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ABSTRACT

A free and informative press is widely agreed to be crucial to the democratic process today. But throughout much of the nineteenth century U.S. newspapers were often public relations tools funded by politicians, and newspaper independence was a rarity. The newspaper industry underwent fundamental changes between 1870 and 1920 as the press became more informative and less partisan. Whereas 11 percent of urban dailies were "independent" in 1870, 62 percent were in 1920. The rise of the informative press was the result of increased scale and competitiveness in the newspaper industry caused by technological progress in the newsprint and newspaper industries. We examine the press coverage surrounding two major political scandals – Crédit Mobilier in the early 1870s and Teapot Dome in the 1920s. The analysis demonstrates a sharp reduction in bias and charged language in the half century after 1870.

From 1870 to 1920, when corruption appears to have declined significantly within the United States, the press became more informative, less partisan, and expanded its circulation considerably. It seems a reasonable hypothesis that the rise of the informative press was one of the reasons why the corruption of the Gilded Age was sharply reduced during the subsequent Progressive Era.

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"Burke said there were Three Estates in Parliament; but, in the Reporters' Gallery yonder, there sat a *Fourth Estate* more important far than they all. It is not a figure of speech, or a witty saying; it is a literal fact … Printing … is equivalent to Democracy … Whoever can speak, speaking now to the whole nation, becomes a power, a branch of government, with inalienable weight in law-making, in all acts of authority. It matters not what rank he has, what revenues or garnitures: the requisite thing is that he have a tongue which others will listen to; this and nothing more is requisite."

Thomas Carlyle, *On Heroes, Hero Worship, and the Heroic in History*
(1993 [1841], p. 141, emphasis in original)

I. Introduction

At the start of the twenty-first century, a free and informative press is widely agreed to be crucial to the democratic process. Now-legendary episodes, such as the press' exposure of the Watergate break-ins, buttress the view that the press can make a difference. When allegations of distortion or political bias in media are made (e.g., Goldberg 2001), they are greeted with hand-wringing and are viewed as a threat to government, even to society as a whole.

But from a historical perspective, the remarkable thing is not that the media remains somewhat biased, but rather that there is now an expectation that the press will provide unbiased information. At the start of the Republic, newspapers such as the *Aurora* were little more than public relations tools funded by politicians. In the nineteenth century, independence was a rarity. As late as 1870, 89 percent of urban dailies that covered political events proudly acknowledged their affiliation to one of the political parties.[1] Information hostile to a newspaper's political viewpoint was either ignored or dismissed as sophistry. Indeed, typical nineteenth century news items seem more partisan than even the most rabid modern editorials. Today's media retain biases, but they are modest relative to the advocacy that was the norm of the nineteenth century.

This paper concerns the causes and consequences of the rise of the informative press, a potent check on corruption. In Section II we document the evolution of media bias using three types of evidence. First, we construct a basic measure of bias: stated party affiliation.[2] While stated political independence is no guarantee of independence, stated party affiliation is surely a

[1] The earliest data on newspaper party affiliation come from the 1850 Population Census of Social Statistics. About 85 percent had an affiliation, not much different from data on urban dailies in 1870.
[2] The use of party affiliation as a measure of bias is similar to that in Hamilton (2004).

guarantee of bias. The share of political newspapers that claimed to be independent rose from 11 percent in 1870 to 62 percent in 1920.[3] Another measure of bias is the use of charged language by the press. Negative words such as "slander," "liar," and "villainous" are used by papers to dismiss undesirable statements; words such as "honest," "honorable," and "irreproachable" are used to defend political heroes. Using textual analysis, we find a substantial drop in partisan and charged language across the late nineteenth and early twentieth centuries.

Because these aggregate measures are inevitably coarse, we also examine the press coverage of two major scandals in depth: the Crédit Mobilier scandal of the early 1870s and the Teapot Dome scandal of the 1920s. Our findings here clearly support the results of the textual analysis: "spin," as measured by charged language and editorializing in news stories, was common in the coverage of Crédit Mobilier but was negligible during Teapot Dome. We also find subtler differences in media behavior between the two scandals. During the earlier scandal, many Republican papers omitted the critical early news that might have cast aspersions on their own party. When these papers eventually did print or acknowledge the stories, they were coupled with violent derogation of Democratic sources. By the 1920s Republican papers no longer coupled allegations of the corruption of their party members with condemnation of the character of the person making the charge. Although stories were still suppressed even during the 1920s, the growth of independent newspapers meant that most urban residents had access to the story.

After documenting the rise of the informative press, we turn to the causes of this change. In Section III we follow Besley and Prat (2004) and present a supply-side model suggesting that newspapers weigh the rewards of bias—politicians' bribes or personal pleasure—against the cost of bias—lost circulation from providing faulty news. The key predictions of the model are that, as the size of the market for newspapers rises, and as the marginal cost of producing a paper falls, newspapers will become less biased and invest more in gathering information. The model also suggests that increased competition may further reduce bias.

[3] The 62 percent figure uses an inclusive measure of independence which includes papers that were listed as Independent-Republican or Independent-Democrat. The less inclusive measure is 40 percent.

In Section IV, we present evidence suggesting that the rise of the informative press was the result of increased scale and competitiveness in the newspaper industry and that technological progress was the cause of these changes. We document the great increase in circulation, the rise in scale, and the overall rise in competition. We also provide evidence showing a link between these trends and the cost of newsprint and newspaper production. Finally, we provide some evidence linking the rise in the independents to growing news markets. We focus on the share of newspaper circulation that claimed to be independent and find that this share increased most rapidly in cities that had the largest increases in population.

II. The Rise of the Informative Press

The informative press emerged sometime between the 1870s and the early 1900s. We present information on the transition using three sources on bias and factual content of newspapers. The first is the number of newspapers that claimed to be independent, rather than being politically affiliated. The second is a time series of words in newspaper articles that suggest a decline in argumentative hyperbole, as opposed to reasoned presentation of facts. Finally we study newspaper reporting of two of the biggest national scandals in American history: Crédit Mobilier in the 1870s and Teapot Dome in the 1920s.

A. The Growth of the Independent Press

Although the assertion of "independence" by a press does not imply unbiased reporting, an outright declaration of party affiliation does seem to assure a political slant to the news. Throughout the mid-nineteenth century, the vast majority of newspapers were explicitly affiliated with one of the major political parties. Some were directly supported by a party, whereas others were supported by patronage positions, such as postmaster, and contracts with the government to print materials.

Few newspapers before 1830 did not have some financial connection to a political party

or a political office holder or office seeker.[4] Many of the pre-Civil War presses were bully-pulpits for political bosses. Take Thurlow Weed for example. He apprenticed as a printer, worked for the *Rochester Telegraph*, and then bought the newspaper, which he used to support his candidates. He soon set his sights higher and took charge of the *Albany Evening Journal*, a Whig party paper backed by the Anti-Masonic party. He used the paper to support Seward for New York State governor in 1838. Together with another well-known editor, Horace Greeley, he successfully worked to elect President Harrison in 1840 (Emery and Emery 1992, p. 104).

Newspapers today vehemently deny that they deliver anything but fair and balanced reporting. Such arguments were rarely heard during much of the nineteenth century, for newspapers never claimed to deliver the unvarnished truth. To the contrary, they proclaimed their close affiliation with one of the two major political parties.

In 1870, 89 percent of all dailies in the larger American cities had an explicit party affiliation.[5] Only 11 percent were identified as independent.[6] The independents were among the larger papers and they accounted for 26 percent of circulation in 1870. Still, the overwhelming majority of news was delivered by papers that were openly partisan.

To explore these and other changes in more detail, we have collected data on newspapers in the largest American cities between 1870 and 1920.[7] The data include any city that was among the largest 100 in any decennial census year during the period, for a total of 152 cities. Table 1, part B shows that the share of dailies that were independent increased from 11 percent

[4] Political parties before the 1830s, according to Cook (1998), financed the press through direct patronage (e.g., printing contracts). Although the government was initially a "sponsor" of the press, it later "subsidized" it through low postal rates. On political subsidies and when the independent press emerged, see also Kaplan (1993). Schudson (1978) contains a history of the informative content of the press and Summers (1994) discusses the transition from a partisan to an independent press.

[5] Throughout the paper, we exclude dailies that had a primary focus other than general-interest news (e.g,, financial, fashion, theater, gardening periodicals). We also exclude in the Table 1 tabulations the minor political parties.

[6] In the newspaper directories from which our data are drawn, newspapers were listed by party affiliation, including Independent, and after 1870 were also classified as Independent-Republican or Independent-Democrat. We have constructed two definitions of independent: a broad one that includes all three and a narrow one that includes only the Independent.

[7] Our data set expands Hamilton's (2004), which he kindly gave us. The details of the construction of this dataset are given in Appendix A.

in 1870 to 62 percent in 1920 (or to 40 percent using the narrower definition of independent). The share of circulation accounted for by independents rose from 26 percent in 1870 to 73 percent a half-century later (line 6). The largest increase occurred during the first and the last decades of the period—the 1870s and the 1910s. Independent papers were anomalies in 1870 but 50 years later they had become the norm. The change occurred for several reasons: previously affiliated papers became independent and new newspapers chose independence rather that political affiliation.

The switch to independence does not necessarily imply a lack of bias, and many nominally independent papers revealed extreme political bias on occasion. Still, the fact remains that in 1870 papers trumpeted their bias and by 1920 they at least pretended to be unbiased. The image of independence had become a valued asset.

B. The Decline of Partisan Content

We now turn to the content and rhetoric of the news to determine whether the rise in declared independence was matched by comparable changes in reporting. Certain words are far more likely to appear in factually vacuous articles than in those that soberly report a fact. For papers on the defensive side of the issue these words include "lie" and its many synonyms.[8] The rhetoric on the offensive side uses the editorializing first person plural. A healthy intrusion of "we" into the text indicates that the newspaper is editorializing in the main body of the news.

Newspaper coverage of the famed Crédit Mobilier scandal of the 1870s, one of our case studies, provides illustrations of both types of bias. According to the Republican (thus on the defensive), *Albany Evening Journal*:

> "The *Credit Mobilier* libel is the latest but not probably the last lie which the 'truck and dicker' gentry will issue during the campaign. The libel was invented by knaves but it is retailed by fools." (September 16, 1872)
>
> "The answer of Vice-President Colfax to the Credit Mobilier slander is manly and dignified. There

[8] See Appendix B for a list of the synonyms we have found in the 1870s.

> was no need, however of any reply to this infamous calumny from him or from the others … It is one of the infamies of this campaign that the supporters of Greeley stop at no outrage, however atrocious, at no falsehood, however monstrous, at no stab at character, however, dastardly …"
> (September 26, 1872)

The first instance of the story as reported by the Republican *Philadelphia Evening Bulletin* contains six sub-headlines including: "Political Slanders," "How Leading Republicans are Vilified," and "The Whole Thing Proven to be False," and the story began with: "The attempt to fasten the charge of bribery … has already been shown to be utterly untrue" (September 14, 1872). This heavily rhetorical style of writing was the norm, not the exception, during most of the nineteenth century.

At the other end of the political spectrum were the anti-Grant papers, which spun their stories with the editorial "we." "At last *we* have one more utterance on the Crédit Mobilier scandal … Mr. Wilson denies … But … *we* know what his word is worth," wrote the *New York Tribune* (September 16, 1872, italics added) a Republican, anti-Grant newspaper. Some of the independents, such as the *Baltimore Sun*, wrote factual stories with little spin. But the *New York Sun*, also an independent, broke the story to the American public using six sub-headlines including: "THE KING OF FRAUDS," "COLOSSAL BRIBERY," "Congressmen who Have Robbed the People, and who now Support the National Robber," and "HOW SOME MEN GET FORTUNES."

By using a search engine capable of searching across several hundred electronically scanned newspapers, we are able to explore a wide range of newspapers for particular words to see if their use rose or fell over the period.[9] To deflate for the general amount of reporting we divide the number of instances that a word appears by the same for the neutral word "January."[10]

Among the various synonyms for "lie," we have chosen "slander" to use in the search and

[9] We use Ancestry.com. Although several hundred newspapers are stored at this site, the number in the years we use ranges from about 10 in the 1840s to 50 for most of the period after the 1880s. The newspapers, furthermore, are almost all from small towns and only occasionally include a big-city newspaper. The search engine counts a "hit" if a word is found at least once on a page. Other search engines, such as Proquest, count a "hit" if a word is found at least once in an article.

[10] To deflate for reporting that is political, we have also use the number of all words beginning with "politic." We do not report those time series in Figure 1 because they reveal similar time trends.

at the opposite extreme in rhetoric we have used the word "honest."[11] Figure 1 shows the time path of "slander" and "honest" (using a 3-year centered moving average) from 1850 to 1950 deflated by the word "January" The use of the word "slander" indicates editorial intervention and the aim of discrediting an opposing view whereas "honest" is used to build respect.

Allegations of "slander" abounded in the 1850s, the start of the period depicted in Figure 1, when the word appeared about 1/12 as often as the word January. By the 1880s, however, the relative usage of "slander" had begun to decline, and by the 1920s "slander" appeared just 1/30 as often as our deflator word. Similarly, the word "honest" declined in usage by about one-half from the late nineteenth century to the 1920s. The highly opinionated style of reporting that was common in the 1870s had became uncommon by the early twentieth century.

As interesting and suggestive as are these facts, they report broad trends with many possible interpretations. To assess the degree to which the bias and information content of the news media changed, we turn to detailed case studies of the Crédit Mobilier and Teapot Dome affairs.

C. Case Studies of Political Scandal Reporting

In the pantheon of national political scandals in the United States a few stand out as momentous. Of these, we have chosen two that are separated by exactly 50 years and span the period of greatest expansion in national daily newspaper circulation per capita and in the number of daily newspapers (see Figure 2). The first of these scandals has become known as Crédit Mobilier and was exposed to the public in September 1872. The second has been called the Teapot Dome affair and was initially revealed in April 1922.

To understand how corruption scandals were reported by different types of newspapers and how their reporting changed over time, we have chosen 19 daily newspapers. Of these, 17 existed during the Crédit Mobilier scandal and 17 existed during the Teapot Dome affair. The newspapers selected include most of the major presses in America, but we have also made an

[11] We traced all words beginning with "slander" (e.g., slanderous) and all words beginning with "honest."

effort to obtain papers from cities that were small, distant from the center of national political activity and that had only one daily (see Appendix B, Table B3).

We have obtained every article covering the events during two critical periods in their history and have coded them to establish: (1) whether particular "facts" were reported; (2) the size, in column inches, of the stories printed; (3) the degree of "spin"; and (4) the timeliness of reporting the facts. "Spin" is measured in two ways. The first counts the number of times the word "lie" and its various synonyms appeared in the first two paragraphs of each article (scaled by the number of articles). The second counts the number of times the first person plural (in any form; as in "we believe") was used in the first two paragraphs (also scaled by the number of articles). The first form of "spin" is anticipated to have been used more by the papers on the "defensive," whereas the second form of "spin" would be expected to be used by those on the offensive. In both cases, "spin" is an editorial ploy and departs from factual reporting.

Because both of the scandals lasted for years—the Teapot Dome affair was not finalized until 1928—we have chosen two relatively brief periods for each scandal. The first period is several weeks around the "breaking news" of the story. The second is an equally brief period when an important detail or decision was announced. We call this the "resolution" period.

Both the Crédit Mobilier and Teapot Dome scandals were complex events and, to this day, have unresolved or undisclosed aspects. We have compiled various indisputable facts concerning the cases and study how these facts were reported by the various presses.

Crédit Mobilier

Crédit Mobilier was an independent corporate entity, set up as the construction arm of the Union Pacific Railroad, part of the great transcontinental railroad. Since stock in the Union Pacific Railroad was widely held, skimming off contracts by the Union Pacific would not greatly benefit particular individuals. But Crédit Mobilier was neither widely held nor traded. The Crédit Mobilier scandal concerned a Congressman, Oakes Ames, whose financial stake in Crédit Mobilier led him to use stock of that company to bribe (or reward) other government officials.

The Crédit Mobilier scandal was broken by the *New York Sun* on September 4, 1872 with the publication of a letter, dated January 28, 1868, purportedly written by Congressman Oakes Ames of Massachusetts to one Colonel Henry McComb. The letter contained a list of names, including current Vice President Schuyler Colfax who had been a Congressman in 1868, ten Representatives, and four Senators, to whom Ames had sold stock in Crédit Mobilier, placing the Crédit Mobilier stock "where it will produce the most good."[12] Among the list was James Blaine (Congress, R-ME), current Speaker of the House, James Garfield (Congress, R-OH), later to become President, George Boutwell (Congress, R-MA), current Secretary of the Treasury, Henry Wilson (Senate, R-MA), the current Vice Presidential candidate on the Grant ticket, and the chairs of most of the important House committees, including Ways and Means. Although the historical record established that Ames actually "sold" the stock, rather than gave it, to at least some of the individuals mentioned, the share price was approximately equal to the dividends paid out in just one year. Of great importance is that all but one was a Republican and a supporter of President Grant.

Oakes Ames and his brother had been major investors in the Union Pacific and were part of a group that held stock in Crédit Mobilier. Because the Union Pacific had received large grants and loans from the federal government and in 1868 appeared to need more, the letter from Ames to McComb in January 1868 suggested that Ames was shoring up further support, or was rewarding his friends for past deeds.

McComb had revealed the letter to the *Sun* after a protracted legal and financial battle with Ames over the disposition of some Union Pacific stock. The timing of the revelation was of immense national importance since the 1872 presidential campaign between incumbent Grant and his challenger Horace Greeley had just begun to heat up. Greeley, moreover, was the founder of both the *New Yorker* and the *New York Tribune*, which he had once edited.

Sometime after the revelation of the letter, the House and Senate appointed committees to investigate the charges. That in the House was chaired by Representative Luke Poland (R-VT),

[12] The quotation is from the letter, as reported in the *New York Sun* and many other newspapers.

whereas that in the Senate was chaired by Senator Justin Morrill (R-VT). The Senate also appointed a committee, chaired by Senator Henry Wilson (one of those implicated in the Crédit Mobilier affair), to investigate the financial activities of the Union Pacific and Crédit Mobilier. In February 1873 the Poland and Morrill committees reported. The Poland Committee recommended that two representatives (Ames and Brooks, the only Democrat involved) be censured and expelled. The House censured but did not expel both, and the Senate voted to expel Paterson.

We have compiled a group of nine "facts" for the "breaking news" period of September 4-30, 1872 (see Appendix B, Table B1). The first fact is the letter from Ames to McComb. The remaining eight facts are denials from the various officials named in the letter. The "resolution" period, from February 14-28, 1873, contains eleven "facts" concerning the Congressional committee hearings and final reports.

Teapot Dome

The scandal that became known as "Teapot Dome" was innocuously broken by the *Wall Street News* (now the *Wall Street Journal*) which reported on April 7, 1922 that the U.S. government had leased lands near a place called Teapot Dome in Wyoming, one of the naval oil reserves, to Harry F. Sinclair of Mammoth Oil. Another naval reserve, in Elk Hills, CA, was also leased for oil exploration. The odd aspect of the leases was that naval oil reserves were under the jurisdiction of the Navy Secretary, Edwin Denby, yet the Interior Secretary, Albert Fall, approved the leases (both were Harding appointees). A week later the Senate called for hearings on the Sinclair lease.

Evidence suggesting an actual scandal erupted in late January 1924 when Edward Doheny, the head of the oil company that had received the Elk Hills lease, revealed that he had given Albert Fall an unsecured loan of $100,000 just prior to the oil deal. Harry Sinclair, the head of Mammoth Oil, also revealed, through his lawyer, that he had given Fall a loan just after the Teapot Dome lease. The resolution of the Teapot Dome affair took until 1928 when Albert Fall was found guilty of accepting a bribe. Fall had already resigned from office in March 1923

and Edwin Denby, the Secretary of the Navy, was forced to leave his position in March 1924.

We have compiled a list of eight facts for the "breaking news" period, April 7-30, 1922. These facts mainly concern the existence of the oil lease, its terms, the justification by the Navy and Interior Secretaries for the lease, and Senate action on oil leases. The resolution period, January 21-28, 1924, contains nine facts concerning the revelation about the loans from Doheny and Sinclair to Albert Fall. See Appendix B, Table B2 for a list of the facts for both periods.

Coverage of Crédit Mobilier by the press

For the three-week "breaking news" period of Crédit Mobilier we have identified 224 articles in the 17 newspapers, and in the two-week "resolution" phase we have found 543 articles among the same group of newspapers.[13] We have coded the articles with respect to the four characteristics: (1) size, (2) facts, (3) "spin," and (4) timeliness (see Appendix B on the coding). The results are summarized by affiliation of the newspaper in Figure 3. Of the 17 papers, eight were aligned with President Grant and the Republican Party, five were either aligned with the Democrats or were anti-Grant Republican papers, and four were listed as Independent.[14]

In the "breaking news" period of the scandal the relative size of articles was considerably smaller in the pro-Grant (or "Republican but not anti-Grant") papers than in the others and the number of facts was somewhat smaller (see Figure 3A, 1872).[15] The "spin" was extremely different between the two types of papers. The pro-Grant papers made use of the word "lie" and its synonyms with far greater frequency in the "breaking news" period, whereas the Democratic

[13] These articles were "found" by our extraordinary research assistants, especially Magali Fassiotto, who scanned the microfilm. Only the *New York Times* and the *Wall Street News* could be used electronically with optical character recognition software.

[14] Affiliations are from newspaper directories (see Appendix A) and newspaper histories. The two Republican, anti-Grant newspapers are the *New York Tribune* and the *Chicago Tribune*.

[15] The mean number of column inches devoted to the story (expressed as a fraction of the total size of the newspaper and multiplied by 10) was .110 for Republican papers, .425 for Democratic and anti-Grant papers, and .992 for Independent papers. The mean percentage of key facts reported was .542 for Republican papers, .689 for Democratic and anti-Grant papers, and .667 for Independent papers. The Democratic papers of the two lower South cities, Galveston and New Orleans, were exceptions to this pattern as they provided relatively less coverage of the scandal.

and anti-Grant papers used the editorial "we" with greater regularity (see Figure 3B, 1872).[16]

When the letter from Ames to McComb was revealed by the *New York Sun* on September 4, 1872 it was viewed by many as mere political chicanery on the part of the Greeley campaign. For the entire period considered (September 4-30, 1872), fully five papers, all Republican, never reported the existence of the letter but simply alluded to it. The remaining four Republican papers were about two weeks late in reporting (see Figure 3C, 1872). In contrast, the Democratic and nonaligned papers reported the *Sun*'s publication of the letter more rapidly. The rest of the "facts" for the "breaking news" period were reported with about equal speed by all types of presses, but with different "spin," since they were denials by various officials. Thus, the timeliness of the first fact differed greatly between the two groups of papers even though the fraction of "breaking news" facts reported was about equal by political affiliation.

Differences in factual coverage among the various types of papers during the "resolution" phase of the story were not as great as in the "breaking news" period. The pro-Grant papers reported the facts with the same frequency as did the other papers. But other differences remained. The Republican papers gave considerably less room to the complete story and printed less of the Congressional testimony (Figure 3A, 1873).[17] The "spin" of the papers switched. In the "resolution" phase the pro-Grant papers used the editorial "we" whereas the others proclaimed more "lies" (Figure 3B, 1873).

In sum, newspapers in the 1870s had just begun their transition from being highly politicized organs, as they were in the ante-bellum era, to being more independent of political parties. When the Crédit Mobilier scandal broke, Americans in some parts of the country did not hear about it for weeks, and even when they were told the news, the "facts" were distorted for many. Distortions came about for several reasons, among them is that many papers were

[16] The average frequency with which "lie" occurred (expressed as number of occurrences in the first two paragraphs per article) was 1.591 for Republican papers, 0.288 for Democratic and anti-Grant papers, and 0.463 for Independent papers. The frequency of "we" was 0.424 for Republican papers, 0.715 for Democratic and anti-Grant papers, and 0.419 for Independent papers.

[17] The average space devoted to the scandal (expressed as a fraction of the total size of the newspaper multiplied by 10) was 0.688 for Republican papers, 0.919 for Democratic and anti-Grant papers, and 2.584 for Independent papers.

geographically removed from the nation's political and commercial centers and facts were still expensive to gather. The telegraph and wire services had cheapened the cost of gathering news, yet it was still an expensive proposition. Most of the distortion, however, came about because of the political alignment of the press.

Coverage of Teapot Dome by the press

For the two-week "breaking news" period of Teapot Dome we have identified 104 articles in the 17 newspapers, and in the week-long "resolution" phase we found 381 articles among the same list of newspapers (see Appendix B, Table B2). We have coded these articles, as we did the others, with respect to (1) size, (2) facts, (3) "spin," and (4) timeliness. The results are summarized by affiliation of the newspaper in Figure 4. In the 1920s there were eight Republican newspapers, five Democratic papers, and four independent ones (including the one financial press—the *Wall Street News*, which broke the story).

By the 1920s American newspaper writing had come to look very much like the fact-based reporting of major newspapers we read today. As opposed to the 1870s, stories in the 1920s were factually reported when they were printed. "Spin" was not evident. In fact, we could not code "spin" by newspaper for the 1920s since we found practically no use of the word "lie" and of the editorializing "we." We did, however, find other ways in which reporting differed by type of newspaper.

During the "breaking news" period of the Teapot Dome scandal in 1922, all but one of the non-Republican newspapers printed more than one-half of the facts (the *DC Star* is the lone exception; see Figure 4, part A). Four of these papers printed three-quarters or more of the facts. Not only did these papers print the stories, but they also did so in a relatively timely fashion and devoted considerable space to the stories. By contrast, the Republican newspapers failed to print many of the stories. Albany, Philadelphia, and Waterbury, for example, printed no stories on the subject of oil leases during the more than two-week period after the *Wall Street News* published the story on the Teapot Dome lease. Three Republican papers published only one of the eight facts. By the 1920s these stories were available to all papers and could have been reported in a

timely fashion. The absence of publication of the stories represents a degree of oversight than can fairly be called suppression of the news.

During the "resolution" phase in 1924 (see Figure 4, part B), the papers were less distinguishable from each other with one exception, which mirrors our findings in the Crédit Mobilier case. The non-Republican papers, especially some aligned with the Democratic party, gave considerably more (relative) space to the stories they printed.

The lesson from these case studies is that although reporting style greatly changed from the 1870s to the 1920s, the aligned papers in the 1920s still suppressed stories and gave far less room to the stories they had to print and that damaged their candidates. Because both of our scandals involved Republican administrations, we do not know from this investigation whether the Democrat newspapers did the same, but we would hazard a guess that they did. The aligned press was often a biased and non-informative press. But the aligned press had become a far smaller fraction of all dailies and an even smaller fraction of circulation. Furthermore, even in cities that had aligned dailies, the existence of competition with the independent dailies would have fostered the informative press.

III. Understanding the Rise of the Independent Press

In documenting the rise of the informative press, we found both a reduction in overt bias and a substantial increase in the information content of newspapers. We now seek to explain the transformation, building on the growing literature that explores the economic forces that act to determine the degree of bias and the amount of information in news articles.

The information content of the news will reflect a tradeoff between the demands of customers who seek knowledge and entertainment, and the incentives of suppliers who seek to earn profit and advance their ideological views. A growing theory literature, including Mullainathan and Shleifer (2004), Gentzkow and Shapiro (2004), and Besley and Prat (2004), explores how these forces can lead firms to report biased news in equilibrium.

In this section, we follow Besley and Prat (2004) in modeling suppliers' incentives as a tradeoff between: (i) profits from consumers who are willing to pay for informative news and (ii) direct payoffs from printing information favorable to one political side or the other. Although such direct payoffs to suppliers are not the only possible source of bias, they seem most consistent with historical evidence on the incentives faced by nineteenth and early twentieth century newspapers.[18]

The most obvious source of such direct payoffs from the political slant of information would be the individual political preferences of newspaper owners themselves. We previously cited Thurlow Weed's *Albany Evening Journal* and Horace Greely's *New York Tribune* as nineteenth century examples of newspapers run by politically interested parties. Other examples include Colonel McCormick of the *Chicago Tribune* and Harrison Gray Otis and his descendants at the *Los Angeles Times* (prior to 1960) who had strong right-wing views and ensured that their papers supported those positions.[19]

An additional source of payoffs to firms would be outside influence from politicians or parties. This could take the form of direct bribes or kickbacks, as in the model of Besley and Prat (2004). Perhaps the most famous example of this kind of incentive is Secretary of State Thomas Jefferson's use of State Department funds to pay Philip Freneau to run the radically partisan pro-Jefferson, anti-Federalist, *National Gazette*. Outside influence could also come from interest groups that provide biased information at low cost, or politicians who are able to use the threat of curtailing reporters' access to information to thwart unfavorable stories.

[18] A model which locates the source of bias on the supply-side seems most consistent with the central empirical fact we document below: that the drop in bias in the late nineteenth and early twentieth centuries coincided with falling costs and increasing advertising revenue. Intuitively, if suppliers trade off direct gains from skewing news against market profits, any changes that increase the magnitude of market returns should reduce the degree of skewing. Models that locate the source of bias on the demand-side do not necessarily imply such a link.

[19] It is interesting to note that whereas through the early twentieth century the usual complaint was that newspapers were biased toward the right, allegations of bias today emphasize the liberal views of reporters who supposedly slant their stories to the left. One explanation for this switch, if indeed it occurred, could be rising reporters' incomes. If the chance to proselytize is a luxury good, then we should increasingly see reporters willing to accept lower wages for the chance to push their own bias, as reporters become generally wealthier.

To develop the model formally, we assume that a newspaper first decides a level of investment that determines the probability, q, that the paper will acquire a "story." The investment includes, for example, the number of reporters, reporter quality, and investment in infrastructure. The investment cost is denoted $K(q)$, where $K(0) = 0$, $K(1) = \infty$, $K' > 0$, $K'' > 0$. We assume that stories cannot be fabricated and that stories do not have "spin." Instead, the primary ideological question that the newspaper faces is whether or not to *suppress* a story hostile to its viewpoint. The newspaper determines how much to spend to uncover new stories.

A story has ideological content, ω, where $\omega \in \{-\infty, \infty\}$. The ideological content reflects the extent to which the story either helps or hurts politicians of different political hues. Conditional on having observed ω, the paper can either print the story $x = \omega$ or suppress it. Suppressing the story could be interpreted to mean not referring to the event at all, or engaging in political editorializing that conveys no real information.

To capture the political bias of the newspaper, we assume that when the paper prints a story with ideological value ω the paper receives payoff $r\omega$. As just mentioned, this could reflect the political preferences of owners or outside influence from politically interested parties.[20] We assume, for simplicity, $r > 0$.

We assume that there are P consumers who always buy the paper, and an additional C consumers who buy the paper if it contains a new story. The newspaper receives advertising revenue a per reader. The marginal cost of printing a newspaper is c. Firm profits are thus $(C + P)(a - c) + r\omega - K(q)$ if they print an informative story with content ω and $P(a - c) - K(q)$ otherwise. We assume for simplicity that $a > c$. The model immediately yields the following proposition.

[20] An important assumption built into this specification is that the direct political returns to suppressing or printing a story do not depend on the number of readers (i.e., C and P). This assumption seems an accurate description of some situations (i.e., payoffs from a politician who has a fixed value of winning an election), while for other situations (i.e., an editor who values the political views of each swayed reader) it is clearly a simplification. In the latter case, our results would require that political payoffs increase more slowly in C and P than market returns.

Proposition 1: There exists an ideological value ω^* at which the newspaper is indifferent between publishing or not publishing the story. For values of ω greater than ω^*, the newspaper strictly prefers publishing the story; for values of ω less than ω^*, the firm strictly prefers suppressing the story. The value of ω^* equals $-C(a-c)/r$ and therefore rises with *c* and *r*, and falls with *a* and *C*.

Proof: The gains from including the story in the newspaper equal $C(a-c)+r\omega$, and therefore when $\omega = -C(a-c)/r$, the firm is indifferent between publishing or not publishing a story. Since $C(a-c)+r\omega$ is monotonically increasing in ω, the firm strictly prefers publishing when $\omega > -C(a-c)/r$, and strictly prefers not publishing when $\omega < -C(a-c)/r$. The comparative statics follow from differentiating $-C(a-c)/r$.

The value of ω^* denotes the degree of bias that has been introduced into the newspaper because of its desire to publish stories that favor a particular political side. As ω^* rises, more stories are suppressed and the degree of bias increases. The comparative statics therefore suggest that the degree of bias is falling with net revenues per consumer ($a - c$), falling with *C* (the marginal consumers that will be produced by a more informative paper), and rising with *r* (the degree of supply-side bias).

Although these comparative static results are not surprising, they illustrate a fundamental tradeoff in newspaper bias. The possible benefits from selling more papers are weighed against the private gains from suppressing politically charged information. In this model, as the size of the market increases (causing *C* to rise) or as the gap between advertising revenues and costs rises, leading ($a - c$) to rise, newspapers will become less biased. The variable *C* can also be interpreted to reflect competition among papers. Suppose, for example, that most consumers prefer to read *some* newspaper regardless of its information content, but would prefer an informative one over a non-informative one. Then a monopoly firm will sell to all readers regardless of information content, whereas a duopoly firm will strictly increase demand by

providing information.[21]

We now turn to the equilibrium investment in information—the choice of q. Expected newspaper profits equal: $(a-c)\left[P+Cq(1-F(\omega^*))\right]+qr\int_{\omega^*}^{\infty}\omega f(\omega)d\omega-K(q)$. Thus the first order condition is: $K'(q)=\left[1-F(\omega^*)\right]C(a-c)+r\int_{\omega^*}^{\infty}\omega f(\omega)d\omega$.

Proposition 2: Investment in information by the newspaper rises with C and a and falls with c and r.

Proof of Proposition 2: Since $K''(q) > 0$, the sign of the effect of any variable "x" on q will be the same as the sign of the effect of that variable on $\left[1-F(-C(a-c)/r)\right]C(a-c)+r\int_{-C(a-c)/r}^{\infty}\omega f(\omega)d\omega$. Differentiation then reveals that q is rising with C and a, and falling with c and r.

Proposition 2 echoes Proposition 1 and shows that as markets expand, we should observe more informative, as well as less biased, presses. Decreases in costs, c, will also increase the incentive to acquire information since the net returns from each reader is higher. If C rises with the level of competition, then information acquisition will also rise with competition. Lower levels of supply-side bias will also increase the tendency to acquire information. Because bias involves the suppression of information, a higher level of bias reduces the value of getting new information in the first place.

The framework has suggested that we look at (1) production costs, (2) market scale, (3)

[21] Besley and Prat (2004) show formally that in a model where firms receive payoffs from politicians to suppress harmful information, increased competition should reduce the degree of bias. In their model, if N firms are all suppressing information in equilibrium, a single deviator who prints the information gets the same payoff as a monopolist. The bribe that must be paid to each firm is thus independent of N, and the total bribe is increasing in N. In more competitive markets, politicians find it more difficult to suppress information.

market competition, and (4) advertising revenues as forces that should determine the amount of information and bias in newspapers. We now turn to evidence on the news media in the nineteenth century to see which of these forces can help us to understand the rise of the informative press.

IV. Evidence on the Causes of the Rise of the Informative Press

We turn now to the factors that the model predicts should impact the degree of bias and the amount of information in the press, such as production costs, market size, and advertising revenues. We will highlight the remarkable changes that occurred in each of these variables across the nineteenth and early twentieth centuries, although we acknowledge that these variables are interrelated and that we are treating each as a separate factor.

A. Production Costs

Perhaps the most important change in the production costs of newspapers in the nineteenth century was the reduction in the price of newsprint. The real price of newsprint fell by one-fifth from 1870, when the cost was $25/pound, to 1910, when it was $5 (see Figure 5). Up through the mid-nineteenth century virtually all newspapers were printed on relatively expensive newsprint made from cotton or linen rags. Although the price of rag paper began to decline in the 1830s with the invention of the Fourdrinier process, the price plummeted with the introduction, in 1867, of the process for making paper from wood pulp (Emery and Emery 1992, p. 188). With the exception of a sharp spike during the Civil War, prices declined rapidly and continuously from then to the 1910s.

Newsprint was the single largest component of costs. In the first year after the *New York Times* was founded in 1851 newsprint accounted for fully half of its operating costs (Mott 1962). Furthermore, the fraction of newsprint in *marginal* cost was considerably larger (the only other per-copy costs were ink and the pressmen's labor). A rough calculation suggests that the cost of the newsprint in a single four-page issue of the 1851 *New York Times* was approximately 1 cent, which was the same as the paper's cover price (the price was increased to 2 cents in 1852).

Changes in the price of newsprint, and the accompanying increase in circulation, made it profitable to invent and invest in high-speed printing technologies. These new technologies, similar to those in textiles a century before, widened "bottle necks." Once the price of newsprint declined (similarly for yarn), it was profitable to increase the speed of printing (weaving). And once printing speeds were faster, it paid to invest in producing even cheaper paper.

The most important innovations in nineteenth century printing technology include steam-driven presses and presses using a cylindrical rather than a flat-bed printing surface. Both innovations were introduced in the mid-1800s and diffused rapidly after the Civil War. Hoe's famed "lightning press," the first of the cylindrical presses, was unveiled in the mid-1840s. The Linotype typesetting machine, which allowed type to be set automatically from a keyboard, was first used in 1886 and was still in use as late as the 1950s. Other innovations of the period include stereotyped plates that could be easily reproduced for simultaneous printing on multiple presses, automatic folders, and the half-toning process for printing photographs (see, e.g., Emery and Emery 1992, chap. 9, and Mott 1962, chap. 30). The typewriter, invented in the 1860s by C.L. Sholes, once an editor of the Milwaukee *Sentinel*, diffused rapidly in the editorial and reporting offices during the 1880s when its price fell (Current 1954).

As the "throughput" of printing machines increased, average fixed costs of operation plummeted. Although we have not located a time series on average fixed costs, we can approximate the change in costs by assuming that the lifetime of capital and its depreciation rate did not differ by type of machine.

In 1850 a six-cylinder type-revolving press could print 12,000 impressions an hour and it cost (in current dollars) between $20,000 and $25,000. By the 1890s almost all printers owned "web" presses, which used a continuous roll of newsprint, printed on both sides of the page simultaneously, and automatically folded the paper. These presses were capable of doing from 24,000 to 48,000 12-page papers in an hour and cost from $40,000 to $80,000 (in current dollars). Expressing the capital cost in constant dollars and assuming no difference in the depreciation rate and lifetime by type of machine, average (per page) fixed costs in 1890 were

only 1/15 of what they were in 1870 (a decline of about 7 percent average annually).[22]

The maintenance cost of "web" presses was probably greater than that of earlier machines. But the newer presses automatically folded the paper, saving on labor costs, and were probably run for more days per year and more hours per day. We do not know the magnitude of these refinements but it is unlikely that the enormous decrease in our estimate of average fixed costs would be substantially altered.[23] Printing technology, moreover, did not stand still. In 1895 Hoe introduced the "octuple press," which did 48,000 16-page papers per hour and in ten years the "double octuple" commenced operation producing 144,000 16-page papers per hour.

Of course, the best evidence that the expansion of newspapers was driven by cost-side changes is the actual sales price of newspapers. Although there is scant evidence on newspaper prices for the antebellum period, what does exist suggests a yearly subscription rate of from $87 to $110 (in 1982-84 dollars).[24] Price, circulation, and size of newspaper data are available in our data beginning with 1880 (see Table 1, part D). In 1880 the average annual (unweighted) subscription price was $57.41 (in 1982-84 dollars) and the price fell to $35.74 in 1920, although there was little change from 1880 to 1910. The price data weighted by circulation display a more extreme and continuous trend downwards. Whereas the 1880 annual subscription price (in 1982-84 dollars) was $71.76, it was $55.90 in 1890, and $33.33 in 1920. Initially newspapers with the greatest circulations were the most costly but became the least expensive by the end of the period. From 1880 to 1920, therefore, newspaper prices for the average reader decreased 1.92 percent average annually.

The decrease in price is even steeper when scaled by the physical size of newspapers. Larger newspapers, not surprisingly, cost more. In the 1890 to 1910 period, during which we can obtain data on the number of pages and the size for each page, the price decline per unit area

[22] The means of the ranges given were used and the CPI deflator was applied (Carter, Sutch et al. 2004). The presses are assumed to run for the same number of days and maintenance is assumed to be a fixed function of the initial cost. Most of the information on press output and prices is from Mott (1962).
[23] Typesetting also decreased in cost with the implementation of Linotype machines. In 1890 Linotype was 3 times faster than by hand and typesetters received $4 for a 9-hour day (Emery 1872, p. 338). Information on typesetting machines is too variable to estimate cost savings since the Paige machine cost $12,000 but the Thorne/Simplex machine cost just $2,000 (Mott 1962, p. 500).
[24] Subscription rates are from Mott (1962, p. 203).

was 3.37 percent average annually (weighted and scaled) while the un-scaled, but weighted, decline was 1.54 percent. Although scaling by size provides a reasonable quality adjustment, it is likely that the decrease we measure is on the high side relative to one that considered the marginal valuation by consumers of square inches of newspapers and that the decrease in cost per unit quality is somewhere between the weighted measure and the size-adjusted (and weighted) measure.

A third crucial set of innovations concerns communications. The constraints faced by early nineteenth-century newspapers in their quest to obtain timely information on events in the United States or across the Atlantic are hard to overstate. Virtually all news was transmitted by the exchange of local newspapers or letters from correspondents through the mails—carried either overland by horse or by sea. If these were delayed, as they often were by bad weather, newsmen could find themselves in the embarrassed position of the editor of the 1805 *Orleans Gazette* who wrote: "No mail yesterday—we hardly know what we shall fill our paper with that will have the appearance of news" (quoted in Mott 1962). A paper in Boston in these years could expect to wait almost a week for news from New York or Washington, a month for news from New Orleans, and several months for news from England (Mott 1962).

The situation was alleviated somewhat by transportation and communications advances such as the improved pony expresses, steamships, railroads, and even carrier pigeons. The key innovation, however, was the telegraph, first used in 1844. Telegraph wires soon connected all the major cities of the United States. With the completion of the transatlantic cable in 1866 instantaneous news was brought from Europe as well. The telegraph gave rise to the wire news services, among which the most important was the Associated Press, founded in 1848 as a joint venture by major New York City papers to share the cost of obtaining news by telegraph.

Also of great importance to the rise of the informative press was the employment of reporters and various types of editors. Up until the 1840s papers rarely employed reporters on a full-time basis. But by the 1850s, and more so after the Civil War when correspondents were employed to send in reports from the front, newspapers hired reporters in large numbers. By the 1870s, according to Emery and Emery (1992, p. 179), the average big city daily employed a

chief editor, a managing editor in charge of news, a city editor who supervised perhaps two-dozen reporters, a telegraph editor who sorted through wire stories, as well as a host of specialty editors and editorial writers. In the context of the model, the increase in staff should be seen as an increase in the amount of investment in information acquisition, or q.

B. Market Scale, Circulation, and Advertising Revenues

The substantial decrease in the cost of newspapers, together with an increase in average city populations and income meant that the period from the end of the Civil War to the beginning of World War I saw enormous growth in the scale of newspaper markets. The number of subscriptions for the entire United States increased twelve-fold between 1870 and 1920, from 2.6 to 33 millions (see Figure 2). This represents an increase from about one paper per day for every 20 inhabitants in 1870 to one per day for every 4 inhabitants in 1920. In America's larger cities the level of circulation per capita was higher but the increase was about the same. There was about one daily per 5 urban residents in 1870 but one per 1.7 residents in 1920.[25] The average urban adult, therefore, was purchasing more than one newspaper per day, and likely reading even more.

While much of the increase in circulation was directly due to falling costs, lower prices, and higher incomes, some of the increase in scale was due to other demand-related factors. The population of America's cities grew rapidly during this period and rising levels of education also may have increased demand for daily news.

The increase in total circulation can be separated into increasing circulation per capita and increasing population levels using a simple decomposition.[26] Focusing on our sample of large cities, total circulation rose from 1.37 million dailies in 1870 to 20.5 million in 1920. Circulation of dailies per capita increased from 0.194 in 1870 to 0.419 in 1890 to 0.606 by the

[25] See Table 1, part B "circulation per capita," inverted to be expressed here as one paper per "x" residents.

[26] Δ Total Circulation = Δ Per Capita Circulation $\cdot$ Initial Population + Δ Population $\cdot$ Initial Per Capita Circulation + Δ Per Capita Circulation $\cdot$ Δ Population

1920 (see Table 1, part B).[27] Based on the decomposition, total circulation would have risen from 1.37 million to 4.27 million if only circulation per capita had changed and not population, meaning 15 percent of the rise in total circulation can be explained by increased per capita circulation holding population constant at 1870 levels. But if circulation per capita had stayed constant and population had grown, total circulation would have risen from 1.37 to 6.593 million. Thus 27 percent of the share of the change in total circulation can be explained by the increase in population between 1870 and 1920. The remaining share of the increase—fully 58 percent—is due to the fact that both per capita circulation and population levels increased in tandem. Soaring circulation levels are largely explained by these concurrent effects.

The rise in readership was accompanied, not surprisingly, by a substantial increase in advertising revenue. Newspaper income became less dependent on sales to consumers and more dependent on advertising. Although a time series on advertising revenue does not exist, we have information on advertising rates for urban dailies in 1880. It is clear from the cross-section data that newspaper circulation was a primary determinant of advertising revenues. An increase in circulation by 10,000 papers was associated with a 28 percent increase in the advertising rate.[28] As such, it is reasonable to think that advertising revenue continued to rise as total circulation soared. Advertising revenues, according to one source, accounted for 50 percent of newspaper income in 1880, rising to 64 percent in 1910 (Emery and Emery 1988). This increase does not correspond exactly to the parameter *a* in the model, which represents advertising revenues per reader, but it does confirm the view that attracting a large audience was the key to financial success for late nineteenth century newspapers.

C. Market Competition

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[27] These figures, and all of Table 1, apply to daily newspapers in the 100 largest U.S. cities in all years from 1870 to 1920 (see Appendix A). By "political" newspapers we mean all daily papers except those that had special coverage, such as financial and theater.

[28] The regression is (with absolute values of t-statistics in parentheses; $R^2 = 0.813$):

$$\text{AdRate} = 4.039 + 4.55\ \text{Circulation} \cdot 10^{-3} + 0.205\ \text{City population} \cdot 10^{-3} - 0.839\ \text{Evening} + 2.066\ \text{Morning}$$
$$(2.82)\quad (17.6)\qquad\qquad (14.1)\qquad\qquad (0.56)\qquad (1.39)$$

where AdRate is dollars per ten lines of advertising, and evening and morning indicate the time of publication (the omitted category is another time of the day). The regression is run over 325 political (non-foreign language) dailies that were aligned with a major political party or were independent. *Sources*: Ayer (various years); see Appendix A.

The rise in market size was accompanied by an enormous increase in the number of newspapers, as well as the number within each urban market. The magnitude of the national transformation is illustrated by Figure 2, which shows the total number of daily papers printed in the United States. The number climbed steadily through the middle years of the nineteenth century, and then exploded after 1870, from 500 to a peak of more than 2,500 around 1910.

Our data on urban dailies includes the top 100 cities by population in each of the census years, 1870 to 1920 for a total of 152 cities (see Table 1, part A for the number of cities in each year). In 1870 our sample contains140 cities and of these 25.7 percent (or 36) had no daily newspaper, 12.9 percent (or 18) had 1 daily paper, 30.7 percent (or 43) had 2, and 30.7 percent (or 43) had 3 or more (Table 1, part A). In 1920 of the 150 cities included in the sample, just 3.3 percent (or 5) were left with no daily newspapers, 10.0 percent (or 15) had just one paper, while 83 had three or more. Competition among newspapers of any political stripes had clearly increased. But perhaps more importantly, there were more competing newspapers among the parties and the independents.

The rise in competition is important for several reasons. Competition appears to have had the effect of inducing newspapers to provide more information relative to "spin." Even when the behavior of newspapers did not change, more newspapers meant a greater supply of information for the population. As long as one major newspaper in a city exposed corruption, the story would get out.

In 1870 25 percent of cities with a daily had just a Democrat (D) or Republican (R) newspaper (only 4 percent had just an independent paper) and an additional 53 percent had competing D and R papers but no independent paper (see Table 1, part C).[29] Thus 78 percent of the 140 large cities in 1870 probably had largely biased, uninformative reporting of events such as Crédit Mobilier. By 1920, however, just 7 percent of cities with a daily had only a D or R (32 percent had just an independent) and 8 percent had competing D and R papers but no independent paper. In contrast, 54 percent (40.7 + 13.1) had an independent paper *and* at least

[29] We categorize the ID and IR papers as independents.

one D or R paper.

Changes in local competition can also be seen through the use of the Herfindahl index. Using the Appendix A data, we have calculated the average Herfindahl index in each city across the 1870 to 1920 period. The index is defined in its usual manner as the sum of the squared market shares times 10,000 and thus bounded by (0, 10,000], where a lower number indicates greater competition. The average Herfindahl index across cities is 6,916 in 1870, 6,531 in 1880, 6,410 in 1890, 6,215 in 1900, 6,295 in 1910 and 5,833 in 1920. As these numbers indicate, local news was never very competitive. These numbers are higher, in each year, than they would be if every market were split equally between two competitors. The cost of providing newspaper content (reporters' salaries) is a fixed cost and together with physical capital creates significant returns to scale (as in Berry and Waldfogel 2001). Nonetheless, the index declines in almost every decade. The decline is even more remarkable because the rapid decrease in the price of newsprint meant that the ratio of fixed to variable costs most likely rose over the period.

The rise in newspaper competition is, of course, not a puzzle. Declining costs and rising demand made it inevitable that there would be new entrants into the market. The presence of a robust market competing for consumers appears to have coincided with an increase in the amount of information contained in newspapers and a replacement of fact for vitriolic argument.

D. Cross-City Evidence

In the previous section, we documented a remarkable concurrence of different economic factors: declining costs and increasing scale, competition and advertising revenues, all of which should (according to the model) have increased information and reduced bias. Given the interdependence of these variables, we cannot identify which of these variables is more important. We turn to cross sectional evidence to examine the relationship among market size, information content, and political independence.

We provide two different forms of cross-city evidence. First, using the data from the Crédit Mobilier episode, we can examine the correlation between newspaper circulation and the

various measures of information we extracted from newspaper coverage of the scandal. As mentioned above, we have four different potential measures of news quality: the percentage of facts recorded, the total number of stories, the relative size of the stories, and the timeliness of the reporting of the stories. We have these measures for both 1872 and 1873 and the circulation of the newspaper as of 1880. While we obviously cannot interpret the relationship among these variables as causal, our model would clearly suggest that circulation and informational content should be positively correlated.

In 1872, the relationships between all four of these variables and our measure of circulation are indeed positive.[30] If the *New York Herald* is excluded from the regression (it was a remarkably uninformative paper with an astonishingly high circulation) then all of these correlations are statistically significant (with the *Herald* two are and two achieve borderline significance). Specifically, the correlation coefficient between circulation and the percentage of facts is 0.335 (0.415 without the *Herald*). The correlation coefficient between the number of stories and circulation is 0.529 (0.729 without the *Herald*). The correlation coefficient between the timeliness of the stories and circulation is 0.382 (0.557 without the *Herald*). The correlation between the relative size of the stories and circulation is 0.788 (0.946 without the *Herald*). Overall, newspapers with more circulation produced more facts and stories of importance, did so in a timelier manner and devoted, relative to the size of the paper, more space to them.

As mentioned above, there is less heterogeneity across newspapers in 1873, when the reporting of the facts of the case became more complete. The relationship between circulation and the number of stories as well as their relative size remains positive. The relationship between circulation and facts and the relationship between circulation and timeliness are both negative and insignificant.

During the Teapot Dome episode, there is a generally positive connection between circulation and both coverage and timeliness (but not at conventional levels of significance). Newspapers with greater readership publish more facts. However, because coverage was

[30] If instead of circulation we used a more plausibly exogenous measure—city population—we obtain correlations that are larger in size with the exception of the relative size of the stories.

generally more complete, the relationships are much weaker than in the 1873 era. Still, the Teapot Dome evidence continues to show that newspapers with more readers did a better job of providing more complete coverage of the events. Great coverage, however, was available to far more Americans.

A second form of evidence concerns newspaper independence across cities. If falling bias is the result of increasing newspaper scale and circulation, then the number and circulation of independent newspapers should be increasing with city population levels and with the level of total readership by city. Hamilton (2004) has shown that in his sample (a subset of ours, including the 50 largest cities for each year from 1870 to 1900) the share of independent circulation was increasing in city population. We perform a similar analysis with our expanded data set, examining the relationship between city size, city circulation, and independent newspapers' share of circulation by city. In what follows, we report only the results using city population although those using city daily circulation are similar.

We report results in Table 2 for a pooled cross-section time-series on 148 cities across six decadal years (1870 to 1920). The results show the relationship between the logarithm of city population and the share of the city's circulation that is independent.[31] In the pooled regression, we find that a 1 log point increase in population (roughly a 100 percent increase in population) is associated with a 7.1 percentage point increase in the share of circulation from the independent papers. The result holds in every decade and using either definition of independent (only I or the inclusive one that includes IR and ID): bigger cities had a greater fraction of their circulation that was independent.

To check the robustness of these results, we also use city fixed effects. By doing so, we are identifying the effect using within-city variation. The results should be seen as testing whether cities that grew more rapidly had a greater increase in the share of circulation that was from independent newspapers. The estimated coefficient of 0.098, somewhat larger than from

[31] In these regressions, we use the more inclusive measure of independence (I + IR + ID). The results are similar using the less inclusive measure (only I papers). The coefficient on log of city population is somewhat lower (although the mean of the dependent variable is as well) and the significance of the coefficient in the city fixed effects model is lower.

the pooled ordinary least squares regression, should be viewed as confirmation that increases in market size are associated with increases in the relative size of the independent press.

If these coefficients are accepted as reflecting the impact that population (or circulation) has on the relative circulation of Independents, then we can determine how much of the rise in the Independents resulted from rising population (or circulation). In our sample of large cities, population increased from 7.1 to 34.4 million between 1870 and 1920. If the coefficient relating the share of independent newspapers to the logarithm of population is 0.098, then the increase in population would predict a 15.5 percentage point increase in the share of circulation that is independent. This predicted rise is about one-third of the total increase of 46.8 percentage points during the entire 1870 to 1920 period. Other factors we have identified above—falling costs, increasing advertising revenue, and so on—presumably accounted for much of the rest.

V. Summary: The Implications of the Informative Press for Corruption and Reform

We have documented significant changes in the news media during the late nineteenth and early twentieth centuries. Newspapers dropped their party affiliations and became far less likely to use partisan language in their reporting. By comparing the coverage of the Crédit Mobilier scandal with the Teapot Dome affair, some fifty years later, we found that reporting became more complete, timely, and generally less dominated by spin.

We also have argued and presented evidence suggesting that this transformation was the result of the rising scale and competitiveness in the newspaper industry. Declining costs and increased city populations caused a huge increase in scale. In 1870, a newspaperman might make more money pleasing a local politician than in selling papers and advertisements. By 1920 newspapers had become big business, and they increased readership and revenue by presenting factual and informative news. Following these financial incentives, newspapers changed from being political tools to at least trying to present a façade of impartial reporting.

We have not directly confronted whether these changes made a difference to political

outcomes.[32] Gathering systematic evidence on this relationship remains a challenge for future work. Nevertheless, a range of anecdotal evidence suggests that growing press independence did have a significant impact on political outcomes, in particular on the incidence of corruption.

First, there are many notorious examples of the rooting out of corruption by the press. Both the Crédit Mobilier and Teapot Dome scandals were exposed by the press; the *New York Times* and *Harper's Weekly* successfully brought down Boss Tweed and Tammany Hall in 1871; and various papers, such as Pulitzer's *St. Louis Post-Dispatch*, were legendary for their campaigns against corrupt politicians.

Despite the spin and bias of individual papers in 1872, it is hard to doubt that the denizens of New York City were exposed to a steady stream of facts about the Crédit Mobilier scandal. By contrast, residents of smaller towns often had no opportunity to learn about major national events. While the rise of the informative press may not have mattered much in large cities, it most likely did in most smaller cities and towns.

The prevalence of political investment in the press also provides indirect evidence that politicians thought the press was important. It seems unlikely that Alexander Hamilton would have been such a prolific polemicist if he did not see it as a tool for political success or that Thomas Jefferson would have put Freneau on the State Department payroll if Jefferson did not see Freneau's *Gazette* as an important tool in battling the Federalists. Whenever politicians used resources, such as government contracts or outright bribes, to influence papers, they affirmed the fact that press coverage was thought to be significant.

For many nineteenth and even twentieth century politicians, newspaper publishing was an important stop on the path to political eminence. Consider the political careers of one-time newspapermen like Horace Greeley, Whitelaw Reid (*New York Tribune* publisher and unsuccessful Vice Presidential candidate in 1892) and Thurlow Weed. James Cox, who owned several papers and was governor of Ohio, ran unsuccessfully for president in 1920 losing to

[32] On the role of the free press in controlling corruption in a cross-country analysis, see Brunetti and Weder (2003).

Warren Harding, a fellow newspaperman (the Harding family owned the *Marion Star*).[33]

Press exposure of major scandals often appears to coincide with electoral losses for incumbents connected to the scandal. Every significant Tammany Hall defeat coincided with a press campaign against municipal corruption. The meager Republican showing in the 1876 election (the only election between 1860 and 1884 when the Democratic candidate won the national popular vote) may have been due to the exposure of the Grant-era scandals such as Crédit Mobilier. Progressive politicians succeeded in ousting incumbents when muckrakers, such as Lincoln Steffens, were regularly exposing corruption. While we cannot prove that a more informative press helped diminish corruption, it does appear that campaigns against corruption succeeded when they were supported by news coverage.

During the decades from 1870 to 1920 when corruption appears to have declined significantly within the United States, the press became more informative, less partisan, and expanded its circulation considerably.[34] It seems a reasonable hypothesis that the rise of the informative press was one of the reasons why the corruption of the Gilded Age was reduced during the subsequent Progressive Era.

[33] The *Merion Star* gave some coverage of the Teapot Dome affair for which Harding was implicitly involved. On April 21, 1922 (p. 2) it printed a small article on the questioning the Teapot Dome oil leases by Senator Kendrick (fact #3, see Appendix B).
[34] On the time-path of corruption, see Glaeser and Goldin (this volume).

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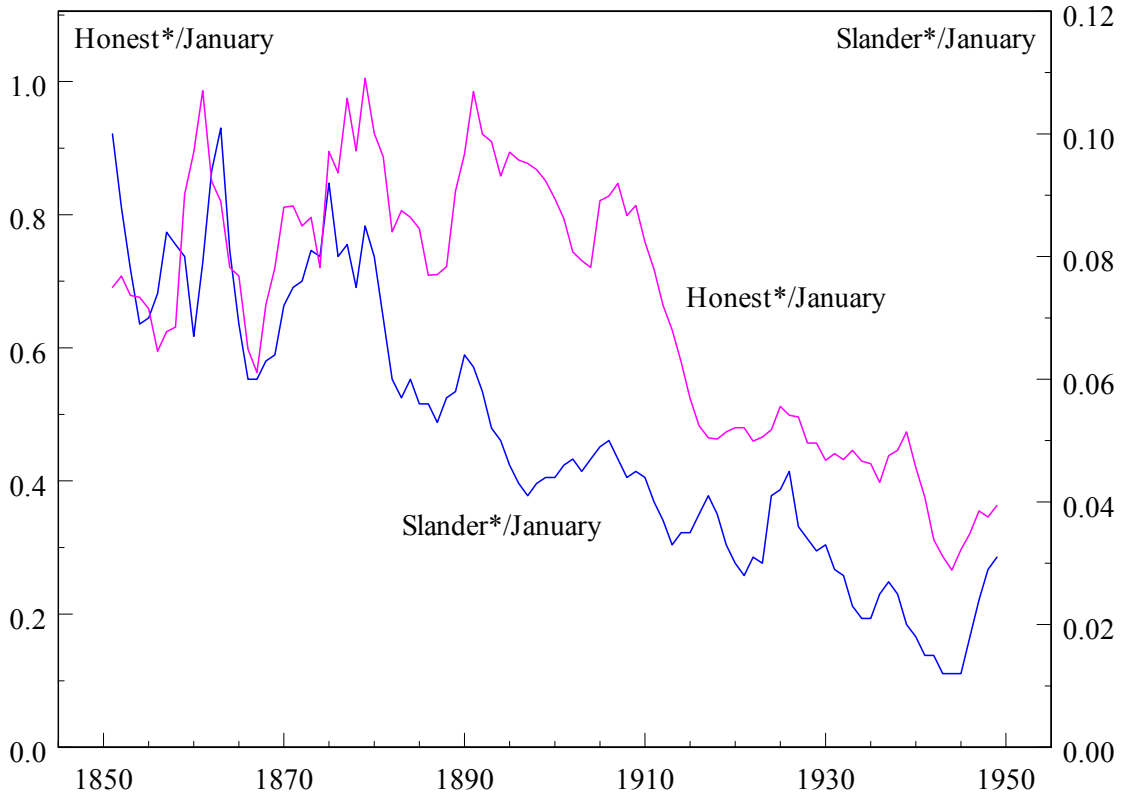
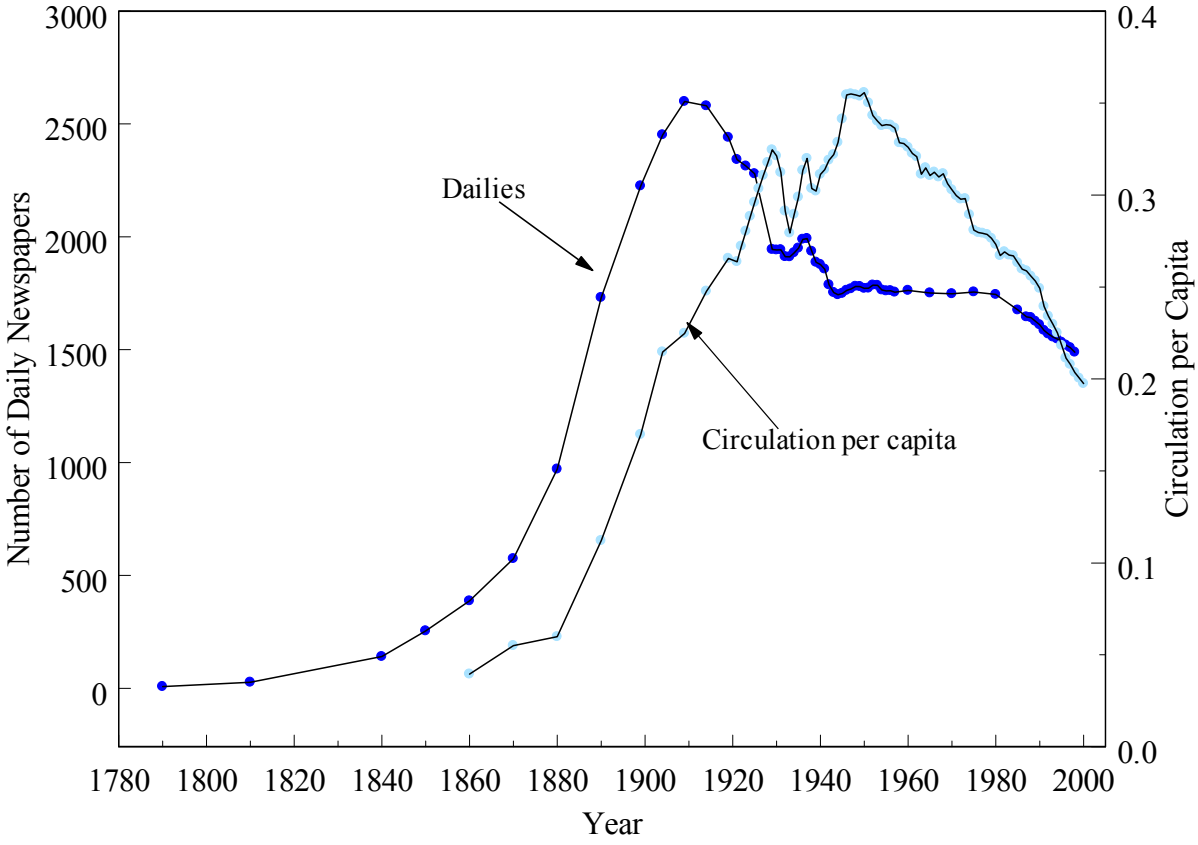
Figure 1
Indicators of Biased Reporting



Source: Ancestry.com scanned newspapers using optical character recognition software. See "Corruption and Reform: An Introduction" (this volume) for more information on Ancestry.com and its newspapers.

Notes: All words beginning with "slander" and "honest," and "January" were searched. A "hit" occurs when at least one word is found on a newspaper page (this search routine is done by page not by article). The newspapers covered vary by year and each year contains anywhere from 10 to 50 newspapers. Most of the newspapers are from small cities and towns.

Figure 2
Daily Newspapers and Circulation per Capita: 1790 to 1998

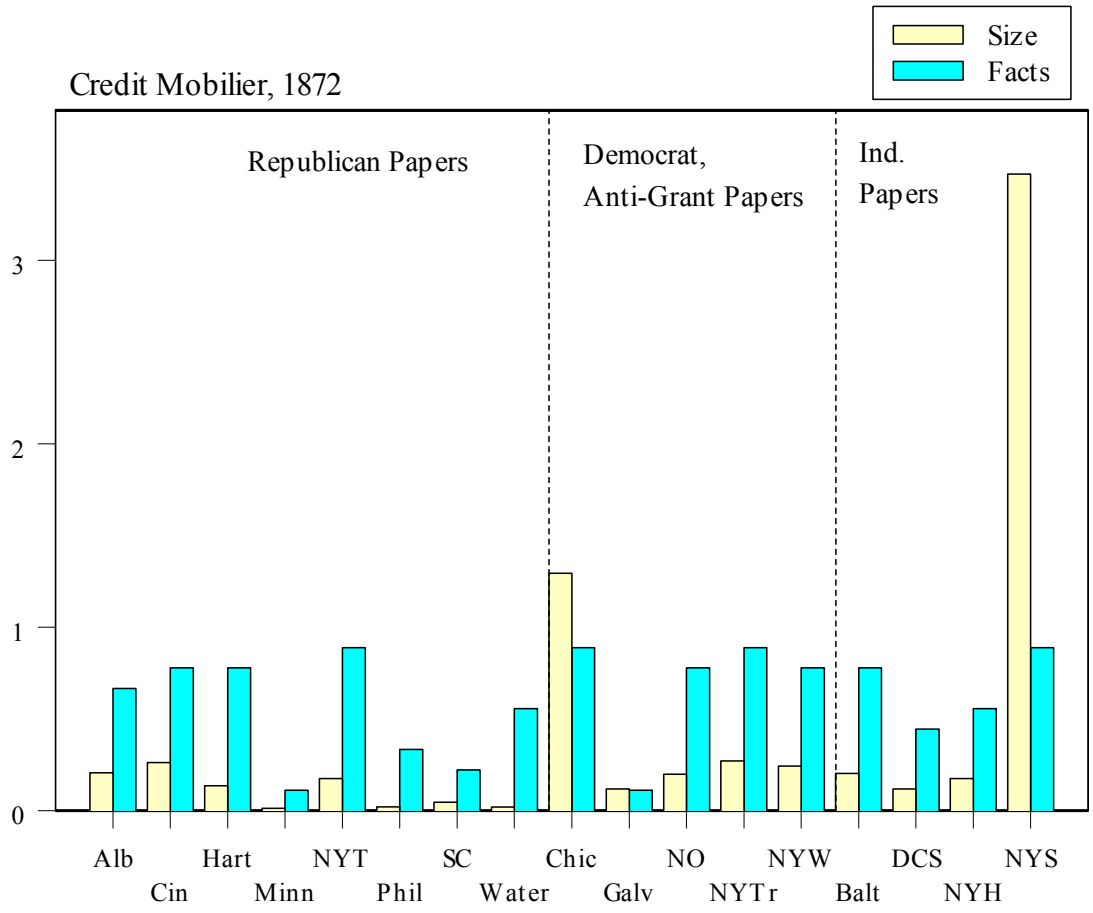


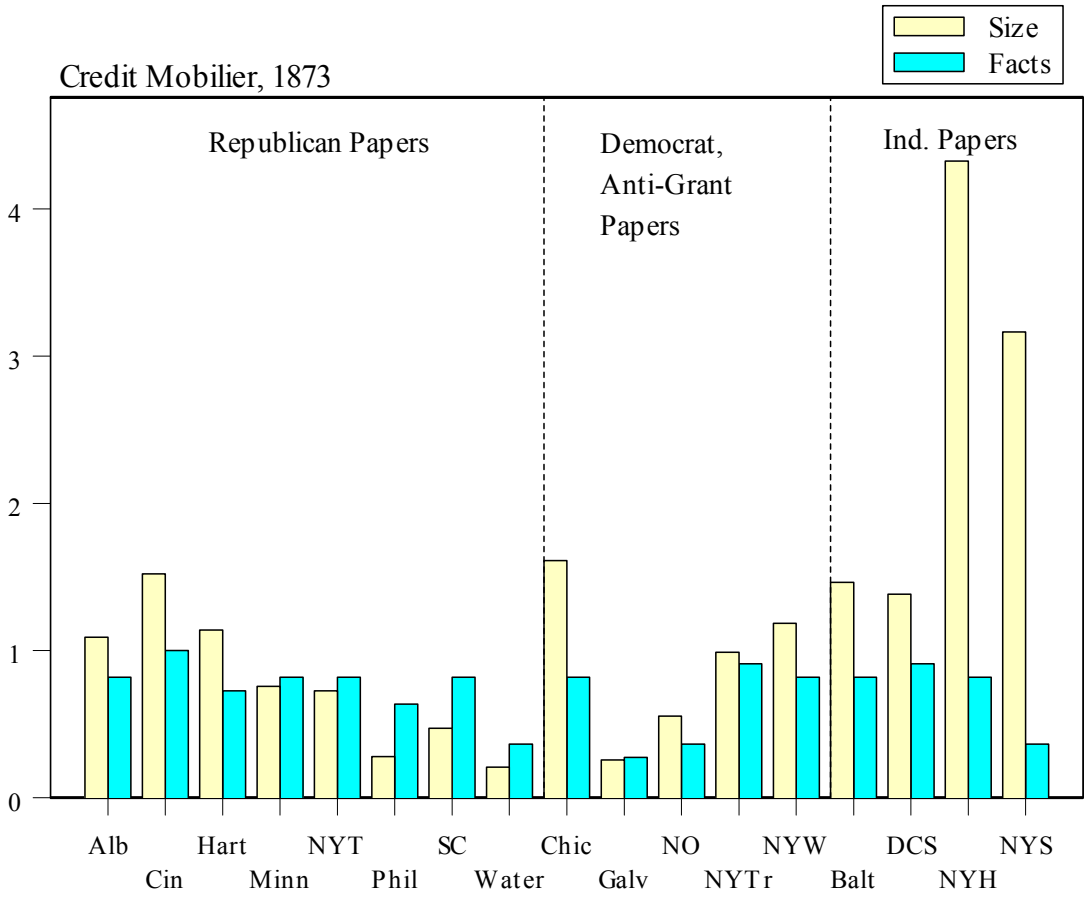
Sources: Dailies, 1790-1925: Dill (1928), table V, p. 28; 1929-1998 Editor and Publisher (various years)

Notes: Daily circulation for 1850 to 1921 is imputed by converting newspaper subscriptions into circulation using the ratio of the two for 1921. That for 1921 to 1928 is interpolated. United States population is imputed from decennial censuses. These data are for the entire United States and are, therefore, different from those in Table 1 which are for large U.S. cities.

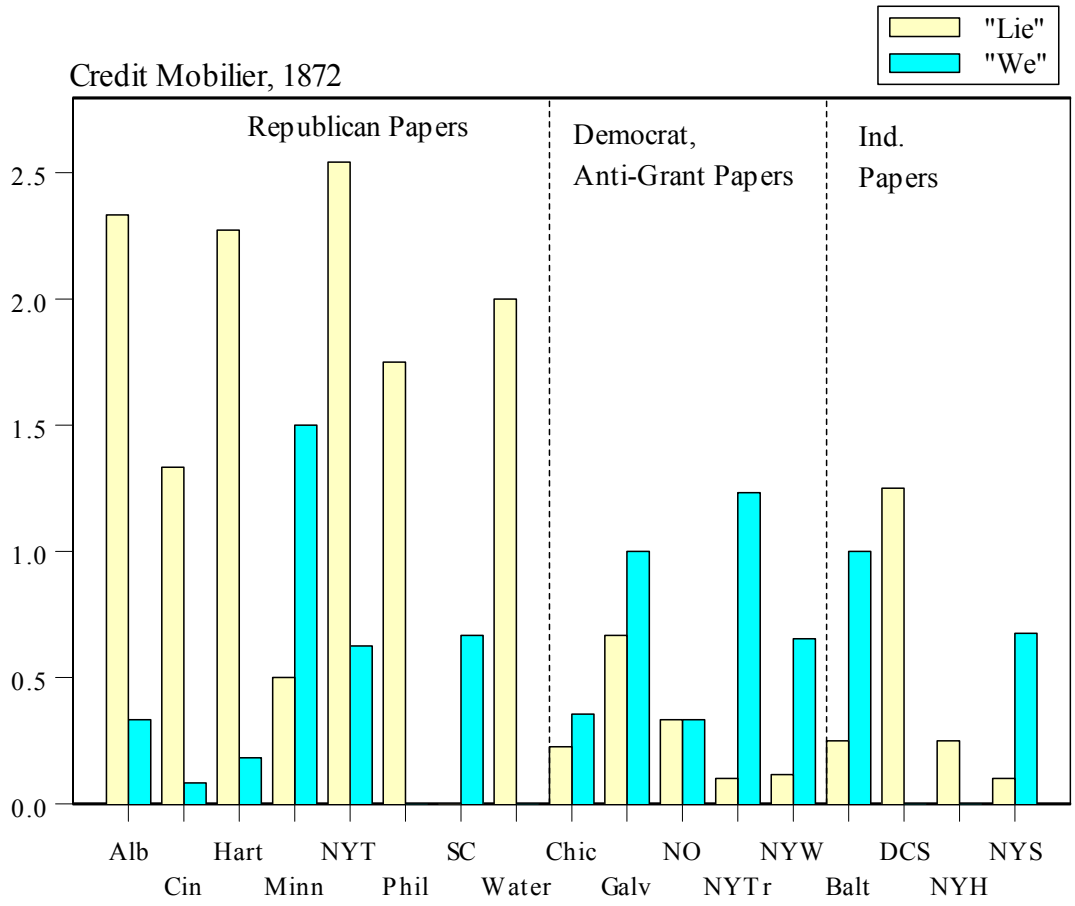
Figure 3
Reporting of Crédit Mobilier: Size, Facts, Timeliness, and "Spin"

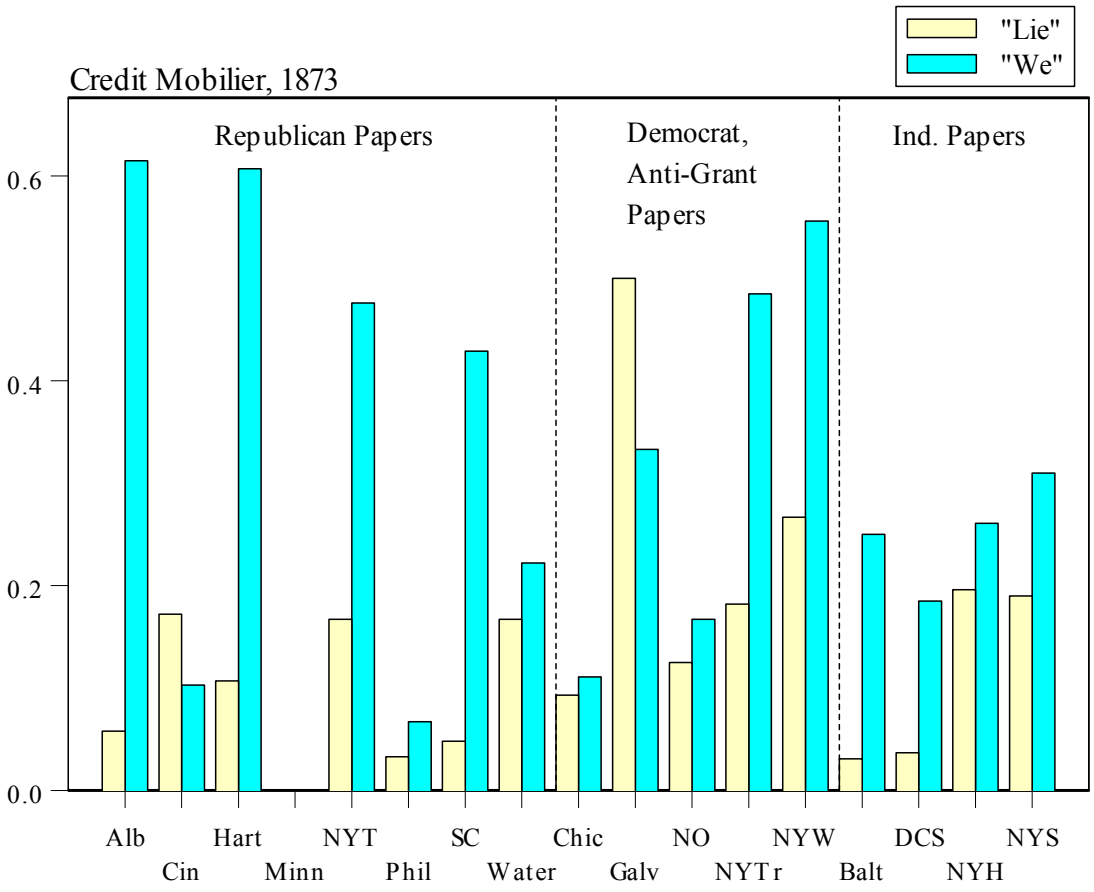
A. Crédit Mobilier, 1872 and 1873: Size and Facts



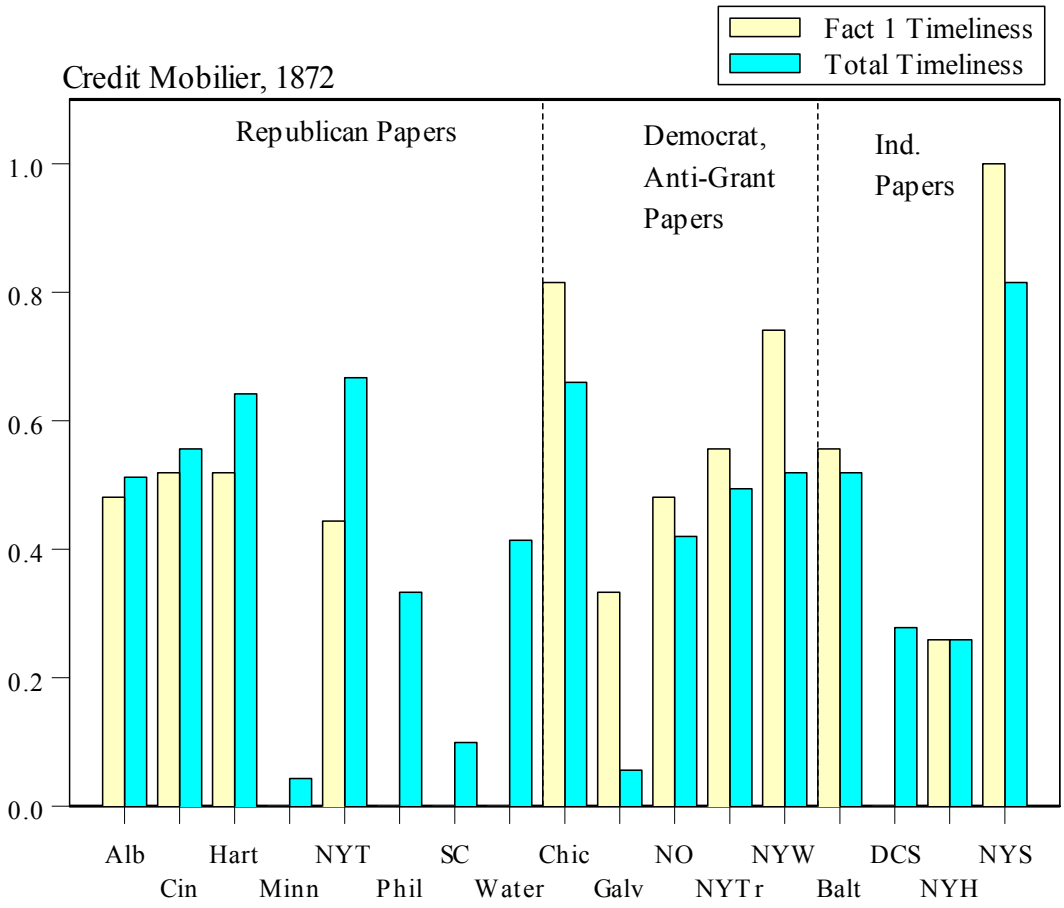

Size
Facts
Credit Mobilier, 1873
Republican Papers
Democrat,
Anti-Grant
Papers
Ind. Papers
4
3
2
1
0
Alb
Cin
Hart
Minn
NYT
Phil
SC
Water
Chic
Galv
NO
NYTr
NYW
Balt
DCS
NYH
NYS

B. Crédit Mobilier, 1872 and 1873: “Spin”




"Lie"
"We"
Credit Mobilier, 1873
Republican Papers
Democrat,
Anti-Grant
Papers
Ind. Papers
0.6
0.4
0.2
0.0
Alb
Cin
Hart
Minn
NYT
Phil
SC
Water
Chic
Galv
NO
NYTr
NYW
Balt
DCS
NYH
NYS

C. Crédit Mobilier, 1872: Timeliness

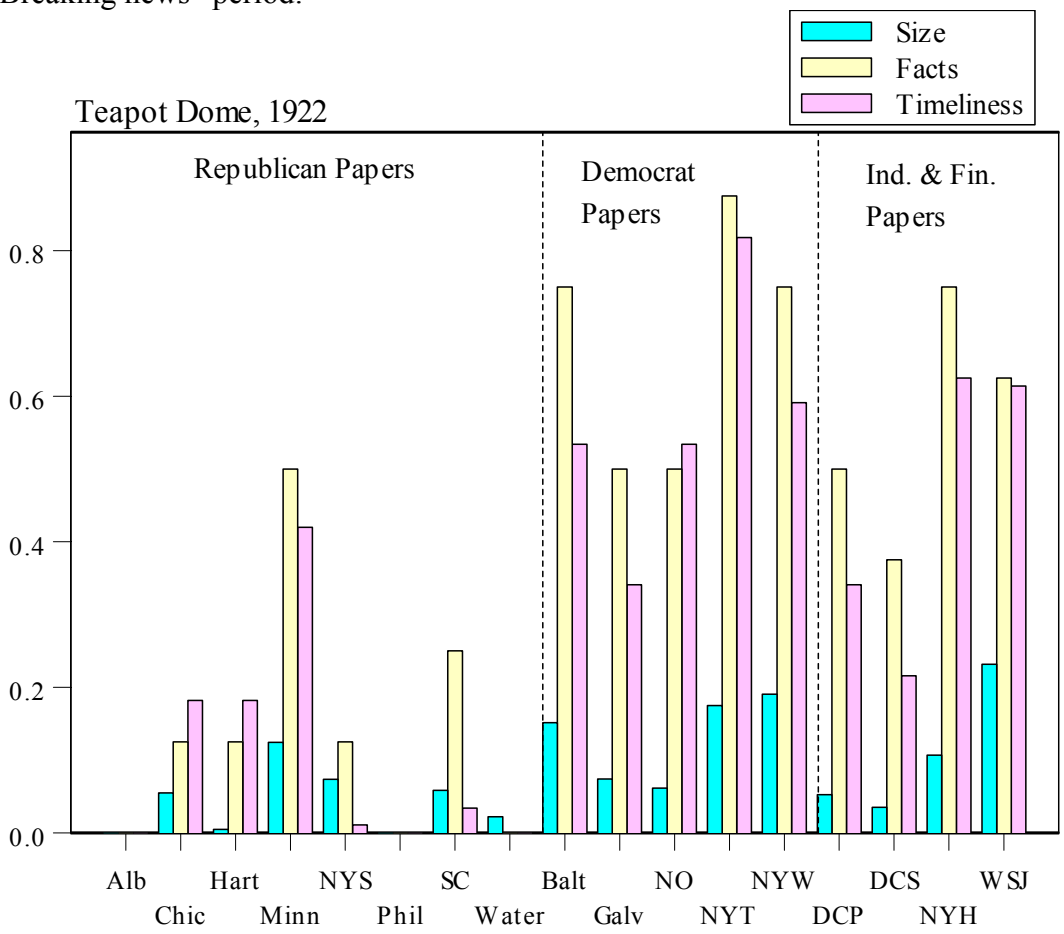


Sources for Figure 3: See Figure 4.

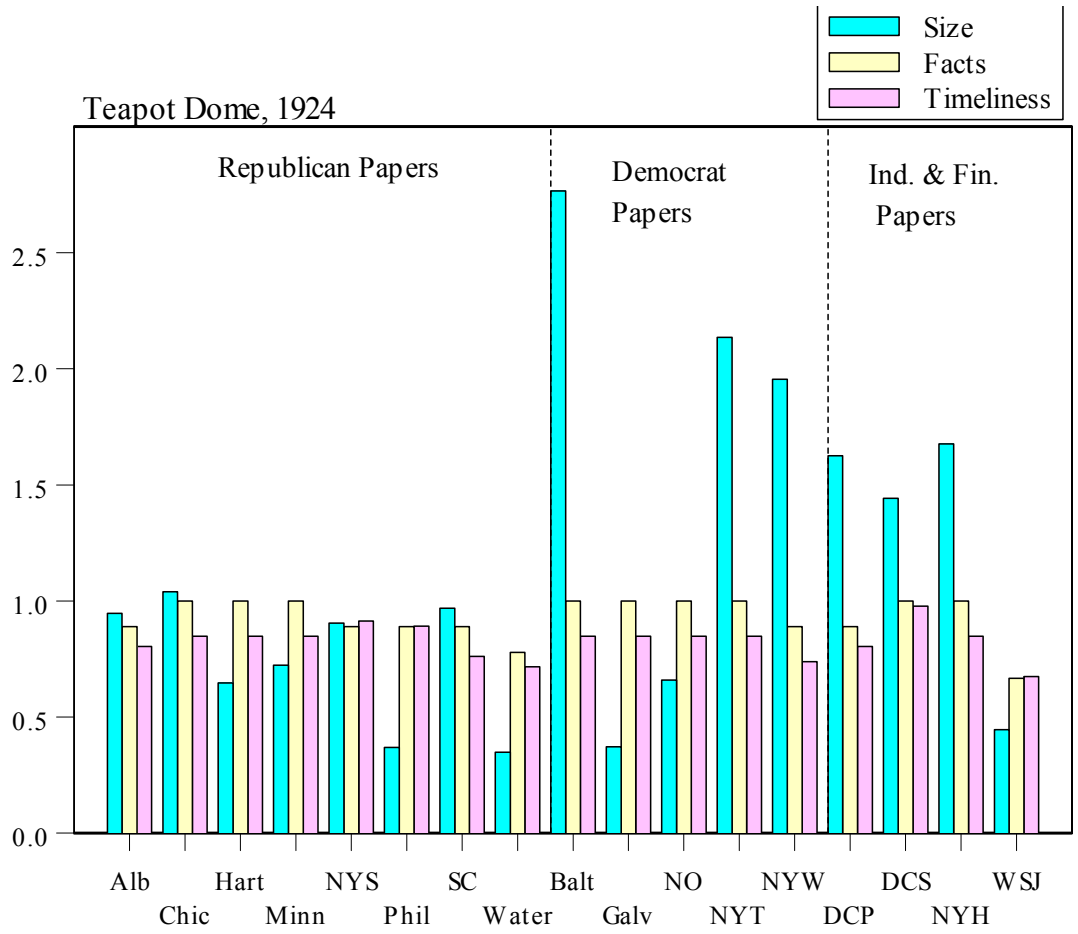
Note for Figure 3C: There are almost no differences in "timeliness" among the newspapers in the sample in total and for the most important facts during the "resolution" period of February 1873.

Figure 4
Reporting of Teapot Dome: Size, Facts, and Timeliness

A. "Breaking news" period:



B. Resolution period



Sources and Methods: See Appendix B.

Notes: Newspaper abbreviations are:
Alb = Albany Evening Journal
Balt = Baltimore Sun
Chic = Chicago Daily Tribune
Cin = Cincinnati Daily Gazette (not in 1920s)
DCS = DC Evening Star
DCP = DC Washington Post (only in 1920s)
Galv = Galveston Daily News
Hart = Hartford Courant
Minn = Minneapolis Tribune
NO = New Orleans (Times-) Picayune
NYH = New York Herald
NYS = New York Sun
NYT = New York Times
NYTr = New York Tribune (not in 1920s)
NYW = New York World
Phil = Philadelphia (Evening) Bulletin
SC = Sioux City (Daily) Journal
WSJ = Wall Street News (later the Wall Street Journal; only in 1920s)
Water = Waterbury Daily American

Newspapers are divided into groups by their stated political affiliations (in the Ayer directories). Supplementary information on the Republican Anti-Grant papers (Chic, NYTr) has also been used. The sole financial newspaper (the Wall Street News) is included with the latter papers in the 1920s because it broke the Teapot Dome story and would probably have been considered an a-political newspaper at the time.

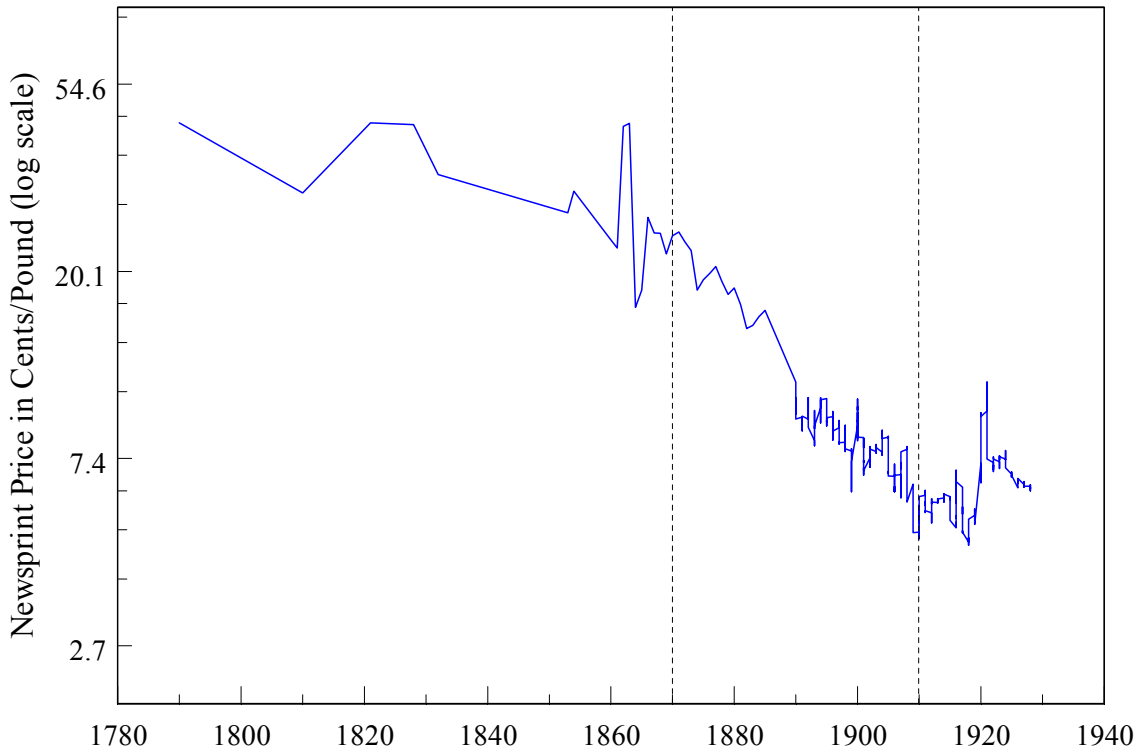
"Size" is the column length of the articles divided by the total size of the newspaper times 10. Thus, size is "relative size," adjusted for the fact that some newspapers were larger than others. Total size is length times width times the number of pages.

"Facts" is the fraction of the facts reported (see Appendix B for the important facts) during the demarcated periods.

"Spin" is measured in two ways. In both cases a count of particular words is done for the first two paragraphs of all articles during the periods. In the first, the word "lie" and its various synonyms are counted. In the second, the words "we" and "us" are counted. The use of "lie" is generally used to spin the fact in the opposite direction. The use of "we" and "us" is generally used to put greater emphasis (that is, editorialize) on the fact. The total counts are scaled by the number of articles in the period for each newspaper.

"Timeliness" is measured by scoring the "facts," dividing by the maximum score, and then subtracting from 1. If a fact is reported on the first day that it could have been reported, the newspaper gets a 0 score and thus a 1 in "timeliness." If the fact is reported a day late, it gets a score of 1, if two days late, it gets a 2, and so on. The maximum days late is (1 + the full length of the period considered). The total score received by the newspaper is then divided by the maximum possible score and subtracted from 1. A zero means that the newspaper never reported the fact during the period considered.

Figure 4
Newsprint Prices, 1790 to 1930
(cents/pound, deflated by the WPI 1967 = 100, log scale)



Sources:
1790 to 1890. Lee (1937), pp. 742-43.
1890 to 1929. NBER Historical Macro Data Base series m04093a, b, quarterly data on newsprint prices. http://www.nber.org/databases/macrohistory/contents/
Wholesale Price Deflator. 1790 to 1889. U.S. Bureau of the Census (1975), series E-52 (Warren and Person). *1890 to 1929*. NBER Historical Macro Data Base, quarterly WPI. On an annualized basis, the NBER series from 1890 to 1915 is the same as U.S. Bureau of the Census (1975), series E-40. That for 1913 to 1929 is approximately series E-23 (BLS).

Notes: The NBER data are monthly, whereas the Lee data are at various intervals until 1860 when they are annual. The Lee and NBER series are linked at 1890. The overlap numbers are nearly identical. The Lee data for 1860 to 1890 are those paid by the *New York Tribune*. Before 1860, he pieced them together from several sources. The two series of newsprint data from the NBER Macro History Data Base are linked at 1914. The deflators are linked at 1890 by multiplying by 0.6854 (= 56.2/82) and again at 1913. The final deflator is constructed for 1967 = 100.

Table 1: The Growth of Dailies, Circulation, and Independent Newspapers: 1870 to 1920

	All Cities in Sample					
	1870	1880	1890	1900	1910	1920
A. *Newspapers by City*						
Number of cities	140	149	150	150	150	150
Fraction cities with						
Dailies	0.743	0.866	0.947	0.967	0.973	0.967
Independent1 dailies	0.164	0.517	0.647	0.633	0.753	0.827
Independent2 dailies	0.164	0.436	0.527	0.527	0.627	0.653
Dailies by city						
None	0.257	0.134	0.053	0.033	0.027	0.033
One	0.129	0.148	0.060	0.047	0.073	0.100
Two	0.307	0.248	0.240	0.293	0.287	0.313
Three or more	0.307	0.470	0.647	0.627	0.613	0.553
B. *Political Affiliation of Newspapers*						
Fraction of dailies by party [a]						
Republican	0.527	0.386	0.336	0.360	0.332	0.219
Democratic	0.360	0.316	0.319	0.302	0.216	0.164
Independent1	0.114	0.298	0.345	0.337	0.452	0.618
Independent2	0.114	0.257	0.263	0.261	0.340	0.404
Circulation per capita						
All dailies	0.194	0.253	0.419	0.450	0.577	0.606
Independent1dailies	0.051	0.135	0.215	0.217	0.300	0.441
Independent2 dailies	0.051	0.128	0.192	0.175	0.237	0.265
Independent fraction of circulation [b]						
Independent1	0.263	0.534	0.513	0.424	0.520	0.728
Independent2	0.263	0.506	0.458	0.389	0.411	0.437
C. *Newspaper Competition: Fraction of cities containing newspapers of the following types* [c]						
Only D or R or I	0.289	0.279	0.162	0.145	0.205	0.386
(Only I)	(0.039)	(0.070)	(0.049)	(0.055)	(0.110)	(0.317)
[D or R] and I	0.058	0.171	0.232	0.269	0.411	0.407
D and R [not I]	0.529	0.194	0.204	0.255	0.130	0.076
D and R and I	0.125	0.357	0.401	0.331	0.253	0.131
D. *Newspaper Prices (real):Annual cost in 1982-84 dollars*						
Unweighted	n.a.	57.41	64.34	62.23	53.02	35.74
Weighted by circulation	n.a.	71.76	60.90	55.90	44.76	33.33
Per square inch × 100, weighted	n.a.	n.a.	1.657	1.383	0.844	n.a.

[a] Republican, Democratic, and Independent1 sum to 1. The omitted categories using Independent2 are the IR and ID papers.
[b] Circulation per capita for the independents divided by the circulation for all dailies.
[c] Independent is defined here as Independent1.

Sources: Ayer (various years), Rowell (various years). See Appendix A. City population data from U.S. Bureau of the Census, Population Division (1998). Deflator (see line 8) from Carter, Sutch, et al. (2004).

Notes: The universe of cities is the union of the top 100 by population in every year. "All cities" includes every city that contained a population in the year given. Brooklyn and New York City are treated as separate cities after they merged. The cities of Charlestown MA and Allegheny PA exit the sample due to mergers. Results from a balanced panel of cities (those in the sample every year even if they do not include a daily in some year) are nearly identical. Daily newspapers include both aligned and independent papers but exclude specialized periodicals (e.g. financial, music, fashion, garden). We have also excluded minor political party newspapers (e.g., Socialist, Labor, Populist) and the foreign language press. We use two definitions of "independent." "Independent1" includes Independent-Republican (IR) and Independent-Democratic (ID), as well as Independent. "Independent2" includes only Independent. The deflator is the CPI, 1982-84 = 100: 1880, 10.2; 1890, 9.1; 1900, 8.4; 1910, 9.5; 1920, 20.0. The "square inch" calculations divide by the size of the page times the number of pages in the newspaper. There are no data available for 1870 and 1880; that for 1920 is not in square inches.

Table 2
City Population and the Circulation Share of Independent Daily Newspapers

Dependent variable: Fraction of city daily newspaper circulation that was independent (I + IR + ID)				
Variable	Pooled		City Fixed Effects	
	Coefficient	Standard error [a]	Coefficient	Standard error [a]
Log city population	0.0710	0.0168	0.0937	0.0418
1880	0.166	0.0362	0.159	0.0422
1890	0.181	0.0396	0.161	0.0479
1900	0.164	0.0388	0.140	0.0557
1910	0.247	0.0440	0.211	0.0667
1920	0.395	0.0476	0.357	0.0760
Constant	-0.624	0.172	-0.852	0.428
R^2	0.206		0.600	
Number of observations	803		803	

[a] Robust standard errors, clustered at the city level (148 cities).

Sources: See Appendix A.

Notes: Independent newspapers are the Independent1 group (see notes to Table 1). That is, independent newspapers include those that were strictly Independent as well as those that were Independent-Republican and Independent-Democrat.

Appendix A: Newspaper Data, 1870 to 1920

We created balanced and unbalanced panels of cities and daily newspapers at decade intervals from 1870 to 1920. The cities were selected in the following manner. The top 100 cities by population in each year were compiled. We then increased the size of the balanced panel by adding information to the earlier years for cities that entered the sample later and also for cities that were in the top 100 earlier but not later. Some cities merged or were non-existent in the earlier years. Thus our total sample contains 152 cities, although the number of cities with population is: 140 in 1870, 149 in 1880, and then 150 for the remaining years. The balanced panel for all five years contains 138 cities.

We collected various types of information on all daily newspapers in these cities for the year closest to which we could obtain a copy of a national newspaper directory, such as N.W. Ayer and Son's *American Newspaper Annual* or George P. Rowell and Company's *American Newspaper Directory*. In most cases we were able to use the precise year. The information available for the newspapers is: city, state, paper name, whether foreign-language press, type of paper, party affiliation, establishment date, subscription rate, advertising rate (for some years), size of paper in pages and square inches, circulation, and the accuracy of the circulation number (e.g., whether it was certified). By "type of paper" we mean whether the paper was non-political, such as the financial and theater press, or whether it was political, either aligned with a party or independent or some mixture. Thus, by "political" we mean the regular, non-specialty, press. We generally grouped cities that later merged, for example Brooklyn and New York City. We added data from the census on population and county name.

The full list of 152 cities (including those that later merged) is:

AL	Birmingham
AL	Mobile
AR	Little Rock
CA	Los Angeles
CA	Oakland
CA	Sacramento
CA	San Diego
CA	San Francisco
CO	Denver
CT	Bridgeport
CT	Hartford
CT	New Haven
CT	Norwich
CT	Waterbury
DC	Washington
DE	Wilmington
FL	Jacksonville
GA	Atlanta
GA	Augusta
GA	Savannah
IA	Burlington
IA	Davenport
IA	Des Moines
IA	Dubuque
IA	Sioux City
IL	Chicago
IL	East St. Louis
IL	Peoria
IL	Quincy
IL	Springfield
IN	Evansville
IN	Fort Wayne
IN	Indianapolis
IN	New Albany
IN	South Bend
IN	Terre Haute
KS	Kansas City
KS	Leavenworth
KS	Topeka
KS	Wichita

KY	Covington
KY	Louisville
KY	Newport
LA	New Orleans
MA	Boston
MA	Brockton
MA	Cambridge
MA	Charleston
MA	Chelsea
MA	Fall River
MA	Gloucester
MA	Holyoke
MA	Lawrence
MA	Lowell
MA	Lynn
MA	New Bedford
MA	Salem
MA	Somerville
MA	Springfield
MA	Taunton
MA	Worcester
MD	Baltimore
ME	Bangor
ME	Portland
MI	Bay City
MI	Detroit
MI	Flint
MI	Grand Rapids
MI	Saginaw
MN	Duluth
MN	Minneapolis
MN	St. Paul
MO	Kansas City
MO	St. Joseph
MO	St. Louis
NE	Lincoln
NE	Omaha
NH	Manchester
NJ	Bayonne
NJ	Camden
NJ	Elizabeth
NJ	Hoboken
NJ	Jersey City
NJ	New Brunswick
NJ	Newark
NJ	Passaic
NJ	Paterson
NJ	Trenton
NY	Albany
NY	Auburn
NY	Binghamton
NY	Brooklyn
NY	Buffalo
NY	Cohoes
NY	Elmira
NY	New York
NY	Newburgh
NY	Oswego
NY	Poughkeepsie
NY	Rochester
NY	Schenectady
NY	Syracuse
NY	Troy
NY	Utica
NY	Yonkers
OH	Akron
OH	Canton
OH	Cincinnati
OH	Cleveland
OH	Columbus
OH	Dayton
OH	Springfield
OH	Toledo
OH	Youngstown
OK	Oklahoma
OK	Tulsa
OR	Portland
PA	Allegheny
PA	Allentown
PA	Altoona
PA	Erie
PA	Harrisburg
PA	Johnstown
PA	Lancaster
PA	Philadelphia
PA	Pittsburg
PA	Reading
PA	Scranton
PA	Wilkes-Barre
PA	Williamsport
RI	North Providence
RI	Pawtucket

RI	Providence
SC	Charleston
TN	Knoxville
TN	Memphis
TN	Nashville
TX	Dallas
TX	El Paso
TX	Fort Worth
TX	Galveston
TX	Houston
TX	San Antonio
UT	Salt Lake City
VA	Norfolk
VA	Petersburg
VA	Richmond
WA	Seattle
WA	Spokane
WA	Tacoma
WI	Milwaukee
WV	Wheeling

Appendix B: Coding Newspaper Stories Concerning Crédit Mobilier and Teapot Dome

1. The Historical Events and Facts

We have chosen two major historical events, known as Crédit Mobilier and Teapot Dome. Two relatively brief periods within each event were selected. The first period begins with the "breaking story," whereas the second includes an incident that coalesced opinion, such as a Congressional investigation or an admission of guilt. The periods span from one to almost four weeks. Their lengths by event were determined by to equalize the frequency of newspaper coverage between them. The dates used for each period per major event are as follows.

Crédit Mobilier *Period 1*: September 4 to September 30, 1872

The period begins with the release by the NY *Sun* of a letter from Rep. Oakes Ames to Henry McComb, once Ames' associate in Crédit Mobilier, (written 1/28/1868) stating that Crédit Mobilier shares were placed "where [they] will produce most good to us." The names of Congressmen, Senators, and the Vice President were written on the reverse side by McComb, supposedly from a list shown to him by Ames. The letter was given to the NY *Sun* by McComb. The remainder of the period is taken up with denials by those on the list.

Crédit Mobilier *Period 2*: February 14 to February 28, 1873

The events of this period include the conclusion of the House and Senate committees on the Crédit Mobilier scandal and the action of Congress regarding implicated sitting members.

Table B1: Crédit Mobilier Facts during Two Periods

Crédit Mobilier *Period 1*: Sept. 4 to Sept. 30, 1872	
1) Sept. 4, 1872	NY *Sun* publishes letter (originally written 1/28/1868) from Rep. Oakes Ames (MA) to Henry McComb stating that shares were placed "where [they] will produce most good to us." Names of Congressmen, Senators, and the Vice President were written on the reverse side by McComb, supposedly from a list shown to him by Ames.
2) Sept. 5, 1872	Sen. Blaine (ME), in the *Kennebec Journal*, denied ownership of CM stock.
3) Sept. 7, 1872	NY *Sun* revealed a second letter (written 1/25/1868) from Ames to McComb also with list of names of those receiving shares.
4) Sept. 11, 1872	Rep. Dawes, in a letter, thanks the editor of the *Syracuse Journal* for denouncing the *Sun* charges.
5) Sept. 13, 1872	Sen. Henry Wilson (MA), in a letter to the *Troy Whig*, denies speculating.
6) Sept. 15, 1872	General Garfield (Rep., OH) denied NY *Sun* charge and stated that held no stock in CM or UP.
7) Sept. 17, 1872	Ames, in a letter to his constituency, denied NY *Sun* charge.
8) Sept. 20, 1872	Rep. Scofield (PA) claimed he never received CM stock.
9) Sept. 25, 1872	Vice President Colfax, in South Bend, Indiana speech, denied wrongdoing.
Crédit Mobilier *Period 2*: Feb. 14 to Feb. 28, 1873	
1) Feb. 14, 1873	Senate Committee chaired by Sen. Morrill heard testimony from McComb, Sen. Conkling (NY), and Sen. Patterson (NH).
2) Feb, 15, 1873	Senate Committee heard from Harlan regarding $10,000 from T. Durant (Union Pacific) to Harlan's campaign; testimony from Sen. Wilson (MA)

3)	Feb. 17, 1873	Washington D.C. Sunday *Herald* published the purported transcript of the Ames memorandum book.
4)	Feb. 18, 1873	Poland Committee (House) recommended the expulsion of Oakes Ames and James Brooks (D, NY). Oakes found guilty of a misdemeanor.
5)	Feb. 19, 1873	Senate Committee heard from Ames about Harlan.
6)	Feb. 19, 1873	Poland Committee (House) heard from Vice President Colfax and Joseph Fowler (ex-Senator, TN).
7)	Feb. 20, 1873	Wilson Special Committee (Senate) on the Union Pacific reported on relations between the UP and CM.
8)	Feb. 20, 1873	House referred to the Judiciary Committee the issue of impeaching the Vice President.
9)	Feb. 22, 1873	Morrill Committee (Senate) heard from Sen. Paterson; Sen. Harlan recalled.
10)	Feb. 27, 1873	House voted to issue severe condemnations of Brooks and Ames but not to expel them.
11)	Feb. 27, 1873	Morrill Committee (Senate) recommended expulsion of Sen. Paterson.

Teapot Dome *Period 1*: Apr. 7 to Apr. 30, 1922

The period begins with a seemingly innocuous release by the *Wall Street News* that the government, through the Secretary of the Interior Albert Fall, had leased oil lands including one known as Teapot Dome in Wyoming to Harry Sinclair owner of Mammoth Oil Company. The remainder of the period concerns Senate demands for more information on the leases.

Teapot Dome *Period 2*: Jan. 21 to Jan. 28, 1924

The main event of this period is the admission by Edward Doheny, whose company had received the Elk Hills oil leases, that he lent Albert Fall $100,000. Sinclair's lawyer also admitted to a loan to Fall by Sinclair.

Table B2: Teapot Dome Facts during Two Periods

Teapot Dome *Period 1*: April 7 to April 30, 1922		
1)	Apr. 7, 1922	The *Wall Street Journal* reported that the U.S. government leased Teapot Dome, one of the naval reserves, to Harry F. Sinclair of Mammoth Oil.
2)	Apr. 14, 1922	Announcement of a Dept. of the Interior policy to store oil above ground.
3)	Apr. 15, 1922	Senate passed Sen. Kendrick's (WY) resolution calling for detailed information on the Sinclair lease.
4)	Apr. 17, 1922	Acting Interior Secretary Finney announced the terms of the lease, viz. graduated royalties ranging from 12.5 to 50 percent.
5)	Apr. 21, 1922	Sen. La Follette (WI) introduced a resolution calling for an inquiry into the leasing of oil areas to influential companies.
6)	Apr. 22, 1922	A joint letter transmitted by Navy Secr. Denby and Finney that in leasing the oil reserves, they were acting under the authority of Congress.
7)	Apr. 28, 1922	Sen. La Follette charged that speculators on the NYSE netted $30 million from advance information.
8)	Apr. 29, 1922	Senate passes resolution directing the Committee on Public Lands and Surveys to investigate the leases.
Teapot Dome *Period 2*: January 21 to January 28, 1924		
1)	Jan. 21, 1924	Archie Roosevelt (son of President) stated he severed ties to Sinclair.

2)	Jan. 22, 1924	Subpoena issued for Fall and Zevely (lawyer to Sinclair) to testify before Senate. Sinclair requested to attend.
3)	Jan. 23, 1924	Sen. Caraway (AR) called for immediate action on his resolution to cancel the Teapot Dome lease.
4)	Jan. 24, 1924	Edward Doheny admitted that he had lent Fall $100,000 ["without security … eventuating in the contract awarded to Doheny on Apr. 25, following, through which he secured, without competition, a contract giving him a preference right to a lease of a large part of Naval Reserve No. 1"]
5)	Jan. 25, 1924	Zevely testified about an additional $25,000 loan from Sinclair to Fall after the Teapot Dome Lease.
6)	Jan. 25, 1924	Senate ordered an investigation on Indian Land Lease entered into by Fall.
7)	Jan. 27, 1924	President Coolidge stated he would appoint a special counsel.
8)	Jan. 28, 1924	House recommended resolution granting $100,000 for Coolidge to investigate the leases.
9)	Jan. 28, 1924	Sen. Robinson (AR) submits resolution calling on the President to request Navy Secr. Denby's resignation.

2. The Coding

Every article concerning the two events in the time periods listed was read and coded in the following manner to ascertain coverage, factual reporting, timeliness, and "spin."

a. Size of article in column inches (excluding headlines).
b. Whether each fact given above was covered and on which day.
c. Spin is captured in two ways. We read the first two complete paragraphs of each article and coded the number of times the first person plural was used ("we," "us"). The use of the first person plural indicates editorializing. We also use the same paragraphs to count the number of times words such as lie and false were used (there were more than 30 different words in the 1870s articles that are synonyms for lie).[35]

3. The Newspapers

We coded daily newspapers and included those that were instrumental in breaking the story (such as the *New York Sun* in the case of Crédit Mobilier). Where possible we included newspapers from smaller cities (such as Sioux City), those geographically distant from the East Coast (such as Galveston), and those in the nation's capital. We attempted to incorporate a mix of political parties, although Republican newspapers dominated in general.

The full list of papers is given below together with the approximate number of separate articles published on the topic during the stated period:

[35] The full list of words is: baseless, calumny, canard, charlatan, cheat, deception, deceitful, dishonest, dishonesty, fabrication, fake, false, falsehood, fib, fiction, fraud, groundless, hoax, humbug, hypocrisy, imposture, insincere, libel, meretricious, misrepresentation, myth, perjury, prevarication, quack, slander, specious, and untruth. All parts of speech were counted (e.g., noun, adjective, verb).

Table B3: Newspapers Used for Coding Crédit Mobilier and Teapot Dome Articles

			Number of Articles for Each Period			
			Crédit Mobilier		Teapot Dome	
	Affiliation		9/9/1872	2/14/1873	4/14/1922	1/22/1924
Newspaper	1880[a]	1920	9/30/1872	2/28/1873	4/30/1922	1/29/1924
Albany Evening Journal	R	IR	12	52	0	20
Baltimore Sun	I	ID	8	32	5	47
Chicago Daily Tribune	R	IR	31	54	9	15
Cincinnati Daily Gazette	R	-	12	29	ne	ne
DC Evening Star	I	I	4	27	4	25
DC Washington Post	D	I	ne	ne	4	19
Galveston Daily News	D	ID	3	6	4	13
Hartford Courant	R	R	11	28	1	21
Minneapolis Tribune	R	R	2	14	9	15
New Orleans (Times-) Picayune	D	ID	6	24	4	18
New York Herald	I	I	4	46	8	25
New York Sun[b]	I	IR	40	42	4	18
New York Times	R	ID	24	42	11	40
New York Tribune	R	-	30	33	ne	ne
New York World[b]	D	ID	26	45	6	38
Philadelphia (Evening) Bulletin	R	IR	4	30	0	15
Sioux City (Daily) Journal	R	R	3	21	2	20
*Wall Street News (*later *Journal)*	-	Fin	ne	ne	32	18
Waterbury Daily American	IR	IR	4	18	1	14
All listed newspapers, articles	-	-	224	543	104	381

Notes: ne = nonexistent for the period given. All newspapers were read from microfilm except the *New York Times* and the *Wall Street News*, which are on-line newspapers with OCR (optical character recognition) technology.

[a] 1880 is used for political affiliation because many affiliations are missing for 1870. Note that the *DC Washington Post* began publication in 1877 and is not in the 1872, 1873 sample.
[b] There was both a morning and an evening paper in the 1920s. The micro-films used were for the morning paper.