidate. Data were obtained from www.newspaperarchive.com. See Gentzkow et al. (2011) for details. Standard errors in parentheses are clustered by newspaper.

Supplemental Appendix Table C.5: Panel Evidence on Demand for Partisanship

Dependent variable: Change in average log(circ) of R papers - Change in average log(circ) of D papers

Data Source:	Observed	Simulated
Change in		
Republican share of two-party vote	0.2003	
(observed)	(0.0785)	
True share Republican		1.2345
(ρ)		(0.0054)
Number of Republican papers	-0.0339	-0.0381
	(0.0175)	(0.0005)
Number of Democratic papers	-0.0043	0.0402
	(0.0175)	(0.0005)
R^2	0.0182	0.9983
Number of counties	365	361
Number of city-years	2398	2288

Notes: Unit of analysis is the city-year. Data are from presidential election years 1868-1928. All models include election-year fixed effects. Sample includes continuing newspapers only. Standard errors in parentheses are clustered by county.

Supplemental Appendix Table C.6: Effect of Newspaper Entry/Exit on Total Circulation

Dependent variable: Change in log(total circulation in market)

Data Source:	Observed	Observed	Observed	Simulated	Simulated
Change in number of daily newspapers	0.2359	0.2785	0.3084	0.3838	0.3717
	(0.0106)	(0.0112)	(0.0142)	(0.0053)	(0.0058)
Holds continuing paper circulation constant?		X			
Allows lag effect?			X		X
R^2	0.1596	0.1800	0.1530	0.8525	0.8416
Number of counties	996	1002	961	1009	968
Number of city-years	9734	9958	9012	10079	9018

Notes: Unit of analysis is the city-year. Data are from presidential election years 1868-1928. All models include election-year fixed effects. Sample includes city-years with at least one newspaper. Standard errors in parentheses are clustered by county. Specifications are linear regression models of change in log(total circulation) on change in number of newspapers and (where indicated) its lag. The reported coefficient is the sum of the coefficient on the change in number of newspapers and (where indicated) its lag. Where indicated we hold continuing paper circulation constant by replacing the circulation of continuing papers with its lag.

Supplemental Appendix Table C.7: Sources for Detailed Readership Survey Data

Survey year	City	Title	Publisher	Publication Year
1929	Detroit	*An Analysis of the Detroit Newspaper Readers*	American Association of Advertising Agencies	1930
1929	Washington, DC	*An Analysis of the Washington Newspaper Readers*	American Association of Advertising Agencies	1930
1930	Boston	*An Analysis of the Boston Newspaper Readers*	American Association of Advertising Agencies	1930
1930	Buffalo, NY	*Buffalo Newspaper Reader Survey*	American Association of Advertising Agencies	1932
1931	St. Louis	*St. Louis Newspaper Reader Survey*	American Association of Advertising Agencies	1931
1939	Los Angeles	*Los Angeles Newspaper Reader Survey*	American Association of Advertising Agencies	1939
1942	Los Angeles	*The Census of Circulations: A Study of Los Angeles Newspaper Readers*	*Los Angeles Times*	1942
1946	Washington, DC	*Washington, DC Newspaper Reader Survey*	American Association of Advertising Agencies	1946
1960	Boston	*The New Boston: A Study of Adult Newspaper Reader Information*	*Globe Newspaper Company*	1961
1961	Philadelphia	*Philadelphia Market Profile: Daily Newspapers*	*Bulletin Company*	1962
1962	Boston	*A Profile of the New Boston: A Study of the Adult Reading Audiences of the Three Major Weekday Newspaper Properties in the ABC Retail Trading Zone*	*Boston Record American*	1962
1962	Boston	*A Profile of the New Boston: A Study of the Adult Reading Audiences of the Three Major Weekday Newspaper Properties in a 24-couty New England Area*	*Boston Record American*	1962
1963	Los Angeles	*Profile of the Los Angeles Market: A Study of the Adult Reading Audiences of Daily Newspapers in the Los Angeles Standard Metropolitan Area*	*Advertising Research Foundation*	1963
1966	Philadelphia	*Philadelphia Market Newspaper Profile: Daily Newspapers*	*Bulletin Company*	1967
1967	Chicago	*Chicago Imprint: A Study of Metropolitan Chicago Readers of Daily and Sunday Newspapers, Newspaper Magazines and Selected National Magazines*	*Tribune Company*	1967
1968	Boston	*Boston Today: A Study of the Market and its Newspaper Readers*	*Globe Newspaper Company*	1969
1969	Seattle	*Seattle Area Market Study*	*Seattle Times*	1969

Supplemental Appendix Table C.8: Overlap and Affiliation

Ratio of Number of Overlapping Readers to Number Predicted Under Independent Demand Model

Data Source:	Mean	SE of Mean	*N*
Two Republican papers	1.7551	0.3385	28
One Republican, one Democratic	1.4417	0.1132	31
Two Democratic papers	1.5008	0.2884	5

Notes: Unit of analysis is a pair of newspapers in the same market. The sample includes all pairs with two affiliated papers in a diverse market with at least three affiliated newspapers. Independent demand model assumes that the share of readers overlapping between any two newspapers is the product of their market shares.

Supplemental Appendix Table D.1: Sensitivity of Parameter Estimates to Omitting Unobservables From Model

	Baseline	No Unobservables
Demand parameters		
$\underline{\beta}$	-0.2906	-0.1757
	(0.0676)	(0.0502)
$\overline{\beta}$	0.8137	0.6862
	(0.0759)	(0.0550)
Γ_s	0.5645	0.5300
	(0.0669)	(0.0602)
Γ_d	0.3004	0.3719
	(0.0469)	(0.0275)
Supply parameters		
a_l	7.4447	8.6340
	(1.2626)	(1.2037)
σ_ξ	0.2277	0.1938
	(0.0298)	(0.0255)

Notes: Column “baseline” presents estimates of a selection of parameters from the corresponding tables in the paper. Column “no unobservables” presents estimates of the same parameters from a model in which we constrain $\sigma_\nu^{mkt} = \sigma_\nu^{town} = 0$ and treat τ_t as nonstochastic in demand estimation.

Supplemental Appendix Table D.2: Estimates by Fraction Politically Independent Consumers

	Baseline	Social Planner	Allow Joint Operating Agreements	Allow Joint Ownership	Optimal Marginal-Cost Subsidy
			Share of Households Reading Diverse Papers		
Full sample	0.029	0.334	0.039	0.011	0.133
Fraction independent (measured using variation over time)					
Above-median	0.033	0.311	0.043	0.019	0.131
Below-median	0.036	0.482	0.040	0.008	0.291
Fraction independent (measured using variation across offices)					
Above-median	0.043	0.382	0.046	0.016	0.224
Below-median	0.031	0.416	0.038	0.008	0.191
			Total Surplus per Household		
Full sample	4.24	8.56	4.29	3.49	6.05
Fraction independent (measured using variation over time)					
Above-median	4.90	8.35	4.65	4.01	6.10
Below-median	3.94	10.82	3.88	2.90	7.73
Fraction independent (measured using variation across offices)					
Above-median	4.82	9.17	4.45	3.82	6.65
Below-median	3.89	9.64	3.91	3.09	6.64

Notes: See supplemental appendix section D for details.

Supplemental Appendix Table D.3: Demand Model Estimates With Politically Independent Consumers

	Baseline	Allowing for Politically Independent Consumers	
		Variation Over Time	Variation Across Offices
α	0.1798	0.1827	0.1805
	(0.0032)	(0.0042)	(0.0035)
$\underline{\beta}$	-0.2906	-0.4236	-0.3728
	(0.0676)	(0.0910)	(0.0823)
$\overline{\beta}$	0.8137	0.9543	0.8979
	(0.0759)	(0.1020)	(0.0915)
Γ_s	0.5645	0.4189	0.4512
	(0.0669)	(0.0676)	(0.0648)
Γ_d	0.3004	0.2154	0.2538
	(0.0469)	(0.0720)	(0.0608)
σ_ζ	0.7017	0.7003	0.6998
	(0.0077)	(0.0077)	(0.0077)
μ_ν^{town}	0.0466	0.0638	0.0834
	(0.0422)	(0.0441)	(0.0466)
σ_ν^{town}	0.2783	0.2787	0.2798
	(0.0135)	(0.0135)	(0.0135)
μ_ρ^0	-0.0714	-0.1057	-0.1444
	(0.0850)	(0.0889)	(0.0937)
μ_ρ^1	1.9952	1.9954	1.9951
	(0.0336)	(0.0336)	(0.0336)

Notes: See supplemental appendix section D for details.

Supplemental Appendix Table D.4: Sensitivity to Unmodeled Horizontal Differentiation

	Morning-Evening (ME) Model		Baseline Model, Estimated on ME Data	
	Baseline	JOA	Baseline	JOA
Markets with newspapers	1064	1064	1074	1074
Markets with multiple newspapers	301	465	279	466
Share of hhlds reading a newspaper	0.41	0.43	0.41	0.44
Avg. price in multi-paper markets	5.20	6.60	5.65	6.79
Avg. ad rev. per reader in multi-paper markets	11.46	12.45	11.01	12.18
Per household:				
Consumer surplus	3.68	3.85	3.59	3.98
Newspaper profit	0.16	0.14	0.45	0.55
Advertiser profit	0.39	0.00	0.45	0.00
Total surplus	4.23	4.00	4.50	4.53
Diversity				
Markets with diverse papers	174	264	152	261
Share of hhlds in markets with diverse papers	0.26	0.34	0.24	0.34
Share of hhlds reading diverse papers	0.029	0.034	0.029	0.040

Notes: Table shows averages over 5 simulations. The first two columns are based on the model defined in section D of the supplemental appendix. The second two columns are based on our baseline model, estimated on data from the model simulated in the first column. A market has diverse papers if it has at least one Republican and one Democratic paper, and a household reads diverse papers if it reads at least one Republican and one Democratic paper. "Baseline" is simulation of the estimated model. "JOA" is simulation of a model in which newspapers jointly set subscription and advertising prices to maximize total newspaper profits. Average price is an annual subscription price. Average ad revenue is reported per reader per year. Surplus and profit numbers are reported in dollars per household.

Supplemental Appendix Table D.5: Comparing Simulated and Actual Newspaper Subscription Prices

	Observed mean price of		Simulated mean price of	
	Democratic newspapers	Republican newspapers	Democratic newspapers	Republican newspapers
1D	4.52	—	4.64	—
1R	—	4.68	—	4.58
2D	5.11	—	5.32	—
1D/1R	4.95	4.98	5.16	5.26
2R	—	5.09	—	5.17

Notes: Each column reports the mean annual subscription price for newspapers of a given affiliation in a given market configuration. The first two columns are from the observed data; the second two columns are an average over 5 simulations at the parameters reported in the paper.

Supplemental Appendix Table D.6: Historical Changes in Variable Costs

Year	*MC*	Number of daily newspapers		Markets with diverse papers	
		Actual	Simulated	Actual	Simulated
1924	8.17	1338	1402	183	143
1868	13.22	199	94	49	11

Notes: The table compares the number of daily papers and the number of markets with diverse papers in US as predicted by our model against the historical market attributes in the US Newspaper Panel introduced in Gentzkow et al. (2011). We use our baseline model to simulate the number of daily papers and the number of markets with diverse papers in 1924. We simulate 1868 by assuming that the only change in model parameters between 1868 and 1924 is a decline in marginal cost *MC* driven entirely by changes in paper and ink prices. To estimate the percentage difference in *MC* between these two periods, we multiply the 1924 variable cost share of newsprint and ink, obtained from the Inland Press data, by the percentage difference in the real price of newsprint between the two periods, obtained from Gentzkow et al. (2006). Column (2) presents the estimated *MC* as average annual variable cost per copy in dollars.

Supplemental Appendix Table D.7: Effect of Reducing Maximum Entrants on Equilibrium and Surplus-Maximizing Outcomes

	Maximum Number of Entrants: 6		Maximum Number of Entrants: 3	
	Baseline	Maximizing Total Surplus	Baseline	Maximizing Total Surplus
Markets with newspapers	951	1910	949	1910
Markets with multiple newspapers	256	1845	256	1843
Share of hhlds reading a newspaper	0.39	0.91	0.37	0.88
Avg. price in multi-paper markets	5.48	0.05	5.38	0.00
Avg. ad rev. per reader in multi-paper markets	11.24	11.31	11.44	11.52
Consumer surplus	3.44	15.69	3.17	12.39
Firm profit	0.41	-17.51	0.51	-14.79
Advertiser profit	0.39	10.39	0.30	10.19
Total surplus	4.24	8.56	3.98	7.79
Diversity				
Markets with diverse papers	143	1370	133	1332
Share of hhlds in mkt. with diverse papers	0.22	0.84	0.21	0.79
Share of hhlds reading diverse papers	0.029	0.334	0.022	0.243

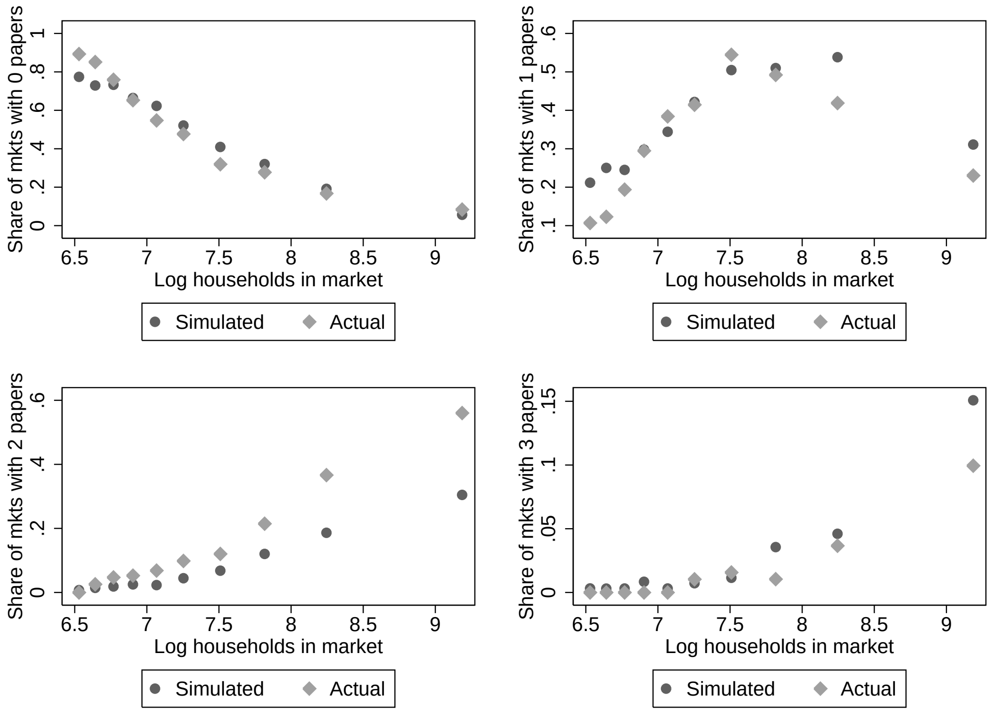
Notes: Table shows averages over 5 simulations at the parameters reported in the paper. Columns (1) and (2) have $J^{max} = 6$ and are identical to columns (1) and (3) in the corresponding table of the paper. Columns (3) and (4) have $J^{max} = 3$. The distribution of profits between firms and advertisers is indeterminate in columns (2) and (4); we assume that advertisers capture all surplus from advertising. A market has diverse papers if it has at least one Republican and one Democratic paper, and a household reads diverse papers if it reads at least one Republican and one Democratic paper. "Baseline" is simulation of the estimated model. In columns (2) and (4), the social planner chooses the number of papers in each market, affiliations, ad prices, and circulation prices to maximize total surplus, with the constraint that all prices must be weakly positive. Average price is an annual subscription price. Average ad revenue is reported per reader per year. Surplus and profit numbers are reported in dollars per household.

Supplemental Appendix Table D.8: Fixed-Cost Subsidies to Newspapers

	Baseline	Optimal Fixed-Cost Subsidy
Amount of subsidy		$12639 per paper
Markets with newspapers	951	951
Markets with multiple newspapers	256	717
Share of households reading a newspaper	0.39	0.49
Avg. price in multi-paper markets	5.48	5.58
Avg. ad rev. per reader in multi-paper markets	11.24	11.03
Per household:		
Consumer surplus	3.44	5.13
Newspaper profit	0.41	0.25
Advertiser profit	0.39	0.93
Cost of subsidy	0.00	1.56
Total surplus	4.24	4.75
Diversity		
Markets with diverse papers	143	421
Share of hhlds in markets with diverse papers	0.22	0.45
Share of hhlds reading diverse papers	0.029	0.071

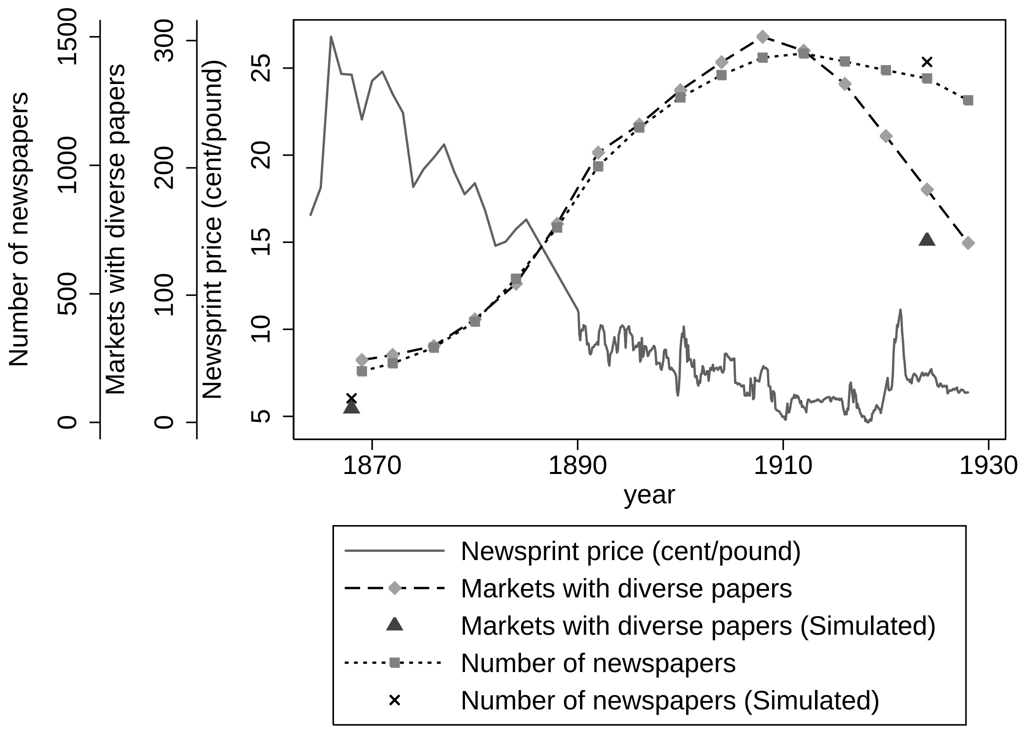
Notes: Table shows averages over 5 counterfactual simulations at the parameters reported in tables 7 and 8 of the paper. A market has diverse papers if it has at least one Republican and one Democratic paper, and a household reads diverse papers if it reads at least one Republican and one Democratic paper. "Baseline" is simulation of the estimated model. Subsidies are chosen to maximize total surplus. "Optimal Fixed-Cost Subsidy" provides a fixed per-household payment to the second and all following entrants. Average price is an annual subscription price. Average ad revenue is reported per reader per year. Surplus and profit numbers, as well as cost of subsidy, are reported in annual dollars per household. Cost of subsidy includes a 30 percent cost of public funds.

Supplemental Appendix Figure A.1: Fit of Entry Decisions in Supply Model



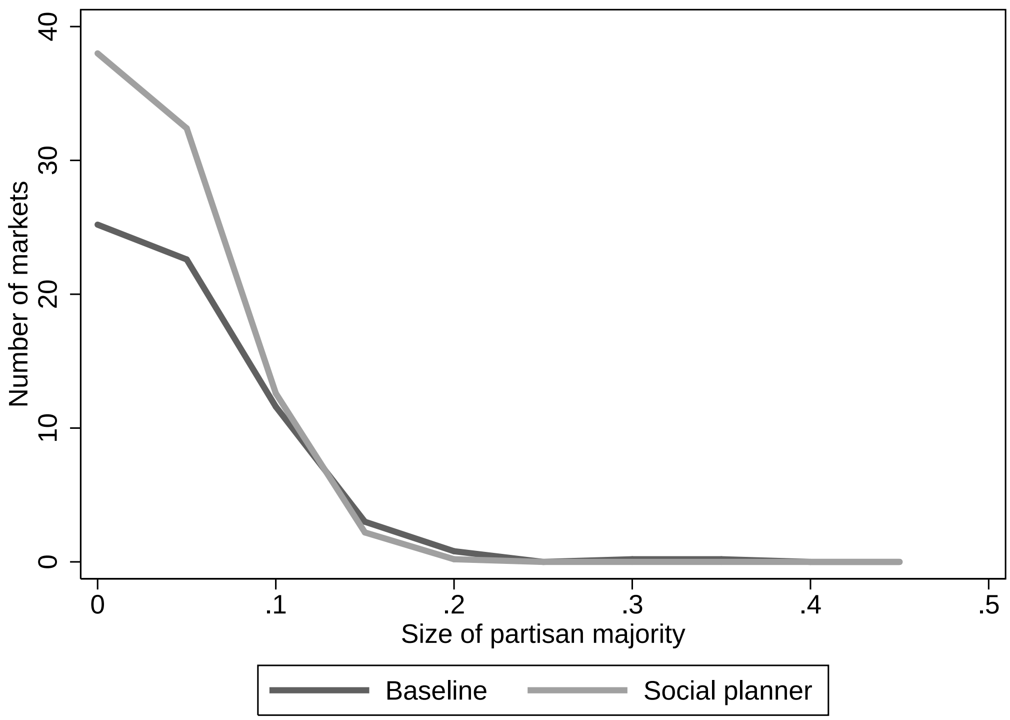
Notes: The panels of the figure show the share of markets with zero, one, two, and three papers respectively by market size in the actual data and data simulated from our baseline model. Simulated shares are the average across five simulations. Markets are divided into deciles by number of households. Markets with four, five, or six papers are omitted from the figure, but included in the denominator in computing shares.

Supplemental Appendix Figure D.1: Market Structure and Changes in Variable Costs



Notes: The figure compares the number of daily papers and the number of markets with diverse papers in US as predicted by our model against the historical market attributes in the US Newspaper Panel introduced in Gentzkow et al. (2011). We use our baseline model to simulate the number of daily papers and the number of markets with diverse papers in 1924. We simulate 1868 by assuming that the only change in model parameters between 1868 and 1924 is a decline in marginal cost *MC* driven entirely by changes in paper and ink prices. To estimate the percentage difference in *MC* between these two periods, we multiply the 1924 variable cost share of newsprint and ink, obtained from the Inland Press data, by the percentage difference in the real price of newsprint between the two periods, obtained from Gentzkow et al. (2006).

Supplemental Appendix Figure D.2: Number of Diverse Markets: Baseline vs. Social Planner



Notes: The plot shows the number of two-paper markets that are diverse as a function of the size of the partisan majority of consumers, defined as the absolute value of the difference between the Republican share of the two-party vote and 0.5. Data are in bins of width 0.05. The line labeled "Baseline" shows the mean across five simulations from our baseline model. The line labeled "Social planner" shows the mean across five simulations from the counterfactual in which a social planner chooses all post-entry endogenous variables.