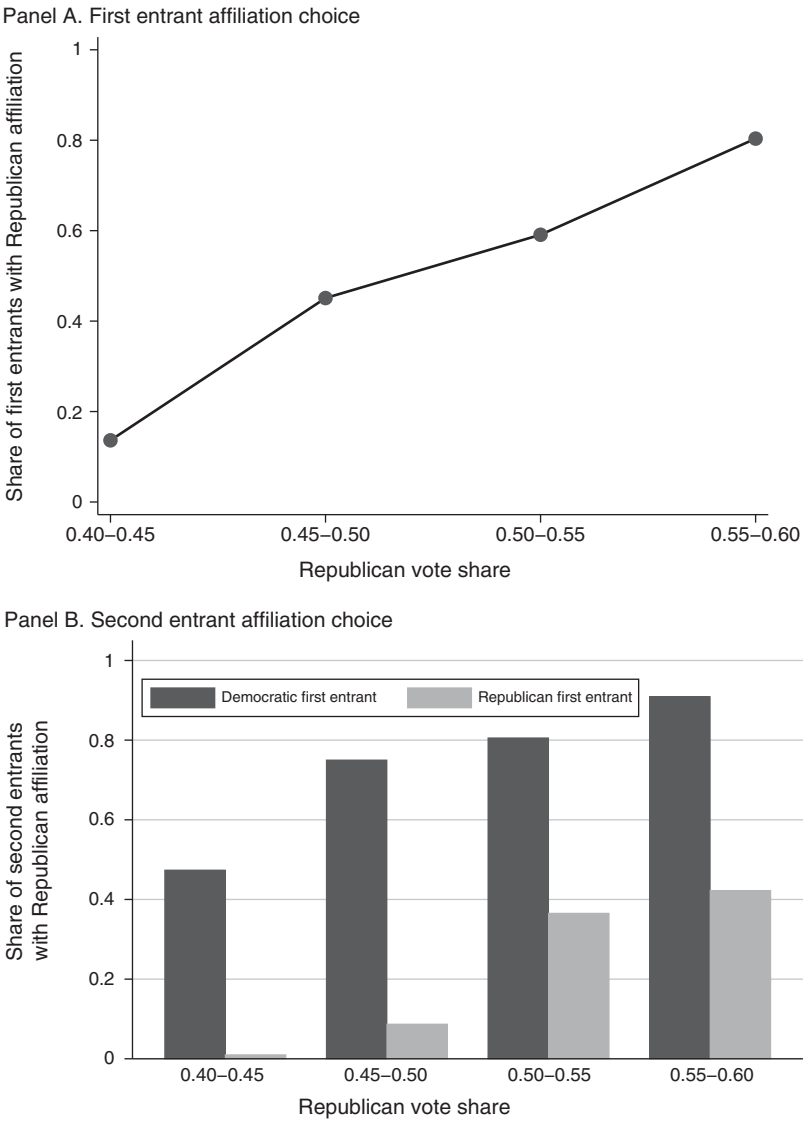

FIGURE 1. DETERMINANTS OF NEWSPAPER AFFILIATIONS

Notes: Data are from the cross-section of daily newspaper markets in 1924 defined in Section IB. Republican vote share is the average Republican share of the two-party vote in presidential elections from 1868 to 1928. The sample includes all markets with two or more newspapers in which the Republican vote share is between 0.4 and 0.6.

across towns and markets, much in the way that correlation over time facilitates identification in panel settings (e.g., Collard-Wexler forthcoming).

To illustrate the logic of our strategy, consider newspapers' affiliation choices. In markets whose first entrant is Democratic, the second entrant is Republican 48 percent of the time. In markets whose first entrant is Republican, the second entrant is Republican 51 percent of the time. We interpret this slight positive correlation as the net effect of negative correlation due to differentiation and positive correlation due to variation in consumer ideology.

Now consider the affiliation choices of the second entrant in a neighboring market—defined in Section IB as a similar-size market between 100 and 400 kilometers away. In markets whose first entrant is Democratic, the second entrant in the neighboring market is Republican 31 percent of the time. In markets whose first entrant is Republican, the second entrant in the neighboring market is Republican 64 percent of the time. As newspapers at this distance did not compete directly, we interpret this strong positive correlation as evidence of underlying spatially correlated variation in consumer ideology.

We show in the online Appendix that a similar pattern is present in the circulation data. A town whose available newspapers are majority Republican exhibits slightly lower relative demand for Republican newspapers. A town whose *neighbor* has primarily Republican newspapers exhibits greater relative demand for Republican newspapers.

In both cases, comparing the correlation within a location with the correlation across neighboring locations reveals information about the importance of unobservable variation in consumer ideology. We will exploit this information to identify our formal model, relying on three key assumptions.

First, we assume that our pairs of markets and towns are close enough to share similar ideology but far enough apart that their newspapers do not interact directly. Appendix Figure 1 shows direct support for this assumption. Two counties located 100–400 kilometers apart have a highly correlated Republican vote share and fraction white. However, newspapers headquartered in the first county rarely circulate in the second at such distances. Second, we assume that there are no spatially correlated supply-side variables which affect the relative profitability of different affiliations.[18] Third, we assume that the correlation of the unobservables is the same as the correlation of the observables.[19] In Appendix A we present evidence on the sensitivity of our findings to variation in the assumed spatial correlation.

D. *Multiple Readership and the Extent of Differentiation*

In our model, market performance (the efficiency of entry and pricing decisions) depends on the extent of differentiation among newspapers. The model estimates reported below imply that this differentiation was substantial. Several pieces of evidence are consistent with this conclusion, some of which we incorporate in estimation, and some of which provide independent verification.

First, newspaper markups were large even in competitive markets. The average newspaper in our sample earned $4.69 (in 1924 dollars) in circulation revenue and

[18] Variable costs such as paper and ink were not affiliation-specific, and in any case these commodities were traded nationally. The cost of hiring editors or reporters could be affiliation-specific, but the market for such talent was geographically broad. For example, in 1920, 49 percent of prime-age (25–55) white male journalists lived in a state other than their state of birth, as against 33 percent for all prime-age white males (Ruggles et al. 2010). Common ownership of newspapers in different markets is a final possible source of correlation. In Appendix A we show that removing the small number of market pairs with common ownership makes little difference to our results.

[19] Appendix Figure 1 shows that the the spatial correlation pattern of the fraction white is similar to that of the Republican vote share. Consistency in the spatial correlation across different observable characteristics of the consumers provides some support for the assumption that the spatial correlation in unobservables will match the spatial correlation in the observables, though of course we cannot test this restriction directly. Murphy and Topel (1990) and Altonji, Elder, and Taber (2005) provide additional justification for using observables to learn the covariance properties of unobservables.

$14.19 in advertising revenue per subscriber, for a gross margin of $10.09 on variable costs of $8.79 per subscriber. As we show in the online Appendix, newspapers in more competitive markets charged, if anything, higher prices.

Second, circulation changes around newspaper entry suggest limited substitutability. In the online Appendix, we show that the entry of an average newspaper increases total market circulation by 24 percent. If there was *no* substitution with existing newspapers, we estimate that this number would be only moderately higher, at 28 percent. Put differently, only about 14 percent of the circulation of an entering newspaper comes at the expense of existing newspapers' circulation. The rest comes either from households who previously did not read a newspaper, or from households reading multiple papers.

Third, multiple readership was quantitatively important at the time of our study. In our 1917–1919 survey data, 15 percent of households who report reading a daily newspaper report reading two or more newspapers. In our readership survey data, for the average pair of newspapers, 16 percent of households who read either paper read both. And as we document in the online Appendix, overlap was if anything larger for newspapers with the same political affiliation, suggesting a high degree of differentiation along nonpolitical dimensions.

IV. Model

A. *Road Map*

The goal of our model is to parsimoniously capture the effect of consumer preferences, price competition, and advertising competition on equilibrium product diversity. Computational and data limitations mean the model is necessarily stylized. We approximate a set of economic forces we judge to be most important, while abstracting from many others.

In the next two subsections, we define the model and characterize its equilibrium. Then in section IVD we return to the main assumptions, discussing their limitations, their importance for our main results, and the evidence that supports them.

B. *Setup*

We consider a cross-section of markets indexed by $m \in \{1, \ldots, M\}$. Each market has J^{max} potential newspaper entrants, a unit mass of homogeneous potential advertisers, and a mass S_m of households indexed by i.

We index the J_m newspapers which choose to enter market m in equilibrium by $j \in \{1, \ldots, J_m\}$. Each entering newspaper chooses a political affiliation $\tau_{jm} \in \{R, D\}$, a circulation price p_{jm}, and an advertising price a_{jm}.

Each household has a political affiliation $\theta_{im} \in \{R, D\}$. We denote the share of households with $\theta_{im} = R$ by ρ_m and assume that ρ_m is common knowledge to market participants but unobserved by the econometrician.

The J_m newspapers may also be available in one or more hinterland towns, which we index by $t \in \{M + 1, \ldots, M + T\}$. A given town t may receive newspapers from more than one market m. We assume that these towns are sufficiently small that they have a negligible impact on newspaper profits, and thus do not affect the entry,

affiliation, and pricing decisions we model below. While we do not explicitly model the economic process that determines which newspapers are available in which towns, in estimation we will allow that the town's choice set depends on town ideology ρ_t.

The game proceeds in five stages. First, the potential entrants choose sequentially whether or not to enter. Second, the newspapers which have entered sequentially choose their affiliations in order of their indices j. The assignment of these indices is random and not learned until the second stage. Third, newspapers simultaneously choose their circulation prices. Fourth, newspapers simultaneously choose their advertising prices, after which each advertiser simultaneously decides whether or not to advertise in each newspaper. Finally, households choose to consume any bundle of the available newspapers, or no newspaper at all. At the end of each stage, all newspapers' choices are observable to all other newspapers.

The profits of entering newspaper j are given by

$$\pi_{jm} = S_m\left[\left(p_{jm} + \psi_{jm} a_{jm} - MC\right) q_{jm} - \xi_{jm}(\tau_{jm})\right] - \kappa_m, \tag{1}$$

where ψ_{jm} is the mass of advertisers advertising in newspaper j, a_{jm} is newspaper j's per-copy advertising price, MC is a marginal cost common to all newspapers and markets, q_{jm} is the share of households purchasing newspaper j, $\xi_{jm}(\tau_{jm})$ is an affiliation-specific cost, and κ_m is a market-specific fixed cost. A newspaper privately observes its own ξ_{jm} after entry decisions are made, at the beginning of the second stage; these shocks are newspapers' only private information. We assume that $\xi_{jm}(\tau_{jm})/\sigma_\xi$ is distributed mean-zero type-I extreme value, where $\sigma_\xi > 0$ is a constant. We assume that κ_m / S_m is distributed logistic with scale parameter σ_κ and location parameter $\mu_\kappa^0 + \mu_\kappa^1 \log(S_m)$.

While the cost shocks ξ_{jm} are ultimately a model residual, we present evidence in the online Appendix that the affiliations of co-owned newspapers are correlated, suggesting that these residuals may be thought of as partly capturing the personal political preferences of owners. We model these cost shocks as proportional to the number of households. Structurally, this reflects the idea that owners may value greater reach for their preferred ideologies. Practically, this assumption makes the affiliation choice game neutral to market scale.

Each advertiser earns a revenue equal to the integral over i of $\mathbf{1}_{n_{im} \geq 1}\left[a_h + (n_{im} - 1) a_l\right]$, where n_{im} is the number of newspapers read by i that contain the advertiser's ad, $\mathbf{1}$ is the indicator function, a_l and a_h are the value to the advertiser of first and subsequent impressions respectively, and $0 \leq a_l \leq a_h$. An advertiser's profit is the advertiser's revenue minus the sum of $a_{jm} q_{jm} S_m$ over all newspapers j in which the advertiser chooses to advertise. The difference between a_l and a_h captures the extent of diminishing returns in advertising impressions. The model allows for the case of zero return to duplicate impressions ($a_l = 0$) as well as the case of no diminishing returns ($a_h = a_l$).

Our demand specification follows Gentzkow (2007) in allowing explicitly for multiple readership. The utility of household i in market m from consuming a bundle of newspapers $\mathcal{B}$ is given by

$$u_{im}(\mathcal{B}) = \sum_{j \in \mathcal{B}} \left(\underline{\beta} \mathbf{1}_{\theta_{im} \neq \tau_{jm}} + \overline{\beta} \mathbf{1}_{\theta_{im} = \tau_{jm}} - \alpha p_{jm} \right) - g_s(\mathcal{B}) \Gamma_s - g_d(\mathcal{B}) \Gamma_d + \varepsilon_{im}(\mathcal{B}), \tag{2}$$