Network Competition and Exclusive Contracts: Evidence from News Agencies

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This paper studies exclusive vertical contracts in network industries and asks whether exclusive arrangements intended to be anti-competitive in one market segment can be pro-competitive in another. The setting is news agencies in the early 20th-century United States, which historically operated with exclusive territory contracts intended to create local newspaper monopolies. I show that these contracts between the Associated Press (AP) and member newspapers inadvertently created demand for and facilitated the growth of the AP's primary rival, the United Press (UP). I introduce a model that captures demand for news agencies and newspaper entry into news agency networks. I estimate the model using a unique dataset that includes news agencies' subscriptions, costs, and physical maps of their networks over time. I find that economies of scale and network effects form considerable natural barriers to entry for news agencies. Counterfactual simulations show that the UP likely would have exited if the AP's exclusive territory contracts were illegal, but incumbent newspapers in the AP benefited from these contracts and thus had incentives to keep them in place. Harms to consumers from exclusive territory contracts were significantly dampened by the UP's entry.

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JEL: K21, L13, L14, L42, L44, L82, N42, N72

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1 INTRODUCTION

The effects of exclusivity on competition remain a matter of considerable debate. A monopolist who controls an essential input can reduce competition by preventing potential rivals from accessing that input. On the other hand, such practices can increase efficiency by preventing excessive entry of rivals and eliminating duplicated fixed costs. Furthermore, excluded rivals may turn to other suppliers and thereby promote competition between suppliers. Thus, exclusive arrangements that are anticompetitive in one segment of an industry can potentially be pro-competitive in another segment. Since U.S. courts currently evaluate exclusive contracts on a case-by-case basis, there is a growing need for empirical evidence that quantifies these contrasting effects.[1]

I study these effects in the setting of news agencies in the early 20th century United States. News agencies are networks of newspapers that exchange local news contributed by member newspapers and coordinated the collection and distribution of national and foreign news. In 1900, the non-profit cooperative Associated Press (AP) was by far the dominant network. Another network called the United Press (UP) entered in 1907. Exclusive territory contracts were a key feature of the industry, as both networks effectively guaranteed local exclusivity by banning the entry of potential competitors of their existing member newspapers.

When the Supreme Court found the AP's exclusive territory contracts illegal in the landmark antitrust case *Associated Press v. United States* (1945), it had to consider harms from contracts "plainly designed in the interest of preventing competition" against potential benefits from these contracts, such as "foster[ing] [...] the growth of [other] news agencies." The Court's speculation that papers excluded from AP service likely sought telegraphic news from the AP's competitor motivates my research question: would AP v. US (1945) have changed the market structure of news agencies had it been decided during UP's infancy? The history of these contracts further motivates my main counterfactual: state-level policies repeatedly attempted to ban the AP's exclusive territory contracts prior to 1945 but none was enforced until the federal case AP v. US (1945). The answer to this question is also pertinent to understanding the causes of media competition in the U.S. as well as the impact of exclusive contracts in network industries.

To quantify the effects of exclusive contracts in this industry, I develop a model of newspapers and news agencies. I use the model to estimate the forces underlying the values and costs of news agencies, endogenize the formation of their networks between 1900 and 1945, and simulate a counterfactual without exclusive contracts. I choose this timeframe specifically to study the dy-

[1]Baseline attitudes toward exclusionary vertical practices have greatly changed over time, in part due to changes in the theoretical and empirical understanding of these contracts. In the early case *United States v. Terminal Railroad Association* (1912), the Supreme Court ruled that a railroad operator was required to let rivals use the only bridge into St. Louis, which the operator owned. In contrast, *Verizon v. Trinko* (2004) held that Verizon was not obliged to share its network with competing local phone companies. Recent matters such as *FTC v. Microsoft and Activision Blizzard* (2023) and *US v. Google* (2023) revolve around similar concerns.

namics of a nascent network entering and competing with an established monopolist. Furthermore, the setting is amenable to my work because the two firms maintained extensive archives in this era. From these archives, I obtain membership, operational, and financial data from both firms as well as then-confidential communications that directly corroborate important components of the model.

The model includes two economic mechanisms particularly relevant to news agencies. First, news agencies exist to pool together newspapers' resources to collect and transmit the news. This function gives rise to *economies of scale*, as larger networks can split the operational costs among more newspapers and so are cheaper for individual members. Second, agencies act as exchanges of local news between newspapers located in different places. This role gives rise to *network effects* on the demand side: larger networks have access to more local news and thus are more valuable to readers. Economies of scale and network effects are natural barriers to entry, which made it harder for rivals to enter and compete with an established monopolist such as the AP.

In the model, forward-looking newspapers enter and become part of a news agency's network over time. These decisions take into account a stream of discounted future profits, which is an expectation taken over the current and future local market structures as well as the values and costs of news agencies. This dynamic consideration is important since, given exclusive territories, a newspaper subscribing to a news agency can foreclose future rival newspapers who can no longer take up the same subscription.

For each newspaper, the stream of future profits depends on a demand system that is realized period by period. Readers purchase newspapers according to a discrete choice model, where a newspaper's characteristics include the value of its news agency subscriptions. I allow news agencies to potentially be differentiated to readers, since some readers could prefer the UP's style or brand over that of the AP and newspapers could bundle both services. The newspaper can then sell their readers' attention to advertisers and earn advertising revenue which varies by the newspaper's readership and market characteristics. I combine the reader demand model, the advertising revenue model, and a pricing model to predict a newspaper's variable markup each period. Computing the first-order conditions of the pricing model at realized prices and market shares recovers the newspapers' marginal costs. I then use the estimated markups and recovered marginal costs to predict newspapers' expected per-period variable profits at the time of entry. The expectation of these per-period variable profits, less a per-period fixed cost as well as costs related to news agency subscriptions, constitutes a newspaper's dynamic payoff when it makes entry decisions.

To estimate the demand and variable profits of newspapers, I collect novel data on news agency subscriptions and advertising quantities and merge them with a panel of daily newspaper circulation and characteristics from Gentzkow, Shapiro, and Sinkinson (2014). The network value for each news agency is identified by the extent to which its subscribers' local market shares vary with the agency's membership size. I capture differentiation between news agencies in two ways. First,

I allow readers of different observable demographic groups to potentially have heterogeneous preferences for news agencies. Second, readers can prefer newspapers that bundle content from more than one agency.

For newspaper and news agency costs, I collect a dataset of annual subscription fees ("assessments") on newspapers by agencies, data on annual revenues and expenditures by news agencies, and maps of telegraph wires leased from telegraph operators. I use these datasets to estimate the formula that the agencies used to determine their annual assessments on newspapers. These assessments enter as an input to newspaper entry estimation and news agencies' revenue. The key parameters for entry costs and news agency subscription costs are estimated via preferences revealed by each newspaper's entry decision, which is set up within a dynamic stochastically-alternating mover model with finite horizon similar to Igami and Uetake (2019).

My demand estimates reveal the following patterns. First, demand-side network effects that result from a news agency's membership size are substantial. Readers valued an AP subscription more than 150% as much as a UP subscription in 1908, but this gap decreased over time as the UP gained scale. By the end of the study period, the value of AP or UP telegraphic news was approximately one fourth of the median price of newspapers. These estimates represent a barrier to entry for the UP as the AP's larger network was preferred by all readers.

Estimates of the supply model show that newspapers internalize the assessments paid to news agencies and the associated economies of scale in their entry and subscription decisions. In 1908, across all possible markets, the average per-capita cost for a newspaper to subscribe to a news agency was \$2.26 for the UP and \$0.50 for the AP, consistent with the original density of the AP's network. These estimates contribute to yet another barrier to entry for the UP: members of the sparser network must pay higher costs to obtain the news, even holding constant the network's value.

I take these empirical estimates to a counterfactual simulation in which exclusive territory contracts were already illegal during the UP's infancy. Model simulations require searching for new equilibria of newspaper entry and network choice, since newspapers join networks based on beliefs over future network effects and economies of scale, which in turn must be internally consistent with the rate at which different networks grow.

I find that exclusive territories granted by the AP to member newspapers contributed to the growth of its rival UP. In the absence of exclusive territory contracts, the UP would have 30% lower membership in 1920 and 40% lower membership in 1924. A series of internal letters by UP board members during the organization's infancy revealed that the UP was only breaking even due to "a large subsidy" from its primary proprietor E.W. Scripps.[2] The same letters include a range

[2]Scripps was a newspaper magnate who founded UP in order to "make it possible for any other man to found a newspaper in any city in the Union" in spite of AP exclusion.

of valuations of the UP. I use the highest discussed valuation as the UP's scrap value, and assume the news agency would exit if it were to lose revenue beyond this amount. In the counterfactual, the UP's revenue loss would have exceeded the agency's scrap value within four years. After eight years, the revenue loss would exceed the size of Scripps' newspaper estate, strongly suggesting that the UP would have exited in this scenario.

In equilibrium, exclusive territories did not achieve their intended effects of limiting competition and making the AP more attractive to local newspapers: I find that AP exclusive territories decreased the number of market-years with AP news. This was due to the UP being available as an alternative. If the UP was guaranteed to not exist, exclusive territory contracts would have increased the number of market-years with AP news. The AP was not able to preempt the entry of a rival news agency because its organizational structure as a non-profit cooperative: individual newspapers have incentives to maintain local exclusivity for themselves, even if these contracts lead to the entry of a rival news agency in the UP. I find that banning exclusive territory contracts and the UP's exiting would not have led to higher profits for AP-incumbent newspapers, since these papers would have experienced entry of an AP competitor in their local market. Newspapers in larger markets were particularly hurt since they were most likely to experience an entrant. Finally, while exclusive territory contracts harm consumers relative to a free-entry counterfactual, I find that the entry of the upstream network UP significantly dampened such harms relative to a world where exclusive territory contracts were in place and the AP was a monopolist.

I also study a counterfactual in which the AP enforced an exclusive dealing clause. Exclusive *dealing* contracts would have required AP papers to source telegraphic news only from the AP (unlike exclusive *territory* contracts which required the AP to sell the news to only one newspaper per market). This is a relevant antitrust counterfactual: in 1915, the US Attorney General gave his opinion that the AP had the right to exclusive territory contracts but *not* exclusive dealing. In response, the AP did not enforce its exclusive dealing clauses. Exclusive dealing has complicated theoretical effects in this setting. First, these contracts can hurt the UP as AP-incumbents cannot bundle UP news. On the other hand, exclusive dealing potentially weakens the incumbent and incentivizes second entrants who can take up UP service. On net, exclusive dealing would have been detrimental to the UP: it loses 15% of newspaper-years compared to the baseline.

Related Literature

My paper presents an empirical study of the effect of exclusive contracts on market structure in network industries and emphasizes that a monopolist network's exclusive territory contracts can

incentivize rival entry.[3]

I am not the first to empirically study questions related to entry incentives due to exclusive contracts: Sinkinson (2020) studies the incentives of handset manufacturer and wireless networks to sign exclusive contracts to soften interbrand price competition; Lee (2013) studies software exclusivity as a tool for entrant video game consoles to gain scale; and Asker (2016) studies whether exclusive distribution leads to cost-based foreclosure of beer brewers in Chicago.

I contribute to this literature along two dimensions. First, I explicitly model and estimate the entry probabilities of downstream firms (newspapers) and how entry responds to the costs and values of upstream inputs (news agencies). This model allows me to quantify how changes in upstream values and costs due to exclusives affect downstream entry probabilities, which in turn affects upstream values and costs due to changes in scale. Second, I study the interaction between exclusive territory and exclusive dealing contracts and their effects on entry incentives of both the downstream and upstream firms. I show that these contracts have complex interactions: exclusive territory protects the downstream monopoly but incentivizes upstream entry, while exclusive dealing protects the upstream firm by preventing the downstream monopoly from bundling suppliers but weakens the downstream monopoly in the process.

There has been much recent attention from policymakers and researchers to multi-sided networks such as credit card associations (Rochet and Tirole 2002), Yellow Pages (Rysman 2004), and hospital networks (Ho and Lee 2019, Ho 2006). Jullien, Pavan, and Rysman (2021) and Evans and Schmalensee (2014) provide comprehensive surveys on this literature. I contribute by studying the role of exclusion in peer-to-peer communication networks such as social media platforms or news agencies.

I also contribute to a literature that studies US newspapers by explicitly modeling the vertical nature of the news media market and the market structure of news agencies. The model extends Gentzkow, Shapiro, and Sinkinson (2014)'s analysis of newspapers' ideological choices in 1928 to allow for news agency bundle choice and dynamic entry decisions. The dynamic extension uses a stochastically-alternating move, finite-horizon model closely related to Igami and Uetake (2019) and is estimated using a full-solution approach as in Rust (1987). There is a small literature in economics that studies how newspapers use wire news.[4] Angelucci et al. (2023) studies how newspapers bundle news agency content with locally produced content, Cage et al. (2019) studies

[3]See Lafontaine and Slade (2008) for a survey of legal attitudes and empirical evidence around this debate and Lee, Whinston, and Yurukoglu (2021) for that of theoretical models and recent structural empirical work on vertical contracting. For the closely related debate on the effects of exclusive franchising on welfare, see Lafontaine and Slade (2014) and Lafontaine and Scott Morton (2010).

[4]The news media industry is characterized by high fixed costs, low marginal costs, and the nature of the news as a public good (there is only a quasi-property right over "hot news" as established by *International News Service v. Associated Press* 1918; Hamilton 2011). There is a small literature in business history that studies the relationship between exclusionary practices of news agencies and these factors (Bakker 2011, Shmanske 1986).

the importance of how online French outlets reprint copy from Agence France-Presse and Reuters in 2013, Chiou and Tucker (2017) studies the value of AP news to news aggregators such as Google News, and Djourelova (2023) studies how slanted language used in AP copy can influence public opinion. My paper also complements Tiew (2022) who examines dynamic decisions related to newspapers signing Joint Operating Agreements that facilitated price collusion and focus on the decline of the newspaper industry starting in the last decade of my period of study.

Roadmap

Section 2 describes the history of news agencies. Section 3 describes the data. Section 4 presents the descriptive evidence that motivates the structural analysis. Section 5 describes the formal empirical model. Sections 6 describes the estimation procedure and estimates. Section 7 presents the model fit and counterfactual simulations. I conclude in Section 8.

2 Historical Setting

In this section, I describe the features of news agencies most relevant in this paper, being their organizational structure and exclusive contracts, the nature of news collection which facilitate network effects, and their cost structure which generate economies of scale.

News agencies, often also referred to as *wire services* or *news wires*, are distinct from feature syndicates: news agencies cover hard news while feature syndicates focus on human interest stories, columns, fiction, and comics (Guarneri 2017, Lee 1937). The definition used in this paper also does not cover supplemental news agencies that specialized in one particular news area such as financial news agencies (e.g. Bloomberg) or picture agencies (e.g. Getty Images).

Historically, the presence of several competing news agencies is a distinctive characteristic of the United States (UNESCO 1953). The vast majority of countries in the world have a single national news agency, which is often either state-owned or partially subsidized by the state.

Among news agencies in the US, the Associated Press (AP; est. 1900) has a unique structure as a non-profit cooperative of newspapers. It had two notable competitors: the United Press (UP; est. 1907) was founded by E. W. Scripps which aimed to be a commercial entity challenging the AP, unlike the International News Service (INS; est. 1910) which was founded by the media mogul William Randolph Hearst primarily in order to advance his political views.

Exclusive Territory Contracts. The AP had exclusive territory contracts since its beginning. These contracts were operationalized via so-called "protest rights," where the rights holder

could protest against the admission of a potential competitor.[5] When it formed in 1900, protest rights were only extended to 260 papers and varied by their geographic radius (most often 10 to 30 miles), applicability across times of publication (morning vs. evening), and whether there were specific carve-outs for other nearby urban markets. The exclusion radius shrunk quickly geographically to a uniform 10-mile radius for most members starting in 1915 (Silberstein-Loeb 2012). An internal coup in 1928 extended these rights to all members who were in the organization for more than 5 years and limited them to a 10-mile radius and within the same time of publication. Between 1900 and 1945, there was no serious internal discussion at the AP about potentially eliminating these contracts.

I make the simplifying assumption that AP exclusivity is automatic to membership and thus exogenous to local market conditions. This is consistent with the empirical probabilities: less than 1% of AP markets had more than one AP paper at any given point in time. Furthermore, an AP board member wrote in 1927 to then AP's general manager Kent Cooper that "It has always been the policy of the Board of Directors whether or not members had a legal right of protest to protect them in their respective [market] against the election of a competing member."

I make the further simplying assumption that exclusivity is limited to the city's geographical limits and to the same time of publication. This simplifying assumption keeps the model tractable — otherwise markets have overlapping boundaries and thus entry decisions are interlinked across markets. This is also consistent with a 1928 letter in which AP board members claim that they have rarely enforced exclusion outside of the immediate city boundary. For the demand system, I maintain the same market definition as that used by the AP for the purpose of their contracts, which is a city and time of publication combination.

UP exclusion could have been endogenous. Substantial historical evidence suggests that despite Scripps' proclaimed ideals for an open organization, the UP enforced exclusive contracts to all clients (Silberstein-Loeb 2012). In my data, fewer than 2% of UP markets had more than one UP paper at any given point in time.[6] Because of this, I also treat the UP's exclusive contracts as exogenous to local market conditions.

NEWS COLLECTION TECHNOLOGY. The collection of local news is the duty of local member newspapers, whose contracts with the AP require that newspapers "furnish for the use of the [AP] the news of [their] territory." In effect, this territory usually spans a 30-mile radius, with exceptions

[5]The protest right could be overcome by an 80% vote by the membership. There were six ever instances of this happening (*AP v. US* 1945).

[6]I observe several instances of UP signing "asset value" contracts, with a clause akin to liquidated damages clause that forces a second UP newspaper in the same market to recompense the first UP newspaper for their loss of exclusivity. These clauses are a way to implement a barrier to entry without explicitly excluding future firms (Whinston 2008, Aghion and Bolton 1987). However, Asker and Bar-Isaac (2014) shows that exclusionary vertical practices can arise in equilibrium due to a tacit understanding between firms even without an explicit contract.

in densely populated regions with multiple publications such as New York City.

One potential concern is that newspapers could free-ride on telegraphic news and scale back their local news production upon obtaining news agency content. Alternatively, newspapers could increase their local news production in order to service the agencies or to complement newly available national news (Angelucci, Cage, and Sinkinson 2023). In this paper, I model the variation in local news collection over time as exogenous to news agency subscription. This is motivated by the fact that telegraphic news only constituted around a quarter of a newspaper's editorial content, and so newspapers still had significant incentives to compete on the quality of their local news (AP v. US 1945).

Agency staff and string correspondents were employed to collect regional and national news. In 1931, the AP and the UP had 91 and 51 domestic bureaus respectively. Bureaus also acted as hubs for rewriting national news for local transmission. Given these practices, I model the nearest bureaus as the source of the news for each newspaper market.[7]

NEWS SHARING TECHNOLOGY AND ASSESSMENTS. Starting in 1900, the vast majority of AP members received the news via a system of leased wires. Leased wires were dedicated telegraph circuits that connect newspapers to bureau news sources and provided by telegraph companies such as Western Union and Postal Telegraph.

Leased wires were important insofar as they dictate the outgoing news but not incoming news provided by their members.[8] While the maintenance of the physical lines was done by telegraph companies, the agencies provided their own operators in most instances. In order to obtain the news from an agency, a newspaper needed to integrate the telegraph circuit physically into their editorial headquarters and maintain an operator there to receive the transmitted news. A paper that subscribed to multiple news agencies separate rooms and operators — this is done in order to prevent breaking news from one organization leaking to the other. There could also be additional related editorial costs. These arrangement means that a newspaper's cost upon subscribing to a news agency may depend include additional costs other than assessments.

The sharing of leased wires is the crucial source of economy of scale for news agencies. The primary wire system (as opposed to special events or financial information supplemental wires) consisted of two systems: a trunk system that connected major bureaus and regional circuits. Regional circuits were often contained within state boundaries due to newspapers in the same state having similar interests. The fact that the news agencies did not own the wire but merely leased

[7]Foreign news are either collected from coastal bureaus through international cables via contracts with international counterpart (e.g. Reuters in the United Kingdom, Havas or later Agence France-Presse, or the Telegraph Agency of the Soviet Union, TASS) or by the agency's own bureaus in foreign countries.

[8]Incoming news are delivered via telephone, commercial telegraph, or carbon copy and constitute a separate expense category.

them via long-term contracts motivates a key modeling decision: the cost of leased wires are an ongoing fixed cost, not a one-time entry cost.[9]

The AP charged its members a weekly membership assessment that depends on three components (Associated Press 1984). First, each member covered its own local costs related to the wire. Second, members on the same leased wire circuit proportionately shared its cost. Third, members paid a share of general expenses at the organization level, which is proportional to the population within 10 miles per the decennial census.[10]

I estimate the assessment formula using the population of the newspaper's headquarter city, the distance to the nearest bureau, the number of newspapers that share the bureau and state circuits, and the region as defined by the nearest news agency headquarter (which closely relates to a Census region). Since the AP formula was first adopted in 1902 and no change was made until 1951 (except for level changes in the general cost due to the Great Depression and wartime budget increases), I maintain this approximation through out the paper (Associated Press 1984).

I do not have direct evidence of the UP's assessment formula. An internal letter to the UP's board by General Manager Roy Howard states that the UP was going to charge a newspaper entrant at cost in a manner similar to the AP before eventually imposing a 15% profit when the paper breaks even. Crucially, Howard did not discuss price discrimination. I assume that the UP uses the same formula as the AP when calculating UP revenue.

3 Data

3.1 News agency membership and newspaper characteristics data

My main dataset on news agency memberships is derived from the Transcript of Record for Associated Press v. United States (1945). In connection to the case, senior executives from AP, UP, and INS were deposed by the government. They were required to submit the names, locations, and time of publication of all their English language daily newspaper clients in the U.S. as of 1941, in addition to the respective dates they first joined.

The data provides information on newspapers that were members of at least one agency in 1941 and their initial subscription date. However, it does not include newspapers who were no longer active in 1941. For newspapers that went through mergers, had short subscription interrup-

[9]Not all papers are receive the news via leased wires. In the year 1926, one quarter of the AP membership received the news via a long distance telephone circuit. I do not have reliable data on other years on which AP or UP papers could be telephone clients rather than leased wire clients. Because of this lack of data, I group all papers in the same subscription class.

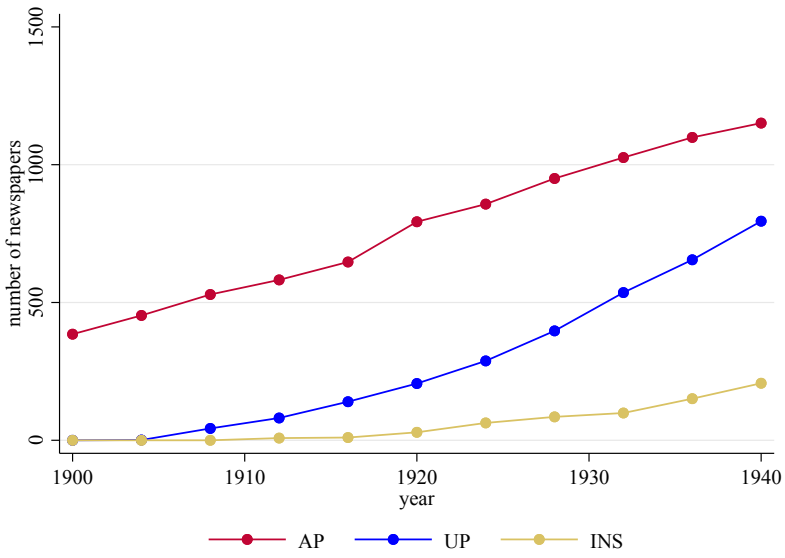
[10]The population proportional method for calculating this share is rather complicated. First, the AP treats each geographic market as a "city" definition in the Census. To account for differential population across neighboring cities, AP documents allude to a "circle overlap" method that assigns the market a fraction of the neighboring cities' population.

tions, or experienced a name or ownership change, their original subscription date is recorded. I trace through these events to categorize different versions of the same newspaper under a single "franchise" designation.[11] A "franchise" subscriber is the relevant unit of subscription from the perspective of the news agency growth: membership is automatically transferred through name and ownership changes and so resulting network effects and economies of scale are preserved.

I merge this data with the United States Newspaper Panel from Gentzkow, Shapiro, and Sinkinson (2014, GSS), which contains newspaper characteristics for election years in the US. This constitutes the bulk of the data that goes into our reader demand system, which includes circulation, subscription prices, and political affiliations. In order to construct market share for each newspaper's home market, I multiply circulation by 75%. This figure comes from GSS (2014) which documents that approximately 75% of an average newspaper's circulation is within its home market. Since subscription prices are unavailable for 1932, I skip this year in the estimation of reader demand.

Figure 1 shows the membership data. Please refer to the appendix for a breakdown of the membership by field, city size, and comparisons with published counts from secondary sources.

FIGURE 1: NEWS AGENCY MEMBERSHIP



Note: This figure plots the number of newspapers in the data that subscribes to each news agency over time. The red, blue, and yellow lines denotes membership count for the Associated Press, United Press, and International News Service respectively. The newspaper panel dataset is from Gentzkow, Shapiro, and Sinkinson (2014) and is available for election years. I merge the panel with initial news agency subscription date as reported in *Associated Press v. United States* (1945) and track a newspaper "franchise" across name changes, ownership changes, and mergers.

I incorporate additional data from several other sources. First, I digitize Annual Linage Sup-

[11] When two newspapers merge, we see the subscription date as before the merge date. For these, I manually research auxiliary databases of newspaper characteristics and newspaper scan archives to ascertain their subscription status.

plement provided by Editors and Publishers for the years 1932, 1936, and 1940. This provides me information on advertising quantities for a large subset of newspapers. Second, I use the Inland Press Cost and Revenue Study for 1928, also provided by GSS (2014). This was a non-random sample of newspapers for which I could observe actual marginal costs and advertising revenue.

I use the Inland Press data in two ways. First, I follow GSS (2014) to calibrate the mean marginal costs of newspapers in 1928 and estimate the price coefficient. Second, I follow Tiew (2022) to calibrate the mean advertising revenue of newspapers and thus the average discount from their posted advertising rates in the trade journal Editors and Publishers. In order to estimate advertising revenue for years prior to 1932, I collected aggregate data advertising revenue for newspapers over time from Lee (1937). I calculate use the circulation data to measure average per-reader advertising revenue for years before 1932 and calibrate the variation in average per-reader advertising revenue over time accordingly.

3.2 Leased wires maps and news agency costs

I collect a number of different leased wire maps for the purpose of the study, whose sources are detailed in the appendix. These maps either come from internal communications or public materials such as promotional circulars. While they differ in specifics, each map shows leased wire connections between cities and whether a node is designated as a bureau.[12]

Figure 2 shows two examples of these maps. In the current version of the paper, I use the maps to identify the relevant nearest bureau for each newspaper as connected via the telegraph lines.

3.3 News agency internal operations: assessments, costs, and contracts

I collect several datasets related to internal news agency operations. The appendix details the sources of this data.

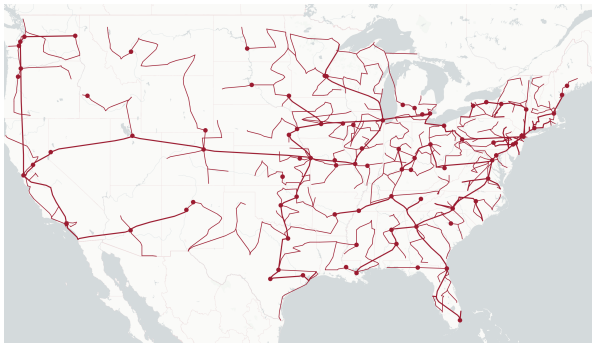
First, I digitize a dataset of payments made by newspapers to the AP in 1926. The data specifies weekly payments and categorizes them as either from leased wire clients or telephone clients. I use this data to estimate the assessment formula for the AP.

Second, I digitize the complete aggregate expenditures from the AP and UP between 1900 and 1945, as submitted to the Supreme Court as part of *AP v. US* (1945). I use this data to evaluate the fit of the assessment model for both the AP and UP as well as for years other than 1926.

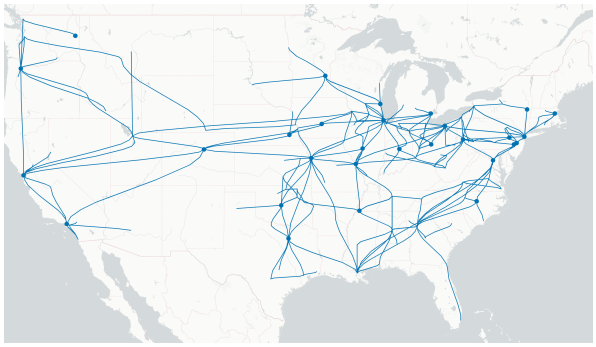
[12]There is substantial evidence that the reported details of telegraph leased lines are accurate. For the original AP map in 1900, I corroborate their details with the corresponding telegraph bills recorded in AP's annual internal audits and find them to be consistent. In subsequent years for AP, these records were either part of the annual directory or officially submitted in courts. As for the UP, the information was included in public promotional materials and also used on UP's official stationery to attract new clients. Any discrepancy or misrepresentation would have likely been identified by potential clients.

FIGURE 2: MAPS OF LEASED WIRES

Panel A: AP 1936



Panel B: UP 1928



Note: These are maps of the leased telegraph line system for each news agency. Lines denote telegraph connections. Dots denote bureaus operated by each news agency at the time. Panel A depicts the Associated Press's network in 1936, including national trunk lines which are bold. This particular AP map was submitted as evidence in *AP v. US* (1945) and printed in Lee (1937). Panel B depicts the United Press's network in 1928. Duplicated connections are possible due to the likely inclusion of both Day and Night wires. This particular map was printed on the back of UP's stationery in 1928 and reprinted in many UP newspapers as part of UP's advertising campaign in 1929.

4 DESCRIPTIVE EVIDENCE

4.1 EXCLUSIVE CONTRACT AND NEWS AGENCY GROWTH

The key argument of the paper depends on the source of the UP's growth. In this section, I show that a substantial share of UP membership came from markets where the AP already had an incumbent.

In Figure 3, for each news agency, I split markets (a city and time-of-publication combination) into two categories: whether a particular news agency was present (i.e. had a member newspaper) before its competitor.

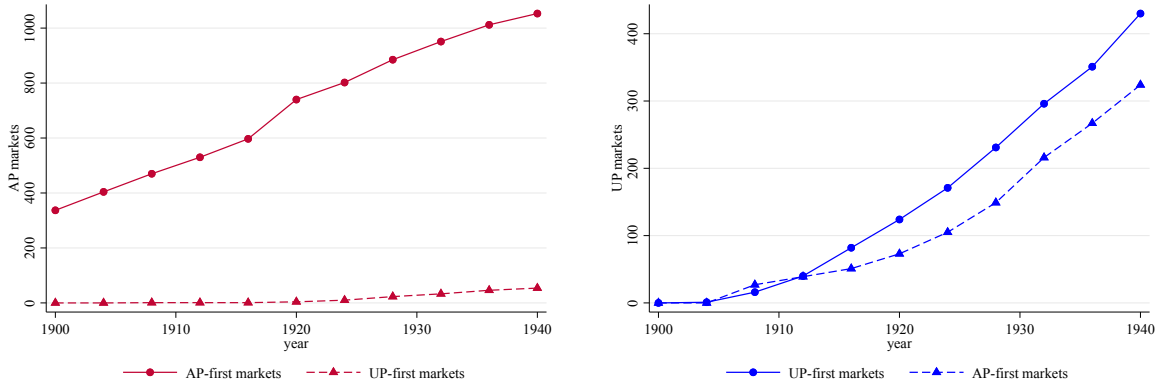
Panel A depicts the distribution of both the AP and the UP's membership, measured by the number of subscribing newspapers. Initially, the AP enjoyed a considerable size advantage. Furthermore, the AP was the first entrant in virtually all of its markets. On the other hand, almost half of UP's presence was in markets where it followed an AP paper. This underscores the initial dominance of the AP's installed base and the UP's status as a challenger against a dominant monopolist.

For Panel B, I define "population coverage" as referring to the total population of cities where an agency had a newspaper, double-counting across Morning and Evening papers. The figure highlights that virtually all of the UP's covered population comes from places where it was second to the AP. This fact is consistent with the fact that the AP already had a substantial presence in most large cities by the time that the UP entered. The key consideration in a counterfactual without exclusive contracts is whether the UP could have gained this membership and population

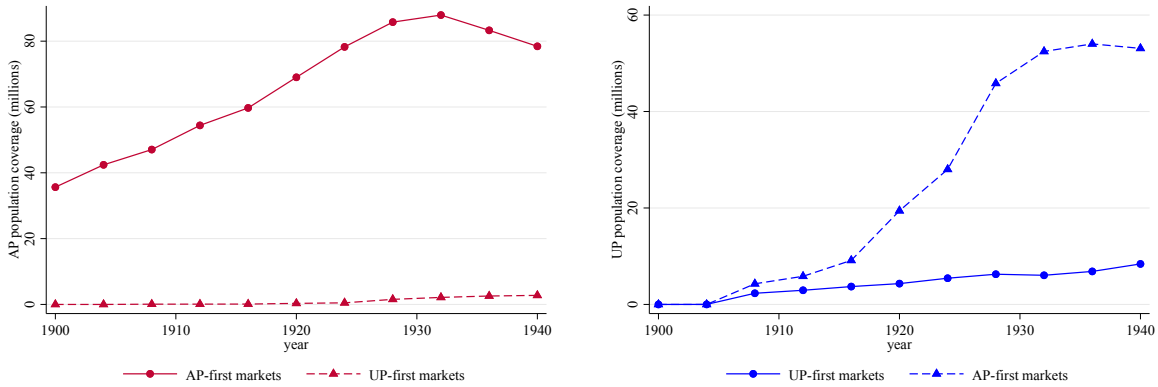
coverage if new entrants in AP-incumbent markets could have acquired AP service.

FIGURE 3: MEMBERSHIP AND POPULATION COVERAGE BY THEIR MARKETS' ORDER OF ENTRY

Panel A: News Agencies' Membership by their Markets' Entry Order



Panel B: News Agencies' Population Coverage by their Markets' Entry Order



Note: This figure depicts whether a news agency's size comes from markets where they were first or second relative to the other agency. Panel A shows size in terms of the number of newspapers. Panel B shows size in terms of the total population in markets where the news agency has at least one newspaper subscriber, double-counting Morning and Evening markets. The left column plots the Associated Press's size and the right column plots United Press's size. For each panel, the solid line plots the news agency size from only markets where the agency had presence before the other agency, and the dashed line plots the news agency size from only markets where the agency was had presence after the other agency.

4.2 ECONOMIES OF SCALE AND ASSESSMENTS

4.2.1 Assessment Model

In this section, I estimate a formula of the AP's assessments using the 1926 data. I perform this exercise using three different specifications. The first and second specifications allow a market's telegraph cost (proxied by its distance to the nearest news bureau) is equally shared across all AP papers using that bureau or across all AP papers in the same state respectively. I also estimate a third specification where costs can vary flexibly with either the number of papers sharing the

bureau or state news circuit.[13]

For each AP member in market m in 1926, I identify its nearest bureau $b(m)$ by tracing along the telegraph maps as observed in 1936 and identifying the nearest city with a bureau by total edge distance. I fit a formula of assessments on the assessment data by the following cross-section regression,

$$\log\left(\tau_m^{AP}\right) = \chi_0 + \chi_1 \log\left(Pop_m\right) + \chi_2 log\left(1 + \frac{\text{Dist}\left(m, b(m)\right)}{N_{b(m)}^{\text{AP}}}\right) + \chi_3 \mathbf{1}\left\{m = b(m)\right\} + \epsilon_m^C, \tag{1}$$

where τ_m^{AP} denotes the total annual payment by a newspaper to the AP. On the right-hand side, the first term denotes the population of the city; the second term includes the as-the-crow-flies distance between the market m and its nearest bureau $b\left(m\right)$, divided by the number of papers sharing that bureau (or the number of papers in the same state); and the third term is an indicator for if the market has a news bureau. The final term ϵ_m^c is an observational error term to allow for potential mismatches in my calculation of the right-hand side variables and the AP's calculation. The most flexible specification separates the distance-related component of cost into three terms: just the distance to the bureau, the natural logarithm of the number of AP papers sharing the same bureau, and the natural logarithm of the number of AP papers in the state.

Table 1 describes the results. Columns 1 and 2 report results for specifications where a newspaper's distance to the bureau is shared by other bureau connections vs. the number of AP papers in the state respectively. Column 3 reports results for the flexible specification.

Across all specifications, a 1% increase of the local market population increases annual assessments between 0.69% and 0.73%. Both telegraph connection costs and the associated economies of scale are economically significant. A 1% increase in the distance of the market to the nearest bureau leads to a 0.25% in costs. Assessments fall as more papers share the same bureau and state news circuit: a 1% increase in the number of newspapers that share a given bureau leads to a 0.28% decrease in annual assessments, and the same figure is 0.17% for a 1% increase in the number of papers in the same state. Since the median AP bureau is serving eight newspapers, another paper connecting to that same bureau would have decreased those members' assessments by 2.5%.

[13]This last specification is motivated by the fact that I do not have access to a precise formula for which fraction of assessments relate to general, state, and local cost. Allowing for a flexible specification avoids committing ex-ante to the way the AP splits costs among papers in the same states or sharing the same bureau.

TABLE 1: ESTIMATES FOR THE AP ASSESSMENT MODEL

	$\log(\tau^{AP})$		
	(1)	(2)	(3)
$\log(Pop)$	0.707	0.694	0.726
	(0.020)	(0.021)	(0.020)
$\log\left(1 + \frac{\text{Distance to Bureau}}{\text{Number of AP Papers sharing the Bureau}}\right)$	0.327		
	(0.025)		
$\log\left(1 + \frac{\text{Distance to Bureau}}{\text{Number of AP Papers in the same state}}\right)$		0.301	
		(0.026)	
$\log(1 + \text{Distance to Bureau})$			0.251
			(0.031)
$\log(\text{Number of AP Papers sharing the Bureau})$			-0.278
			(0.041)
$\log(\text{Number of AP Papers in the same state})$			-0.170
			(0.034)
$\mathbf{1}\{\text{Bureau Market}\}$	1.232	1.059	1.354
	(0.084)	(0.082)	(0.154)
Constant	0.679	0.993	1.252
	(0.234)	(0.235)	(0.287)
N	456	456	456
R^2	0.796	0.781	0.805

Note: This table presents regressions of AP annual assessments for leased wire clients in the year 1926 on observable market characteristics. τ^{AP} denotes AP annual assessments for 1926. $CityPop$ is the population of the city in 1926 (linearly interpolated using counts from the decennial census). Distance to Bureau is the distance of the market to the nearest AP news bureau. The number of AP papers sharing the Bureau is defined as the number of AP papers with whom the market shares its nearest bureau with. The indicator $1\{\text{Bureau Market}\}$ denotes whether the market has an AP news bureau.

4.2.2 Bureau Sharing Correlates with Subscription Choice

In this section, I show that the determinants of economies of scale correlate with the choice of news agency subscription. In particular, I show that whether a newspaper takes up AP or UP service is highly correlated with the number of other papers of the same service that connects to the same bureau.

I estimate a linear probability model of news agency subscription choice across newspapers as a function of the number of AP and UP papers sharing the bureau:

$$w_{jmt} = \kappa_{AP} N^{\text{AP}}_{b(m)} + \kappa_{UP} N_{b(m)} + \text{Controls}_{jmt} + \epsilon^{w}_{jmt},$$

where two separate specifications for $w \in \{\text{AP}, \text{UP}\}$ denoting a newspaper j's subscription to w in

market m in year t, and τ denotes the predicted assessments for either agency. The main regressors are the number of *other* AP papers that share the same bureau (and same for UP). All specifications control for the demographics, newspaper fixed-effects and Year $\times$ Time-of-Publication fixed effects.

Table 2 describes results. First, note across Columns 1 and 2 that when an additional other AP newspaper shares the same bureau, the probability of a newspaper subscribing to the AP increases by 1.8% and decreases for UP by 0.7%. Second, an additional other UP newspaper sharing the bureau increases the probability of joining UP by 1% and decreases that for the AP by 0.7%. Together with the estimated cost formula, these estimates are suggestive that the nearby density of a network influences subscription behavior by reducing telegraph costs born by any particular member.

TABLE 2: BUREAU-SHARING PREDICTS NEWSPAPER SUBSCRIPTION TO NEWS AGENCY

	(1) AP	(2) UP
Number of other AP papers sharing the bureau	0.018	-0.007
	(0.001)	(0.001)
Number of other UP papers sharing the bureau	-0.007	0.010
	(0.001)	(0.001)
R^2	0.874	0.735
Number of newspaper-years	15,826	15,826

Note: This table describes the relationship between a newspaper subscribing to the AP/UP and the number of other AP/UP papers sharing their nearest bureau in a linear probability model. Each observation is a newspaper-year. All specifications control for demographics, newspaper fixed-effects, and Year $\times$ Time-of-Publication fixed effects.

4.3 THE VALUE OF NEWS AGENCIES

The value of a newspaper's subscription to news agencies come from access to foreign, national, regional, and local news.[14] To demonstrate that news agencies provide additional content for the newspaper, I regress a newspaper's observed number of physical pages on their news agency subscriptions and newspaper fixed-effects:

$$\text{NumPages}_{jmt} = \sum_{w \in \{\text{AP,UP,INS}\}} \kappa_w w_{jmt} + \mathbf{1}\{j \text{ bundles multiple services}\}_{jmt} + \text{Newspaper-FE}_j + \epsilon^{Pages}_{jmt},$$

[14] Previous work has shown the contribution of telegraph news to newspaper editorial content: Wang (2023) shows that the electric telegraph speeds the news from Washington DC; Silcock and Dell (2023) shows that a substantial fraction of newspaper texts are reprinted, which increases between 1920 and 1945 (with a sharp spike at the start of the second World War).

where the number of pages is either the minimum or maximum number of pages in a typical issue for the paper that year as reported in Editors and Publishers. The right hand side includes w which are indicators for the three news agencies, an indicator for whether the newspaper bundles multiple wire services, and newspaper fixed-effects. ϵ_{jmt}^{Pages} denotes a measurement error.

Table 3 presents results. Column 1 presents results for the maximum number of pages observed within the year, and Column 2 presents that for the minimum number of pages. For both specifications, the number of pages that a given newspaper prints increase significantly with news agency subscription. Since the regression controls for newspaper fixed-effects, this increase is due to only within-paper variation.

Subscribing to news agencies significantly increases the page count in newspaper issues. Specifically, an AP subscription leads to an 18% increase relative to the average maximum page count, while UP subscriptions result in a 25% increase (the difference in effect sizes between AP and UP is not statistically significant). The magnitude of this increase in page count is larger for the maximum number of pages compared to the minimum. Furthermore, when newspapers bundle services from multiple agencies, there's a substantial increase in only the maximum number of pages. This is likely due to to the additional of content available during special events that both agencies cover.

TABLE 3: NEWS AGENCY SUBSCRIPTION CORRELATES WITH NEWSPAPER LENGTH

	(1) Max # of pages	(2) Min # of pages
AP	1.146	0.554
	(0.299)	(0.134)
UP	1.511	0.396
	(0.467)	(0.201)
INS	-0.471	1.577
	(1.651)	(0.738)
Bundling multiple services	2.345	0.531
	(0.972)	(0.435)
Constant	6.077	5.873
	(0.277)	(0.124)
R^2	0.821	0.777
Number of market-years	6,758	

Note: This table presents the relationship between news agency subscriptions and number of pages in a newspaper. I present two measures in the panel dataset, extracted from Editors and Publishers' reporting a newspaper's the range of number of pages in a typical issue that year. Data on the newspaper length is only available for election years between 1900 and 1912. Both specifications control for newspaper franchise fixed effects.

5 EMPIRICAL MODEL

In this section, I develop a model of newspaper and news agencies to capture the key forces of economies of scale and network effects. I focus on these particular forces as they are uniquely important to the economics of news agencies, thus necessarily abstracting away on other forces that were previously studied in the literature on the economics of newspapers.

First, I will present a model of per-period profits for newspapers, which nests a model of reader demand for newspapers, a model of newspaper advertising revenue, and a pricing model. The resulting profits then represent payoffs in a dynamic entry model where newspaper incumbents and entrants successively makes choices over entering and subscribing to different news agencies.

5.1 SETUP

I consider geographic markets $m \in \{1, \ldots, M\}$ spanning finitely many discrete time periods $t \in \{1, \ldots, T\}$. Each market m at time t has a mass of households, Pop_{mt}, who are potential newspaper readers and market characteristics, X_{jmt}, which contain observable demographics in the Census including the population share of a town that is urban, white, works in manufacturing, or is foreign-born.

I refer to the set of incumbent newspapers for each market-period combination as $\mathcal{J}_{mt}$ (with size J_{mt}) and cap the number of newspapers for each market-period at J^{max}. Incumbent newspapers each period can potentially change the bundle of subscriptions W_{jmt} to news agencies $w \in \{\text{AP}, \text{UP}, \text{INS}\}$ where W_{jmt} can be the empty set, and reader price p_{jmt}. News agencies w each period differ by their membership J_t^w which denotes the set of all newspapers which subscribes to w.

5.2 VARIABLE PROFIT

5.2.1 Reader demand

My demand specification follows a nested-logit reader demand system similar to Berry (1994). Each household i in a geographic market m at time t chooses whether to buy a newspaper j or to take the outside option of not buying a newspaper; so it maximizes the following utility equation across those options

$$u_{ijmt} = -\alpha p_{jmt} + g_{mt}\left(W_{jmt}\right) + \overline{\xi}_{jm} + \xi_{jmt} + \left(\zeta_{inmt} + (1-\sigma)\,\epsilon_{ijmt}\right) \tag{2}$$

where α is a coefficient on the newspaper's price p_{jmt}, $g_{mt}\left(W_{jmt}\right)$ is a household's valuation over newspaper j's bundle of news agency subscriptions W_{jmt} which could depend on the characteristics of market m, $\overline{\xi}_{jm}$ is an unobserved vertical quality component of the newspaper that persists

over time, ξ_{jmt} is an idiosyncratic vertical quality component of the newspaper that gets drawn each period, ζ_{inmt} is an idiosyncratic preference for a product "nest" n, ϵ_{ijmt} is a type-I extreme value error, and σ dictates the correlation of idiosyncratic utilities among the products in the same nest. There are two mutually exclusive nests of products: the outside good (not buying a newspaper) or the inside good (buying a newspaper).

My specification for a household's valuation over a newspaper's news agency subscription bundle is:

$$g_{mt}\left(W_{jmt}\right) = \overbrace{\beta_1\left(1-\gamma_{|W|>1}\right)\sum_{w\in W_{jmt}}\log\left(1+|J_t^w|\right)}^{\text{network effects}} + \underbrace{\beta_2 \mathbf{1}\left\{W_{jmt}=\emptyset\right\}}_{\text{preference for no-wire papers}} + \underbrace{\sum_{w,\emptyset}\mathbf{1}\left\{w\in W_{jmt}\right\}\left(X_{mt}\gamma_w\right)}_{\text{demographic-specific preferences}}. \quad (3)$$

The first component captures the total network strengths of a newspaper's news agency subscription bundle. In the baseline specification, I specify this component to be the sum over the natural logarithms of the number of newspapers in each subscribed network, $|J_t^w|$. (I also report a specification where a network's strength instead depends on the total population covered by its newspaper members.) β_1 is a scalar that captures households' preference for network strength. The coefficient $\gamma_{|W|>1}$ captures a "penalty" that is relevant if the newspaper is bundling multiple news agencies' content and is analogous to measuring the potential overlap in network values: $\gamma = 0$ implies that there is no overlap and $\gamma = 1/2$ implies that bundling is worthless to the reader.

The second component captures any potential preference for no-wire papers. This allows for potential quality investments that papers without telegraphic wires make in the absence of agency telegraphic news.[15]

The third component captures any demographic-specific preference for the different news agencies that are independent of their network effects, such as the agency's brand, style, or slant. X_{mt} is a vector of market-level Census demographics and γ is a vector of associated coefficients.

These reader utilities yield a mean utility $\overline{u}_{jmt}$ for each newspaper j.[16] The share of potential readers that buys newspaper j after integrating over idiosyncratic preference shocks, s_{jmt}, follows

[15] In this period, newspapers without a telegraphic news subscription often rewrite news from copies of previously published newspapers to fill space. News only has a "quasi-property rights" for a short duration and published facts cannot be copyrighted.

[16] $\overline{u}_{jmt} = -\alpha p_{jmt} + g_{mt}\left(W_{jmt}\right) + \overline{\xi}_{jm} + \xi_{jmt}$.

the familiar nested logit probabilities.[17] The demand curve facing newspaper j is then its market share multiplied by the number of households in the market, $q_{jmt} = Pop_{mt} s_{jmt}$.

5.2.2 *Advertising revenue*

I specify the per-reader advertising revenue that a newspaper gets given its reader demand to be

$$\log a_{jmt} = \lambda_0 + \lambda_1 \log \text{Pop}_{mt} + \lambda_2 \log s_{jmt} + X_{mt}\lambda_3 + \iota_{jmt}, \tag{4}$$

where λ_0 is a constant, λ_1 is a coefficient on the natural logarithm of the number of households in the market, λ_2 is a coefficient on the natural logarithm of the newspaper's reader market share s_{jmt}, λ_3 is a vector of coefficients on market characteristics X_{mt}, and ι is an error term.

5.2.3 *Pricing*

Given a vector of reader prices $\mathbf{p}_{mt}$, an incumbent newspaper j earns the following variable profit

$$v_{jmt}\left(p_{jmt}, \mathbf{p_{-j,mt}}\right) = \left[p_{jmt} - MC_{jmt} + a_{jmt}\left(p_{jmt}, \mathbf{p_{-j,mt}}\right)\right] q_{jmt}\left(p_{jmt}, \mathbf{p_{-j,mt}}\right),$$

where p_{jmt} is the firm's own price, $\mathbf{p}_{-j,mt}$ is the vector of other firms' prices, MC_{jmt} is the marginal cost per copy of newspaper, and a_{jmt} is the per-reader ad revenue function which depends on the reader price vector.

I assume that an equilibrium price vector $\mathbf{p}^*_{mt}$ is such that for each price p^*_j,

$$p^*_{jmt}\left(\mathbf{p^*_{-j,mt}}\right) = \arg\max_p v_{jmt}\left(p, \mathbf{p^*_{-j,mt}}\right), \tag{5}$$

yielding equilibrium variable profits $v^*_{jmt} \equiv v_{jmt}\left(\mathbf{p}^*_{mt}\right)$ for each incumbent newspaper j.

5.3 Dynamic model of newspaper entry and news agency membership

5.3.1 *Timing*

I adapt the stochastically alternating moves game developed in Igami and Uetake (2019) to model the entry of newspaper over time and subscription to news agencies.

Time is discrete and has a finite horizon, with periods indexed by $t = 1, \ldots, T$. For expositional ease, I refer to two types of alternating periods. I refer to even periods as *Entry* periods where a

[17] The following derivation uses the notation from Miller and Weinberg (2017), where the nests are in and out. Let $\overline{s}_{j|in} = \frac{\exp\left(\frac{\overline{u}_{jmt}}{1-\sigma}\right)}{D_{in}}$ where $D_{in} = \sum_k \left(\frac{\overline{u}_{kmt}}{1-\sigma}\right)$. The unconditional choice probability for the inside good is $\overline{s}_{in} = \frac{D_{in}^{1-\sigma}}{1+\sum D_{in}^{1-\sigma}}$, and the market share of good j is $s_j = \overline{s}_{j|in}\overline{s}_{in}$.

potential entrant can come into the market and odd periods as *Update* periods where incumbents can change their subscriptions. Demand and costs are only realized at the end of *Entry* periods — thus *Update* periods are essentially intermediate stages where incumbents can change their subscriptions and are only included for notational simplicity.

At the very beginning of the game, news agencies publish their schedule of subscription assessments for each market τ_{mt}^{AP} and τ_{mt}^{UP}, which depends on market characteristics to be specified.

I model each period as follows.

1. Nature chooses a mover.

   (a) In an *Entry* period, a potential entrant newspaper j^+ is born and becomes this period's mover if $J_{mt} < J^{max}$. Otherwise, the game skips this period.

   (b) In an *Update* period, nature picks an incumbent $j \in \mathscr{J}_{mt}$ according to a selection probability $Prob(j)$ to be this period's mover if there is at least one incumbent in the market. Otherwise, the game skips this period.

2. The mover observes the current market state which includes market characteristics X_{mt}, the network configuration at the end of the previous period J_{mt-1}^{w}, the profile of active incumbents from the previous period $\left\{(\overline{\xi_{jm}}, W_{jm,t-1}, MC_{jm,t-1})_{j \in \mathscr{J}_{m,t-1}}\right\}$. It draws shocks related to one-time sunk costs relevant only to decisions for this particular period, η_{jmt}.

3. The mover makes its choice. Recall that the mover has access to available news agency subscriptions $W \subseteq \overline{W}_{jmt}$ which depends on the exclusive contracting regime in place and the set of incumbents' subscriptions.

   (a) In an *Entry* period, the entrant chooses whether to enter with a bundle of news agencies W or to stay out of the market. The entrant "dies" if it chooses to stay out.

   (b) In an *Update* period, the selected incumbent chooses whether to expand its current bundle and add news agencies that it does not already subscribe to.

4. Only in an *Update* period, period-specific idiosyncratic demand shifters ξ_{jmt} are realized. All active newspapers (including j^+ if it entered) set prices according to equation 5, earn period profits, and pay fixed costs.

5.3.2 Choices and payoffs

Each period, the mover makes a choice of news agency subscriptions W.

The set of news agency subscriptions available to the mover, denoted as $\overline{W}_{jmt}$, is a subset of the complete set of news agencies. This availability is determined by two factors: the exclusive

contracting regime currently in effect and the subscriptions held by incumbent newspapers. I also allow the potentail entrant to select $W = \text{Out}$ which denotes not entering the market.

Choosing a bundle of news agencies W is equivalent to signing a perpetual contract with agencies $w \in W$: the mover agrees to pay the sum of assessments τ_{ms}^{W} for the current period $s = t$ as well as all future periods $s > t$. Thus, the stream of discounted payoffs to mover j from the bundle of subscriptions W is

$$V_{jmt}^{*}(W) = \begin{cases} \pi_{jmt} + \delta^{s-(t+1)} \sum_{s=t+1}^{T} \mathbb{E}\left[\pi_{jms}\right] + \eta_{jmt}(W) & W \neq \text{Out} \\ \eta_{jmt}(W) & W = \text{Out} \end{cases}, \tag{6}$$

where δ is a discount factor, $\eta_{jmt}(W)$ is a private cost shock specific to choice W to be specified, and the per-period total profit π is:

$$\pi_{jms} = \begin{cases} \mathbb{E}_{\Delta\xi}\left[v_{jms}(\mathbf{W})\right] - WC_{jms}(W;\tau) - FC_{jms} & \textit{Entry} \text{ period} \\ 0 & \textit{Update} \text{ period} \end{cases}$$

where v is the variable profit specified in Section 5.2, FC denotes the per-period fixed-cost, and WC denotes the per-period costs related to the newspaper's news agency subscriptions and is a function of the assessment schedules τ. The uncertainty in v is over possible realizations of the newspaper local quality $\overline{\xi}_{jm}$ and marginal costs MC_{jms} for newspapers that are not yet in the market as well as per-period realizations of $\Delta\xi_{jmt}$.

FIXED COSTS I now specify the two components of a newspaper's per-period fixed costs: the costs related to its wire subscriptions $WC_{jmt}(W;\tau)$ and its local operational costs FC_{jmt}.

I first specify the costs for a newspaper to subscribe to a news agency as

$$WC_{jmt}(W;\tau) = \begin{cases} \theta_{trend}^{t}\tau_{mt}^{AP} & \text{AP} \in W \\ \theta_{trend}^{t}\tau_{mt}^{UP} & \text{UP} \in W \\ \theta_{trend}^{t}\theta_{bundling}\left(\tau_{mt}^{AP} + \tau_{mt}^{UP}\right) & \{\text{AP}, \text{UP}\} \subset W \end{cases}$$

where

$$\tau_{mt}^{AP} = \theta_{0}^{AP} + \theta_{1}^{AP}\frac{Pop_{mt}}{\sum_{,m(k):k\in J_{t}^{AP}} Pop_{m(k),t}} + \theta_{2}^{AP}\frac{Dist\,(m, b(m))}{N_{b(m)}^{AP}}$$

and similarly for τ_{mt}^{UP}.

The formula for the transfer τ to a news agency uses the components known to be included in the AP's cost schedule. First, θ_{0}^{AP} is a per-household constant. Second, θ_{1}^{AP} a cost-sharing component that depends on the town's population Pop_{mt} divided the population covered by all AP

newspapers. Third, θ_2^{AP}reflects a component that depends on the distance from the market to the nearest AP news bureau $Dist\left(m, b(m)\right)$, divided by the number of newspaper sharing that news bureau $N_{b(m)}^{AP}$. The formula is similar for UP.

In computing the total wire costs, I also allow there to be an exponential time trend in the cost of news agency subscription over time not captured by the data θ_{trend} (e.g. increasing labor cost in operating the telegraph), and a parameter that affects the cost of bundling multiple news agencies $\theta_{bundling}$.

I specify the fixed cost for a newspaper independent of news agency subscriptions to be:

$$FC_{jmt} = \theta_0 + \theta_1 Pop_{mt} + \theta_2 Dist\left(m, b(m)\right)$$

where θ_0 is a constant, θ_1 is a coefficient on the number of town's population, and θ_2 is the distance of the market to the nearest AP bureau. The last component is meant to capture any investment in news collection that a newspaper would need to make regardless of wire subscription in order to enter (e.g. sending their own reporters).

CHOICE-SPECIFIC COST SHOCK. I assume that $\eta_{jmt}\left(W\right)$ is a private shock i.i.d. across markets and periods. I follow the intuition of nested logit demand systems and specify two components for η:

$$\eta_{jmt}\left(W\right) = \zeta_{jomt}^{Entry} + \left(1 - \sigma^{Entry}\right)\epsilon_{jmt}^{Entry}\left(W\right),$$

where $\epsilon_{jmt}^{Entry}\left(W\right)$ is distributed EV-1 and specific to each choice W, ζ_{jomt}^{Entry} is an idiosyncratic cost shock that is only specific to choice of an entrant staying out or entering the market.[18] σ^{Entry} captures the correlation of cost shocks related only to the choice of news agency as opposed to an entrant's choice to enter the market.

5.3.3 Beliefs over transitions

Optimizing over options in equation 6 requires the mover to have beliefs over the evolution of the two networks, the characteristics of future entrants $\left\{(\overline{\xi_{jm}}, MC_{jmt})_{j\in\mathscr{J}_{mt}}\right\}$, and market characteristics X_{mt}.

Regarding network evolution, I assume that movers have perfect foresight over only the moments of the network that enter their value functions. These include the number of newspapers in the network (which enters demand), the total population covered by those newspapers, and the

[18]Following Cardell (1991) regarding the nested logit, ζ_{jomt}^{Entry} follows the unique distribution so that $\zeta_{jomt}^{Entry} + \left(1 - \sigma^{Entry}\right)\epsilon_{jmt}^{Entry}\left(W\right)$ is an EV-1 random variable.

number of newspapers that share their closest news bureau (the latter two enter costs).[19]

Regarding the characteristics of future entrants $\left\{(\overline{\xi_{jm}}, MC_{jmt})_{j\in\mathscr{J}_{mt}}\right\}$, I assume movers expect realizations to match the median value of the characteristic's distribution within the state and city size (where a city can be large or small defined as being above vs. below the 80th percentile within a state) for each time period.

Regarding market characteristics, I assume movers to have perfect foresight over local market characteristics which include city population and Census demographics.

5.3.4 Equilibrium

Given this parametrization, for a given mover and realizations of shocks, their unique optimal choice of subscription bundles maximizes the stream of discounted payoffs to mover j from the bundle of subscriptions W,

$$W^* = \arg \max_{W\in\overline{W}_{jmt}} V^*_{jmt}(W).$$

The ex-ante probability of the mover choosing W follows the familiar nested logit choice probability expression.

As in Igami and Uetake (2019), the game is essentially a sequence of finitely many discrete choice problems, each of which has a unique solution. Thus, given a set of beliefs over network evolution along with the perfect foresight assumption, the entire game has a unique equilibrium. However, different sets of beliefs may give rise to different equilibria. For example, the belief that UP will gain no member may be self-fulfilling, as this leads to the choice of UP having low demand and high costs, which in turns leads to UP actually gaining no members. In estimation, I enforce that movers have expectations that match the empirical realization of the network. In counterfactual simulations, I assume that movers' initial beliefs are the empirical realization, and update their beliefs until they are consistent with the entry patterns. These correspond to a fulfilled-expectations equilibrium common in the network literature.

6 Estimation and Estimates

6.1 Demand estimation

I estimate the demand model using a two-step routine. In the first step, I guess the price coefficient α. In the second step, I estimate equation (2) using two-staged least squares. An instrument is

[19] This assumption requires movers to have no uncertainty about the evolution of the market over time (despite there being uncertainty in the realization of cost shocks of other movers). It can be thought of as an approximation to the actual realization of the network via the law of large number given the large number of potential entrants into the network each period.

needed for the market share of a newspaper conditional on being an inside good. For each guess of the price coefficient, this routine gives me the demand for each newspaper as a function of prices and product characteristics s_{jmt}. I then use the first order condition implied by equation 5 to back out implied marginal costs MC. I follow the intuition of Gentzkow, Shapiro, and Sinkinson (2014) and iterate on α until the mean marginal cost equates that observed in the Inland Press Cost and Revenue Survey for monopolist papers in towns between the 25th-75th percentile of the population distribution in the year 1928.

Identification of the reader demand equation (2) relies on variation in newspaper market shares that correlates with changes in its news agency's membership. An important concern is that papers of different quality could have selected into different news agencies over time. For example, if UP did not gain high-quality papers until later in life, we would have mis-attributed UP's paper strength to its network rather than its local quality. I overcome this selection problem by estimating equation (2) with explicit newspaper fixed effects $\overline{\xi}_{jm}$. Since I observe newspapers over time, I interpret this as the component of unobserved local quality of the newspaper that is constant over time.[20]

Demand estimation requires an instrument for the within-nest market share. The standard instrument in the literature is a shifter of the number of available products inside the nest (Miller and Weinberg 2017). I use a vector of indicators for whether one of the following events happened in a market in that particular period: the entry or exit of a newspaper, the merger of two newspapers, and whether a competitor picked up a news agency subscription.

For advertising demand, I estimate the model via two-staged least squares for the years 1932, 1936, and 1940. An identification challenge is that papers that have high market share may also have unobservable qualities that make their readers more attractive to advertisers. I instrument for reader market shares using the recovered newspaper local qualities $\overline{\xi}_{jm}$ estimated in the reader demand model. Since reader demand estimates are unavailable for 1932, the specification with this particular instrument omits observations for that year. I also present the OLS with the 1928 advertising data where results are similar.

I have two measures of total advertising revenues: one implied by the Inland Cost Revenue and Cost Survey data and one implied by multiplying advertising rates posted in *Editor and Publisher* with reported linage[21]. I find that the two figures are greatly mismatched: surveyed revenue is approximately 5% that of calculated revenue from advertising quantity and posted prices for small

[20] Another concern is that it could be that newspapers who were and that other features of the newspaper could have changed over time in a way that matched UP's development relative to AP. For example, if papers that join news agencies are more likely to invest in their local quality, we would wrongly attribute the resulting increase in market share to news agency network effects rather than in this local investment.

[21] Advertising rates posted in *Editor and Publisher* are often consistent with rates listed in individual newspapers' "rate cards." These cards provide information for the benefit of advertisers which includes the newspaper's rate, potential quantity discounts, deadlines, circulation, and the paper's mechanical specifications.

markets (those below the 80th percentile in population), and approximately 10% that for large markets. This is consistent with Tiew (2022) who finds the discount to be 3% for the period from 1932 to 1992 and is likely because advertising rates are often individually negotiated and can involve steep discounts relative to posted rates. I scale the calculated revenue by 5% for small markets and 10% for large markets respectively in order to account for this discount.

Estimates

Tables (4) and (5) report estimates of the reader demand model and advertising revenue model respectively.

I report two different specifications for reader demand. The first specifies a news agency's network strength by the number of newspapers that are its clients. The second specifies a news agency's network strength by the population covered by the news agency. Figure 4 demonstrates coefficients for the first specification in units of annual subscription price.

I find that the network strength strongly contributes to a news agency's value to a newspaper reader. The value of subscribing to the AP at the beginning would have been one and a half larger than subscribing to the UP. This mostly converged toward the end of the time frame as UP gained scale. The magnitude is substantial: the mean utility of wire services contributing to a newspaper is about \$1.5 for the reader. Given that median subscription price is about \$7.50, telegraphic news constitute about 20% of the value of a newspaper by the end of the sample. This is consistent with reports in *AP v. US* (1945) noting that about 20% of a newspaper's content is telegraphic news.

I also find that bundles of news agency exhibit substantial overlap: the utility resulting from subscribing to more than one agency is about 0.7 or 0.8 the sum of utilities from each separate subscription. This significantly lessens the incentive for newspapers to bundle both news agencies' content.

I find that observable market demographics exhibit heterogeneous preferences across news agencies, but little that advantages UP over the AP or not having a news agency subscription. Comparing to a baseline newspaper without wire subscriptions, I find that the brand effect of UP corresponds to approximately \$1 decrease in reader utility when the market has a 1 s.d. increases in its share-urban measure. I also find that the AP enjoys approximately an \$0.50 increase in mean reader utility when the market has a 1 s.d. increase in its share white demographics. Neither foreign or manufacturing share exhibit any significant heterogeneity.

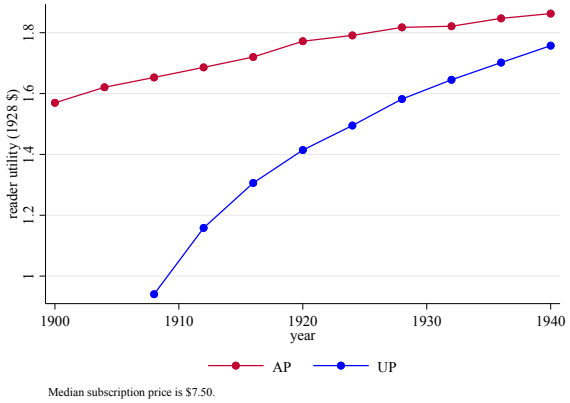
TABLE 4: ESTIMATES FOR THE READER DEMAND MODEL

		(1) Membership Size	(2) Population Coverage
Network Effects	Strength (β_1)	0.029	0.028
		(0.012)	(0.011)
	Overlap ($\gamma_{\|W\|-1}$)	0.219	0.292
		(0.139)	(0.104)
	No-Wire (β_2)	-0.024	0.031
		(0.076)	(0.094)
Demographics ($\gamma_\emptyset$)	White	0.513	0.511
		(0.206)	(0.206)
	Manufacturing	-0.278	-0.287
		(0.382)	(0.382)
	Foreign-Born	-0.180	-0.184
		(0.250)	(0.250)
	Urban	0.717	0.718
		(0.144)	(0.144)
Demographics × AP (γ_{AP})	White	0.052	0.053
		(0.015)	(0.015)
	Manufacturing	0.001	0.001
		(0.019)	(0.018)
	Foreign-Born	-0.025	-0.025
		(0.022)	(0.220)
	Urban	-0.300	-0.302
		(0.025)	(0.025)
Demographics × UP (γ_{UP})	White	-0.025	-0.025
		(0.022)	(0.023)
	Manufacturing	0.020	0.021
		(0.382)	(0.022)
	Foreign-Born	-0.001	-0.001
		(0.250)	(0.023)
	Urban	-0.099	-0.100
		(0.144)	(0.025)
	Nesting coefficient (σ)	0.072 (0.07)	0.071 (0.07)
	Price Coefficient (α)	0.10	0.12
	R^2	0.857	0.857
	Number of market-years	14,121	14,121

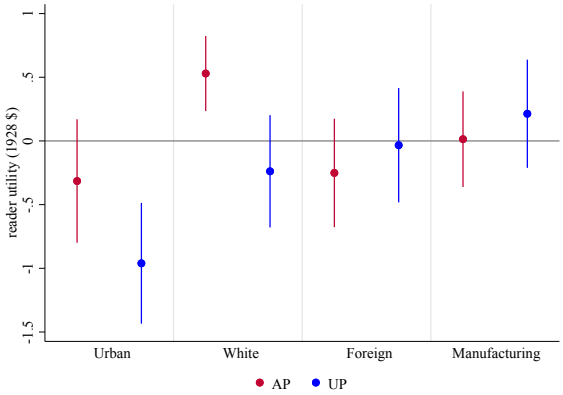
Note: This table presents estimates for the demand model described in Section 5.2. All specifications control for city-population-decile fixed effects, franchise fixed effects, and Year × Time-of-Publication fixed effects.

FIGURE 4: GRAPHICAL INTERPRETATION OF DEMAND ESTIMATES

Panel A: Network Effects



Panel B: Demographic-Specific Preferences



Note: This figure depicts a graphical representation of demand estimates in Column 1 of Table 4. Panel A depicts the magnitude of the coefficient on network strength (β_1) in terms of 1928 dollars. Each dot is a year in the data and is calculated by $\frac{\beta_1}{\alpha} \times \log(N_w)$ where α is the price coefficient and N_w is the size of the news agency w's membership in each year. Panel B plots the magnitudes of the set of coefficients on demographics γ_{AP} and γ_{UP} respectively in terms of 1928 dollars. Red dots for AP are calculated by $\frac{\gamma_{AP}}{\alpha}$ and blue dots for UP are calculated by $\frac{\gamma_{UP}}{\alpha}$ respectively. Bars are 95% confidence intervals.

I cannot reject the null hypothesis that the nesting coefficient is different from 0, suggesting that newspapers are highly differentiated in unobserved dimensions not captured by news agency choices.

For the advertising model, I report both the OLS and the preferred specification, the two-staged least squares (2SLS) that uses newspapers' quality as an instrument for newspaper market share. Consistent with Tiew (2022), I find that observed advertising revenues are far smaller than what would be implied from linage and posted rates, approximately 0.1 for large markets and 0.05 for small markets. I find that per-reader advertising revenue drops sharply as the paper's market share increases. This coefficient is consistent with standard models of media advertising where the marginal eyeball is potentially less valuable to advertisers.[22]

[22]Two sets of theories can imply this result. The marginal reader might makes the readership's demographic more diverse and less niche, making it difficult for advertisers to target their desired demographics (Chandra 2009). The marginal reader could also be more likely to consume other media (such as the radio, magazines, or competing newspapers), making their impressions less valuable to advertisers (Gentzkow, Shapiro, Yang, and Yurukoglu 2022). I am agnostic on the source of this interaction and am holding it fixed in the counterfactual.

TABLE 5: ESTIMATES FOR THE ADVERTISING REVENUE MODEL

	(1) OLS	(2) 2SLS
Log Market Share	-0.064	-0.200
	(0.043)	(0.111)
Log City Population	0.142	0.008
	(0.034)	(0.140)
White	0.021	0.410
	(0.315)	(0.324)
Manufacturing	-0.636	0.517
	(0.527)	(0.559)
Foreign-Born	1.486	0.266
	(0.594)	(0.640)
Urban	0.002	0.040
	(0.155)	(0.166)
Big-market discount rate	0.1	
Small-market discount rate	0.05	
First-stage F statistic	-	32.57
N	1,822	855
R^2	0.04	0.22

Note: This table presents the advertising revenue model described in Equation (4). The "discount rate" refers to the scaling factor needed to match the Inland Press revenue survey data. The instrument for the 2SLS is the estimated newspaper local quality from the reader demand system. Both specifications control for state fixed effects and Year $\times$ Time-of-Publication fixed effects.

6.2 ESTIMATION OF FIXED COSTS

To estimate the entry and subscription choice model, I take the demand parameters estimated as given and estimate the supply side using maximum likelihood. The key parameters to be recovered are entry costs and costs specific to news agency subscription bundle choice.

For each market (a city-time of publication combination), I assume that there are at most $J^{max} = 2$ newspapers active at any given time. I also only estimate the model on entrants and subscription decisions made *after* 1912.[23]

The data is available in four-year intervals. I split each year into two periods: an initial *Update* period where an incumbent could change their wire subscription, and then an *Entry* period where the potential entrant could come in. The data on the supply side consists of market characteristics that vary with entry cost Z^{FC}_{jmt}, market characteristics that vary with wire choice Z^{wire}_{jmt}, and choices

[23]This sample is motivated by two factors. First, many papers that entered news agencies prior to 1912 constitute UP's installed base (including papers belonging to the Scripps chain). These papers may have a difference entry model than those that came into UP later on. Second, the AP's geographical radius for exclusive territory contracts were not standardized before this period.

W_{jmt} conditional on choice set $\overline{W}_{jmt}$ for each market-period.

I assume that entry cost FC_{jmt} is linear to Z^{FC}_{jmt} and wire cost for each subscribed wire w_{jmt} is linear to Z^{wire}_{jmt}. For each parameter guess, I compute the probability for each choice following the nested logit probability formula (see Section 5.3). The log likelihood of observing the data conditional on parameters is

$$\log L = \sum_m \sum_t \log \Pr \left[W_{jmt} = \arg \max_{W \in \overline{W}_{jmt}} \Pi^*_{jmt} \left(W | \theta^{entry}, \theta^{wire}, \sigma^{entry}, \rho \right) \right]. \tag{7}$$

I am not able to estimate the nesting parameter σ^{Entry}. On the reader demand side, the identification of the nesting parameter is from the variation in reader's choice sets. The only variation in choice set that I have in wire subscription choice is from first vs. second entrant (due to exclusion), which may be unreliable toward identifying how subscription costs vary relative to entry costs. Instead, I calibrate σ^{Entry} is so that the relative magnitude of the EV-1 shock from wire choice vs. entry choice is approximately the relative magnitude of reported wire cost vs. fixed cost.[24]

The mover selection rule $Prob(j)$ decides which incumbent is allowed to update their subscription bundle each period. I set the selection rule to be equal probabilities for all incumbents, $Prob\,(j) = \frac{1}{J}$. [25]

I make two further simplifications in computing the model. First, I do not explicitly recompute the stage-game equilibrium profit v^* for each parameter guess. Instead, I computed v^* on 100,000 grid points of $\left\{\delta_j^{\text{reader}}, \delta_j^{\text{ad}}, MC_j\right\}_{j\in\{1,2\}}$. I then use a cubic fit using all possible combinations of linear, quadratic, and cubic terms of these $3 \times J$ variables. The R^2 of this fit is 0.98 for monopoly markets and 0.95 for duopoly markets. I take the fitted values from this exercise to form equation (6). Implementation details of this exercise are in the appendix. Second, in computation, I impose a shorter horizon for firms than they would have under the full game. This means that firms only take into account $T^{Horizon}$ periods from the period t when it makes its decision (unless $T > T^{Horizon}$). I set $T^{Horizon} = 6$. I calibrate the discount factor δ so that the sum of future values of δ is equivalent to that of $\delta^* = 0.95$ in an infinite game. [26]

Estimates

Table 6 report estimates of the entry and news agency subscription choice model.

[24] The intuition is that the relative importance of these two shocks should match the relative importance of FC vs. cost of wire connection, so $(1-\sigma) = \overline{\left(\frac{\tau}{FC}\right)}$. Using reported means for fixed costs in the Inland Press survey and means of the transfer formula, I pick $(1-\sigma) = 0.25$ or $\sigma = 0.75$.

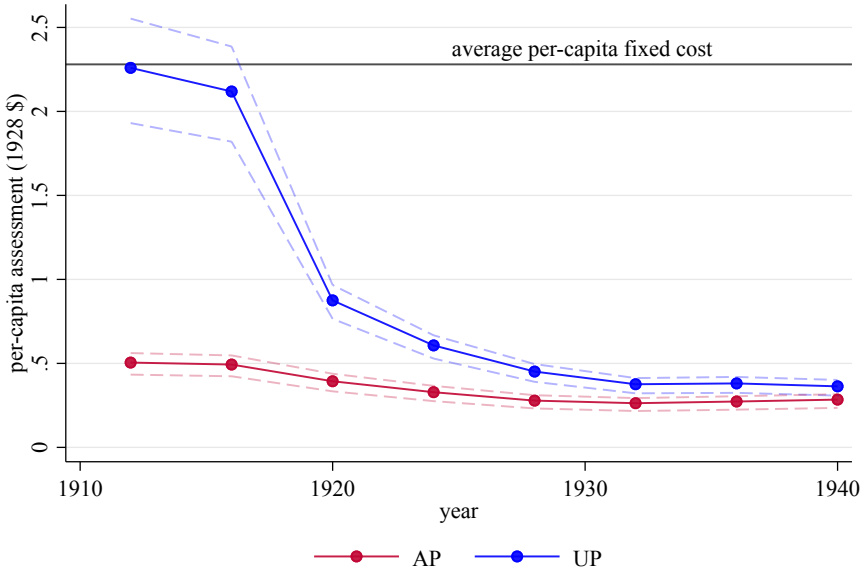
[25] This also means that in estimation, if I do not see a change in news agency subscriptions for a two-paper market during an Update period, I assume randomly that one of the two incumbents was picked and decided to not change their subscriptions.

[26] This means finding δ such that $\frac{1}{1-\delta^*} = \frac{1-\delta^{T^{Horizon}}}{1-\delta}$ where $\delta^* = 0.95$. For $T^{Horizon} = 6$, $\delta = 1.483$.

The magnitude of the newspaper-specific components are similar to previous work.[27] I find that a newspaper's fixed cost increases as it is further away from the nearest bureau, even if it has no telegraphic news subscription. This is plausible since in the absence of telegraph news, it would have had to invest in other technologies (such as hiring its own reporting staff) in order to enter. This is also consistent with per capita fixed costs being lowered when a paper picks up AP or UP.

In order to interpret the news agency-specific costs, I aggregate the estimated components and plot the average across all markets in 5. From the revealed preference model, the average per-capita cost of subscribing to the AP in 1928 is \$0.28 (compared to \$0.27 in the assessment data). In 1912, the per-capita cost of news agency subscription is \$0.50 for the AP and \$2.26 for UP respectively. The significant gap and subsequent decrease underscores the importance of economies of scale in this setting: the cost of joining the AP and UP drops over time as the network increases in density.

FIGURE 5: GRAPHICAL INTERPRETATION OF SUPPLY ESTIMATES



Note: This figure presents the implied news agency specific costs as calculated using estimates from Table 6. Costs are computed for *all* markets (regardless of observed subscriptions). The figure presents the average cost for a market to connect to the AP vs. UP. over time.

[27] I report a \$2.28 per-capita for fixed cost. Gentzkow et al. 2014 reports a \$9.03 per-reader. The Inland Press survey reports mechanical fixed cost to be \$7.73.

TABLE 6: ESTIMATES FOR THE SUPPLY MODEL

		(1) Fixed Costs (per capita)
Newspaper-Specific	Inverse population (θ_0)	0.695
		(0.007)
	Constant (θ_1)	2.281
		(0.186)
	log(Distance to bureau / City population) (θ_2)	0.526
		(0.008)
News Agency-Specific	AP inverse population (θ_0^{AP})	-0.235
		(0.008)
	UP inverse population (θ_0^{UP})	-0.004
		(0.009)
	AP general costs (θ_1^{AP})	0.020
		(0.009)
	UP general costs (θ_1^{UP})	0.020
		(0.009)
	AP assessments (θ_2^{AP})	0.463
		(0.363)
	UP assessments (θ_2^{UP})	0.404
		(0.072)
	Cost multiplier from bundling ($\theta_{bundling}$)	1.124
		(0.206)
	Cost trend (θ_{trend})	1.10
		(0.010)
Calibrated parameters	Entry nesting parameter (σ^{entry})	0.75
	LLH	-39,400.94
	Number of market-years	14,121

Note: This table presents estimates for the entry and news agency subscription choice model described by Equation 7. The population-independent constants are a component of cost that does not scale with population size (and thus in a per-capita specification is modeled as $\frac{x}{Pop}$). AP and UP general costs are fixed constants divided by the population covered by the AP and UP in each period (with the 1928 AP population normalized to 1). AP and UP assessments are predicted values estimated from Column 3 of Table 1, divided to be per-capita. The cost-trend is an exponential trend that captures secular changes in news agency costs in this period. The nesting parameter dictates the magnitude of the unobserved cost shocks in entry choice relative to news agency choices and is calibrated using ratio of fixed costs measured in the Inland Press data relative to AP assessments in 1926. The model is estimated for election years between 1912 and 1940. Standard errors do not account for uncertainty in the estimation of variable profits.

7 Model Simulations and Counterfactuals

7.1 Framework

To obtain counterfactuals, I fully solve the model and compute new equilibria where the realizations and beliefs regarding economies of scale and network effects could potentially change. In the counterfactual, a small change in membership sizes at the beginning can snowball as firms anticipate that future costs and values will adjust. The equilibrium outcome of the economy is a vector of entry probabilities such that implied network effects and economies of scale matches these entry probabilities.

I solve the model on a set of constructed representative markets. Since local economies of scale are heterogeneous by distance to the nearest news source, I designated different markets into four types: Urban, Suburban, Remote, and Very Remote, corresponding to quartiles of distance to the nearest bureau. I further split each category markets by within-category population quartiles and by time of publication (Morning/Evening). This makes up $4 \times 4 \times 2 = 32$ representative markets. For each representative market, I calculate their exogenous market characteristics such as demographics and population as the average of all cities that fall into that category.

I compute a fulfilled expectations equilibrium for these 32 markets. Formally, I find a set of choice probabilities $\Pr[W_{jmt}]$ such that the following three variables are consistent with each other: entry probabilities for each period, the network values and costs for each period implied by these entry probabilities, and movers' beliefs over them. For each guess of $\Pr\left[W_{jmt}^{(k)}\right]$ in iteration k, I compute the implied network values and costs, update entry probabilities to $\Pr\left[W_{jmt}^{(k+1)}\right]$, and iterate until this vector of entry probabilities converge.[28]

Multiple equilibria are possible due to differences in starting beliefs. I set starting beliefs to the realized patterns in the data. In order to compute news agency revenue fit, I take the per-capita formula estimated in Table 1 as given and sum up the payments to AP and UP across all markets.

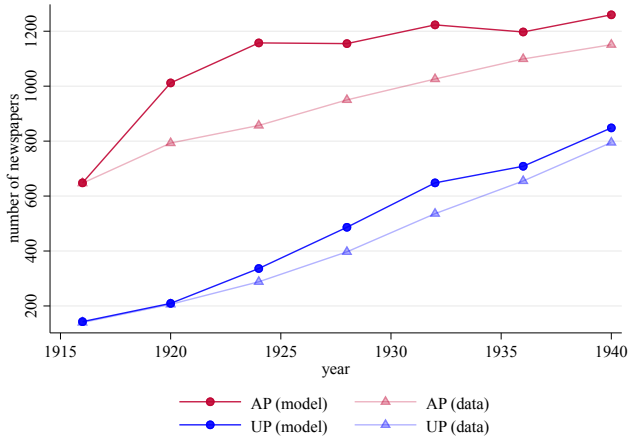
7.2 Baseline Simulation and Model Fit

Figure 5 presents the equilibrium from the model simulation where the model starts from the installed base of 1916. The model approximates patterns in the data well. In particular, the patterns are close to the actual patterns of UP growth. The model somewhat overestimates AP's growth. This suggests that there can be additional costs to joining the AP that are not captured by my

[28] In computation, I enforce that $sup\left(\left\{\left|Pr\left[W_{jmt}^{(k+1)}\right] - Pr\left[W_{jmt}^{(k+1)}\right]\right|\right\}_t\right) < 0.0001$.

model.[29]

FIGURE 6: MODEL FIT



Note: This figure presents the number of newspapers as implied the model (dark circles) vs. the number of newspapers in the data (light triangles). The starting point for model simulation is the both firms' installed bases in the year 1916.

7.3 COUNTERFACTUAL NETWORKS: NO EXCLUSIVE CONTRACTS

Figure 8 presents the counterfactual membership path where there are no exclusive contracts. This is the main counterfactual considered by *AP v. US* (1945): would UP have been able to enter and compete with the AP if there were no exclusive territory contracts?

In Panel A, we observe a marked decline in UP memberships. In the counterfactual without AP exclusive territories, many papers opted to switch away from UP service and joined AP instead. This led to a substantial 30% decrease in UP's membership within the first four years, further deepening to 40% over eight years. Despite this initial loss, UP was still able to gain scale. This is due to its large installed base already established in 1916.

In Panel B, I examine the revenue effects of membership changes on both UP and AP news agencies. While both agencies face a drop in revenue, the reasons differ. UP's decline is due to its shrinking membership. For AP, despite an increase in members, the new additions come from cities where AP already operates. Because their payment model requires members in the same city to share costs equally, these new members do not generate additional revenue.

UP's revenue loss in Panel B quickly becomes devastating for the organization. As detailed in Section 2.1, UP was barely breaking even due to subsidies from the Scripps family, which offset its operational expenses. While the precise amount of the subsidy remains unclear, the counterfactual allows us to examine the impact of revenue loss. In this scenario, the cumulative revenue shortfall

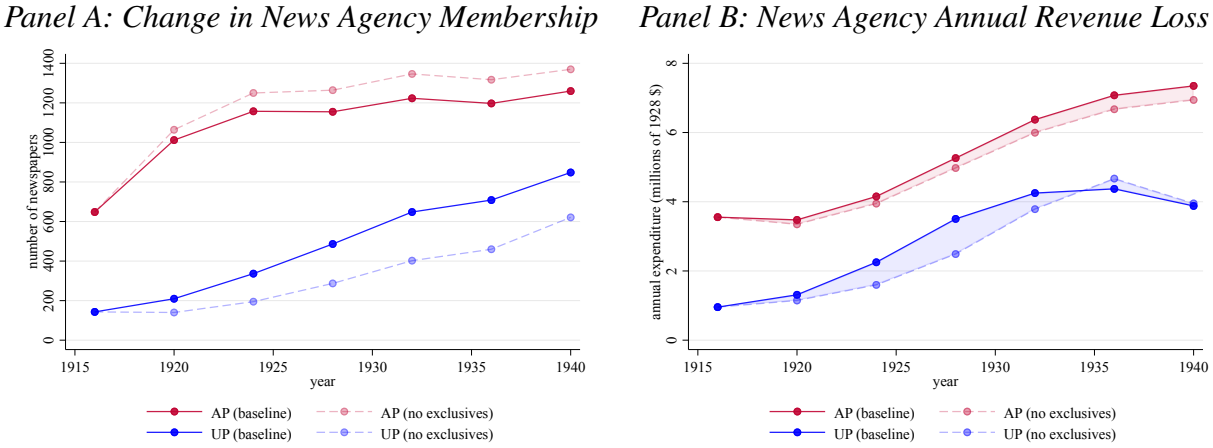
[29] One candidate explanation is that exclusive contracts beyond the city's immediate radius may have been informally enforced. This suggests a robustness check where I use the observed exclusive radii in 1900 rather than the city boundaries.

(illustrated as the shaded area in 7) quickly surpasses $1m (1928 dollars) in the first four years. This matches the highest potential scrap value discussed within the UP organization. Within eight years, this deficit nears $8m (1928 dollars), equivalent to the entire worth of E.W. Scripps' newspaper estate. Although I do not have an economic model for the Scripps' subsidizing process, these numbers indicate that no plausible subsidy would have sustained UP's break-even point without AP's exclusive territory agreements.

7.4 Counterfactual Networks: Exclusive Territories vs. Exclusive Dealing Contracts

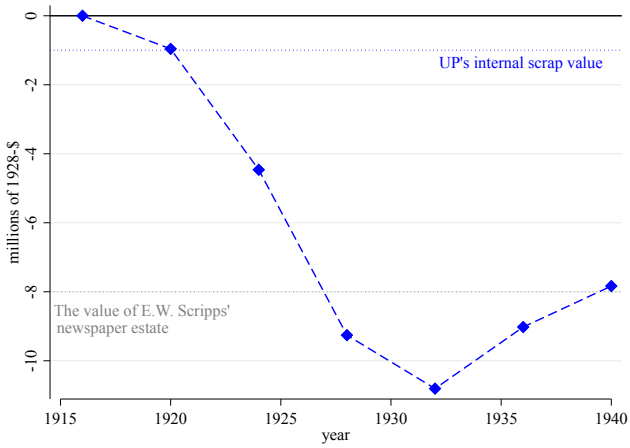
Figure 9 and Table 7 presents news agency membership growth under counterfactual contracting regimes. I explore four different scenarios: the baseline with only exclusive territories in place, a counterfactual based on the *AP v. US* (1945) ruling where no exclusive contracts exist, another counterfactual where only exclusive dealing contracts are permitted (excluding exclusive territory contracts), and a final counterfactual where both types of contracts are allowed. These counterfactuals have historical significance: In 1915, the US Attorney General opined that the AP was entitled to exclusive territory contracts, but *not* to exclusive dealing. Internal documents reveal that AP's strategy was to limit UP's expansion by enforcing exclusive dealing clauses, thereby preventing their current members from accessing UP services.

Figure 7: Counterfactual with no Exclusive Contracts



Note: This figure presents the counterfactual model simulation where there are no exclusive contracts. Panel A presents the path of membership under the baseline and counterfactual. Panel B presents the path of change in news agency revenue under the baseline and counterfactual.

FIGURE 8: CUMULATIVE UNITED PRESS REVENUE LOSS



Note: This figure presents the the cumulative change in UP's revenue in a counterfactual without exclusive contracts relative to the baseline simulation in terms of 1928 dollars. The plot includes two horizontal lines that describes plausible scrap values for the UP organization. The top line, at negative $1m, is the highest value internally discussed as the total valuation of the United Press stocks. The bottom line, at negative $8m, is the total value of E. W. Scripps's newspaper estate as described in his will in 1921.

In Table 7, I present results in terms of the number of newspaper-years that would have been part of either organizations under different counterfactual. I normalize memberships under the baseline (where there are exclusive territory contracts but no exclusive dealing contracts) to unity. Figure 9 shows the growth path.

My analysis indicates that the baseline scenario—with exclusive territories but without exclusive dealing contracts—is the most unfavorable for the dominant AP and the most favorable for the newcomer UP in terms of membership size. In this situation, UP attracts two groups of newspapers: those wanting to combine both AP and UP services, and those excluded from AP. Introducing exclusive dealing contracts from this baseline considerably undermines UP. However, the impact of exclusive dealing contracts on news agency memberships is much less pronounced when exclusive territories are not active, given that UP's reduced value and increased costs in this setting makes it less enticing to potential bundlers.

7.5 COUNTERFACTUAL NEWSPAPER MARKET STRUCTURES AND CONSUMER WELFARE

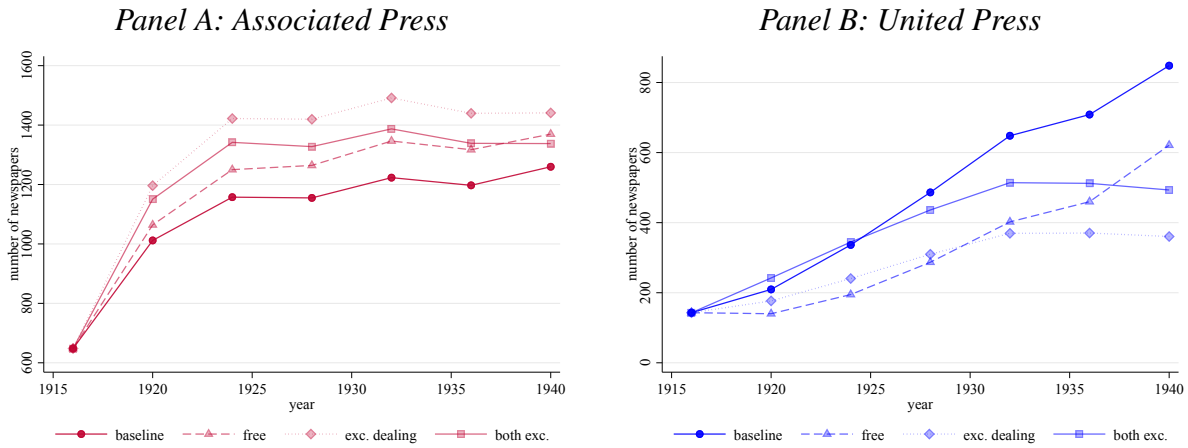
In Table 8, I show counterfactual newspaper market structures under counterfactual exclusive contracting regimes. Each figure denotes the fraction of total possible market years in the economy that corresponds to each market structure under various counterfactuals. I present four counterfactuals in addition to the baseline.

First, in the main counterfactual, UP exits in the absence of AP exclusive territories. Here, AP captures an additional 8% of the market-years, roughly half of what UP loses. The overall

number of market-years receiving telegraphic news drop by 5%, indicating the reduced incentive for entry without exclusivity. These effects are also present in the second counterfactual where UP is subsidized to remain in the market, though the impacts are less pronounced.

In the third counterfactual, only exclusive dealing contracts are in effect. Here, UP suffers a large drop in market-years due to the loss of newspapers that bundled both services. Surprisingly, these contracts increase the AP's membership. This outcome seems counterintuitive, given that exclusive dealing contracts are designed to protect the upstream AP from competition at the cost of restricting downstream newspapers from bundling services. This unexpected result stems from an increase in AP's quality and a decrease in UP's in the counterfactual. This effect is clearer in the fourth scenario, where both exclusive dealing and exclusive territory contracts are in play. In this scenario, there's a slight uptick in markets featuring two newspapers compared to the baseline (an increase of 0.002% in market-years or 0.6% of the baseline). This minor increase is the downstream effect of exclusive dealing contracts: new newspaper entrants are encouraged to enter as incumbents are weakened by their inability to bundle various services.

FIGURE 9: NEWS AGENCY MEMBERSHIP UNDER COUNTERFACTUALS



Note: This figure plots the growth rate of the membership of the Associated Press and United Press across counterfactual contracting regimes.

TABLE 7: MEMBERSHIP SIZE UNDER EXCLUSIVE DEALING COUNTERFACTUALS

Associated Press		Exc. Dealing	
		No	Yes
Exc. Territories	No	1.08	1.17
	Yes	**1**	1.12

United Press		Exc. Dealing	
		No	Yes
Exc. Territories	No	0.65	0.63
	Yes	**1**	0.85

Note: This table presents counterfactual news agency membership sizes (in market-years) under counterfactual exclusive contracting regimes. The left panel shows membership size for the Associated Press and the right panel shows that for United Press. For each panel, rows vary by whether exclusive territory contracts are enforced, and columns vary by whether exclusive dealing contracts are enforced. The bolded cell is the baseline observed in the real history and is normalized to 1.

TABLE 8: COUNTERFACTUAL NEWSPAPER MARKET STRUCTURES

Market structure		(1) Base	(2) UP-exit	(3) Free	(4) Deal	(5) BothExc
Number of newspapers	0	0.17	-0.02	+0.00	-0.02	-0.02
	1	0.56	+0.02	-0.00	+0.02	+0.02
	2	0.27	+0.00	-0.00	+0.00	+0.00
Number of AP papers	0	0.53	-0.09	-0.04	-0.10	-0.07
	1	0.47	+0.08	+0.04	+0.09	+0.07
	2	0.01	+0.01	+0.00	+0.01	-0.00
Number of UP papers	0	0.84	+0.14	+0.06	+0.07	+0.03
	1	0.16	-0.14	-0.06	-0.07	-0.03
Number of bundling papers	0	0.97	+0.03	+0.01	+0.03	+0.03
	1	0.03	-0.03	-0.01	-0.03	-0.03
Number of papers with telegraphic news	0	0.40	+0.03	+0.01	-0.06	-0.07
	1	0.58	-0.03	-0.01	+0.06	+0.07
	2	0.02	+0.00	+0.00	+0.00	-0.00

Note: This table presents newspaper market structures under counterfactual exclusive contracting regimes. Each row corresponds to a market structure, and each column corresponds to an exclusive contracting regime. Column 1 presents the fraction of total market-years that corresponds to the relevant market structure. Columns 2 to 5 present the difference in market-years that corresponds to the same market structure for each counterfactual. Columns 2, 3, 4, and 5 are for the counterfactual regimes where UP exit (UP-exit), with no exclusive contracts but UP stays in the market (Free), only exclusive dealing contracts but UP stays in the market (ExcDealing), and both exclusive territory and exclusive dealing contracts (BothExc).

Finally, to highlight the importance of equilibrium network adjustments, I compare the primary counterfactual to a scenario where UP does not exist even when exclusive territory contracts are in place. This counterfactual underscores the motivation for suppliers to adopt exclusive territory

contracts in non-network industries (or when they deem rival entry unlikely). Under this scenario, the number of market-years with AP news decline by 12%. This reflects the reduced entry incentives for newspapers, as they lack protection from potential future competitors.

TABLE 9: COUNTERFACTUAL NEWSPAPER MARKET STRUCTURES *without* UNITED PRESS

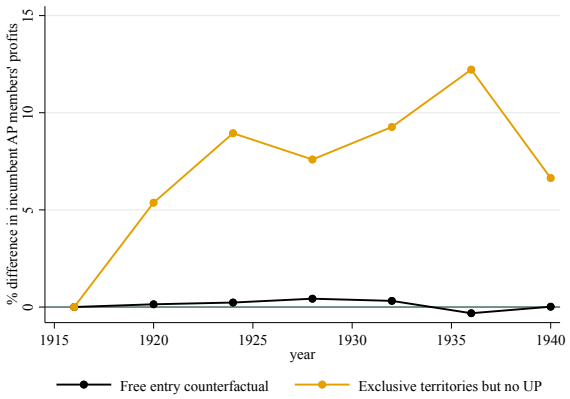
Market structure		(1) Exclusive	(2) Free Entry
Number of newspapers	0	0.20	-0.04
	1	0.71	-0.15
	2	0.09	+0.18
Number of AP papers	0	0.27	+0.12
	1	0.72	-0.12
	2	0.01	+0.00

Note: This table presents newspaper market structures under a counterfactual where United Press did not exist regardless of contracting regimes. Each row corresponds to a market structure, and each column corresponds to an exclusive contracting regime. Column 1 presents the fraction of total market-years that corresponds to the relevant market structure, when there are AP exclusive territory contracts but UP did not exists. Columns 2 presents the difference in market-years that corresponds to the same market structure for a counterfactual where there is no UP and no exclusive territory contract.

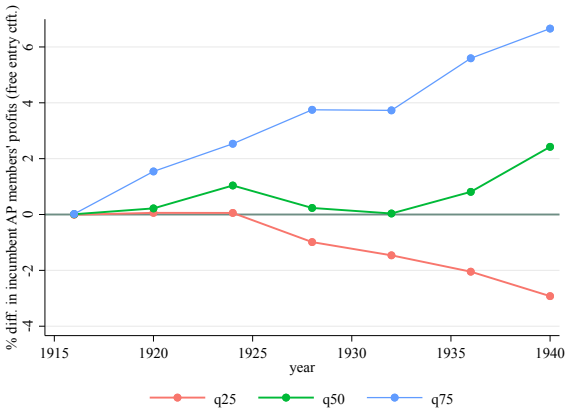
These results highlight the importance of the AP's organizational structure toward the observed market structure in news agencies. In particular, as a non-profit trade association controlled by its member newspapers, it is most likely that AP management was not attempting to maximize membership but rather the profit of its incumbent newspapers. In Figure 10, I plot the profit of newspapers who were already members of the AP in 1916 over time under counterfactual regimes relative to the baseline. In the counterfactual where there are no exclusive territory contracts, the threat of an immediate rival entrant with the AP mostly cancels out any gains these incumbents would have had from increased network value and decreased network cost from UP exiting. On the other hand, under a counterfactual where the AP can maintain its exclusive territory contracts *and* operates as a monopolist news agencies, the profit of member newspapers would have increased by approximately 10%. Yet, this scenario never realized due to UP's existence as AP's rival.

FIGURE 10: INCUMBENT NEWSPAPER PROFIT

Panel A: Overall Incumbent Profit Changes



Panel B: Heterogeneity in Profit Changes



Note: This figure demonstrates the change in incumbent newspaper profit over time across counterfactual legal regimes relative to the baseline regime. Incumbent newspaper profit is calculated as the average total profit for newspapers who were Associated Press members as of the start of the study period. Panel A denotes the overall changes for AP incumbents. The green line denotes the baseline regime. The black line denotes a counterfactual where there are no exclusive contracts and United Press exits. The orange line denotes a counterfactual where exclusive territory contracts are in place, there are no exclusive dealing contracts, and United Press regardless exogenously exit at the beginning of the study period. Panel B breaks down the profit change by quantiles across AP incumbents in a counterfactual where there are no exclusive contracts. The red, green, and blue lines show the 25th, 50th, and 75th percentile of profit change among AP incumbents respectively.

I further highlight the importance of accounting for equilibrium network competition and their effects on consumer surplus in Figure 11. In the counterfactual without exclusive territory contracts, consumer surplus increases by approximately 4%. This gain is the result of increased newspaper competition but is limited by the duplication of news agency fixed cost and the splitting of network effects across the AP and UP. Importantly, the counterfactual where the AP is a monopolist news agency with exclusive territory contracts represents the worst case scenario for consumers, with a decrease in surplus of approximately 12% over time relative to the baseline. Once again, the existence of upstream competition between the AP and UP significantly dampened harms to consumers from exclusive territory contracts.

FIGURE 11: CONSUMER SURPLUS

Note: This figure demonstrates the change in consumer surplus over time across counterfactual legal regimes relative to the baseline regime. Consumer surplus is calculated as the average population-weighted reader utility given their utility-maximizing choice across representative markets. The green line denotes the baseline regime. The black line denotes a counterfactual where there are no exclusive contracts and United Press exits. The orange line denotes a counterfactual where exclusive territory contracts are in place, there are no exclusive dealing contracts, and United Press regardless exogenously exit at the beginning of the study period.

8 CONCLUSIONS

I analyze exclusive vertical contracts in network industries, focusing on early 20th-century U.S. news agencies. I find that while the Associated Press (AP) aimed to establish local newspaper monopolies with exclusive territory contracts, it unintentionally aided the growth of their primary rival, United Press (UP). I develop a structural model of news agencies and estimate it using historical data. I identified strong natural barriers to entry for news agencies due to economies of scale and network effects. Counterfactual simulations show that exclusive territories protected downstream newspaper monopolies but incentivized upstream news agency competition. Exclusive dealing contracts have the opposite effects.

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APPENDIX A: NOTATION

TABLE 10: MODEL NOTATION

Use	Symbol	Meaning
Indexing	m,M	markets and the set of markets
	t, T	periods and the last period
	j, J	newspapers and the set of newspapers
	i, I	households and the set of households
	w	news agencies
	n	nests in demand
Reader demand	u	reader utility
	p	annual newspaper price
	W	bundle of news agency subscriptions
	$g(W)$	value of news agency subscriptions to readers
	X	market-level demographics
	α	price coefficient
	γ	demographics coefficients
	$\overline{\xi}$	time-invariant unobserved newspaper quality
	ξ	time-variant unobserved newspaper quality
	σ	nesting coefficient for newspaper demand
	ϵ	idiosyncratic reader preferences
	β	news agency value coefficients
	s	newspaper market share
Advertising demand	a	per-reader advertising revenue
	λ	advertising revenue coefficients
	ι	idiosyncratic newspaper advertising value
Pricing	v	per-period newspaper variable profit
	MC	newspaper marginal costs
Entry and Subscription	$Prob$	mover selection rule for incumbents
	$\overline{W}$	set of news agency subscriptions available to the mover
	τ	annual payments from newspaper to news agencies
	δ	discount factor
	Ω	market states
	η	idiosyncratic choice logit shock
	ρ	nesting coefficient for entry choices

Online Appendix A: News Agency History

In this section, I describe the history of American news agencies. A complete history of news agencies is necessarily outside the scope of this paper. I direct interested reader to the historical appendix for references that relate to the aspects of news agencies that referred to in this paper. Readers interested in the early technology of the electric telegraph and its effect on news content will find an excellent summary in Wang (2023). John (2015) provides a history of exclusion in American telecommunication networks in general. Silberstein-Loeb (2014, 2012) studies the legal history of the news agencies' exclusive contracts.

The Associated Press (AP) In 1856, the New York Associated Press (NYAP) was established as the earliest precursor to the current Associated Press (AP). Its non-profit cooperative structure can be traced back to its early days when newspapers pooled resources to hire boats in the New York harbor to collect news from arriving vessels (Rosewater 1930). A personal relationship with Abraham Lincoln allowed it exclusive access to the Union's war bulletins which contributed to its rise to prominence. Significant demand for news and additional costs due to coverage of the Civil War and the ensuing Spanish American War led to considerable upheavals in the news agency business. By the end of the 19th century, the Associated Press, now having re-established in Illinois, emerged as the dominant American news agency (Blanchard 1987).

In reaction to the Illinois Supreme Court decision Inter-Ocean Publishing Company. v. Associated Press (1900) which found the AP's ongoing exclusive contracts in restraint of trade as long as it remained an Illinois corporation, the AP decided to "consequently [...] discontinue business and wind up its affairs" in the state of Illinois and reincorporated into a new corporation in New York with an identical name and member list (Associated Press 1901).[30] I regard 1900 as the entry point of the modern iteration of the AP in this paper and thus the beginning of the period of study. The AP continues to be the predominant American news agency today.

United Press (UP) The year 1907 saw the inception of United Press (UP) from a merger of three newspaper chains Scripps-McRae, Scripps-Blades, and Publishers' Press Association (Benét 1933; Morris 1957).[31] The family of E. W. Scripps and its associates owned these newspaper chains.

From the outset, UP's primary intent was to serve newspapers who could not get AP service. In a 1912 private letter to UP's General Manager Roy Howard, Scripps claimed that he "wanted to make it possible for any other man to found a newspaper in any city of the Union."[32] This seemingly altruistic desire was also rooted in a practical problem: several of Scripps' newspapers were not welcome in the AP due to existing exclusive agreements.

[30] In 1900, the AP's legal counsels found that the only way to maintain exclusive contracts was to restart the AP as a non-profit under New York's "Membership Corporation Law." The state passed this law in 1895 with the intention to provide for the incorporation of medical and college alumni societies (State of New York 1918). The AP remains a non-profit to this day.

[31] UP's full name initially was "United Press Association." The organization of interest bears no relation to another short-lived news agency also named "United Press" that went out of business in 1898. UP's morning operation was initially called "United News" until it was brought under the same umbrella.

[32] For details on the source of these letters, please see the appendix.

Scripps matched his verbal commitment to the UP by a financial one. In his letter to Howard, Scripps revealed that he had initially covered "the whole expense of paying for the cables and gathering news from all over the country" and bailed out the Publishers' Press Association's debts with $150,000 (roughly $285k in 1928 or $5m today). A series of letters in 1912 between UP's proprietors deliberating on the organization's valuation reveals that UP is only breaking even because of a "large subsidy" from Scripps.

These letters motivate two important factors in my analysis. First, they reveal that UP needed a large subsidy in order to cover its costs in 1912. This is in line with evidence that UP's overall cost was very high relative to its membership. Drawing from observed expenditures submitted as evidence to AP v. US (1945), I find that UP's expense per member in 1912 was more than twice as much as the AP, while their assessments were roughly similar. Second, it reveals that UP's proprietors had a scrap value: internal valuations of UP stock in 1912 ranged from $75,000 to $600,000 (this upper bound is $1m in 1928 or $19 million today). These two factors lead me to conclude that any potential revenue shortfall the UP might have faced in the counterfactual would need to be offset by additional support from Scripps, and that a revenue shortfall beyond the upper bound of $1m would have led to UP's exit.

UP eventually gained scale to compete with the AP and was treated as one of the three domestic news agencies by AP v. US (1945). The post-war entry of television and the general decline of newspaper advertising revenues saw UP merged with INS to form United Press International (UPI) in 1958 (Angelucci, Cage, and Sinkinson 2023). Despite this merger, UPI struggled financially and relied heavily on a cross-subsidy arrangement with the far more lucrative United Features Syndicate which owned the comic strip "Peanuts." The decline of UPI in the late 1970s echoed the broader downturn in the American newspaper industry. Ultimately, by 1982, its value had diminished so much that it was sold for a mere dollar. (Cohen and Gordon, 1900).

INTERNATIONAL NEWS SERVICE (INS) The International News Service (INS) was established in 1910 as an arm of the Hearst newspaper conglomerate. Originally, its primary role was to manage the Sunday comics business, but it soon expanded to serve Hearst-owned newspapers as a full-fledged news agency (Nasaw 2013).

However, rather than being a direct commercial rival to the AP and UP, INS mostly functioned as a medium for Hearst to broadcast his viewpoints (Rosewater 1930). For example, the firm's distinct pro-German stance led to it being banned from Allied cables during the first World War. The substantial deficits INS ran, notably $400,000 in 1919 (or approximately $7.5m today; Schwarzlose 1989), further underscores its non-commercial purpose. Given this history, I have chosen to treat subscriptions to the INS and its growth as independent of the AP and UP which are distinctly commercial entities.

ONLINE APPENDIX B: UNITED PRESS ASSESSMENTS

In this section, I discuss UP's method of calculating assessments on newspapers. My knowledge of the UP's comes primarily from two documents.

The first document includes minutes and exhibits from the "United Press Rate Setting Committee" held in November 1912, hereby referred to as *Minutes*. The committee was appointed by the Scripps newspapers and the Board of UP in order to propose a method for calculating assessments

on UP members broadly and Scripps newspapers specifically. At this time, Scripps newspapers contribute over 24% of total receipts of United Press.

The second document is a memo prepared in 1913, titled "System for the Determination of a Proper Basis of Charges for United Press Clients," hereby referred to as *Memo.* This memo was created as a result of the rate setting committee, as the original committee struggled to decide on a cost apportioning method given "the impracticability of adopting any of the [present suggestions]."

The assumption that UP calculates the cost of an additional member in a similar fashion to that of the AP is supported by the following statements:

- The formula for calculating the cost of an additional member depends on a similar method as the AP. Overhead charges (total news collection by the organization and administrative cost) is divided across clients "irrespective of geographical location" . The cost of the trunk line is also divided independently of geographical location as "all clients are [...] dependent upon, and should pay their faire (sic) share of the cost of maintaining a trunk line of communication from Coast to Coast." The cost of the local circuit is divided by members in that circuit: "all wire and operating cost, exclusive of Trunk Line Charges, should be divided equally among the Clients in each zone." (Page 2 of *Memo*)

The assumption that UP does not engage in strategic pricing is supported by the following statements:

- UP did not expect to lose money initially on new members: "[Board member] Rickey asked what percentage of profit the UP should retain, ultimately, as a "goal." Mr. Howard thought 15% and saw no reason why it should not. [...] The profit-making feature [of the UP] was an asset in getting clients." (Page 6 of *Minutes*)

- UP did not price discriminate by local market structure. The organization also used "rate cards" based on the market's exogenous characteristics: "It shall be left to the management of the UP and the management of each individual group to determine a card rate for the United Press service to possible non-Scripps clients in each individual city of that [region]. (Exhibit F of *Minutes*).

- UP was unable to turn a profit at the beginning or even in the long run. Scripps said, as quoted in Morris 1957: "[...] in founding the new UP, the Scripps papers actually paid out several hundred thousand dollars more than they would have paid out had they been members of the AP. However, notwithstanding these comparatively large payments, I felt that the investment, bad as it was financially in one way, was a good one beacuse it secures freedom from the temptation of one huge monopoly." At the time of the merger with INS, a UP executive told *Editor and Publisher* that "Both agencies operated under low profit margins for many years."

Online Appendix C: United Press Scrap Value and Subsidies

In this section, I discuss the evidence surrounding the scrap value of the United Press in 1912 and 1913. Here, I describe a series of letter in Roy Howard's Archive:

First, in a letter dated August 15, 1912 to James G. Scripps (E.W.'s son), Howard asks to discuss a "proper valuation of the United Press property." Howard then wrote to J. C. Harper

(general counsel for the E. W. Scripps Company) dated August 9, 1912, asking "to know just what in your opinion this United Press stock is worth." In this letter, Howard mentioned that it would be "absurd to regard the United Press" as worth $700,000.

In a reply to Howard dated August 13, 1912 by Harper, he stated that UP "has no tangible property" and alludes to UP being a going concern purely because of a large subsidy by the Scripps organization:

> If certain Scripps' papers paid to the UP on the basis that non-Scripps papers pay, or on the basis that their competitors pay the AP, how much of UP profit would be left? [...] You know that E.W. Scripps and James G. Scripps both recognize that the payment that certain papers made and are now making to UP is excessive. [...] I submit, therefore, that [...] UP is a subsidized concern.

He countered that even $600,000 would be too high that he "doubt[s] whether [he] would want to pay that figure." Given these discussed figures, I use $600,000 (1912 dollars, approximately $1m in 1928) as the scrap value for UP in 1912.

Since United Press was heavily subsidized, it is plausible that the Scripps family could increase the subsidy to cover the fixed cost of the organization in an event of membership loss. A letter dictated April 26, 1920 by E. W. Scripps to T. L. Sidlo (general counsel for the Scripps media conglomerate starting 1916) states that E. W.'s newspaper estate is inventoried at $8m and that of his sister Ellen B. Scripps' is at $4m. I use this figure as the maximum plausible additional subsidy by the Scripps family into United Press.