Media Bias in China

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Abstract

Media in China are owned by governments with a politico-economic dual goal. Theoretically, we argue that vertical competition between governments for economic benefits should erode their political goals. We measure media bias defined as the weight placed on political goals in Chinese newspapers by analyzing the content of 117 mainstream newspapers in China from 1999 to 2010. Consistent with the theoretical predictions, we find that lower-level governments produce less-biased newspapers and launch commercial newspapers earlier than higher-level governments. Exploiting a reform that closed most county-level newspapers, we show that decreased product competition increases newspaper differentiation - party papers become more biased but commercial papers become less biased.

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1 Introduction

A burgeoning strand of research on the political bias of the mass media has enhanced economists' understanding of the role of media in democracies.[1] By contrast, rigorous research on media bias in autocracies is scarce. This paper provides a novel measure of the political bias of Chinese newspapers and then examines the determinants of media bias in China – the largest autocracy in the world.

It is hardly surprising that the Chinese media are biased toward the ruling party – the Chinese Communist Party (CCP). All Chinese newspapers require dominant state ownership and government supervision. Reporters Without Borders has consistently ranked China among the countries with the lowest levels of press freedom. However, the Chinese newspaper market is remarkably vibrant. Approximately 2000 newspapers sell more than 100 million copies every day. The Chinese advertising market is the world's third largest, following the US and Japan. Many newspapers in metropolitan areas publish punchy tabloids that sell a mix of entertaining reports and investigative journalism.

Several questions arise. First, is there a trade-off between newspapers' political and economic goals, or is market demand elastic with respect to politically oriented content? Second, to what extent do Chinese newspapers deviate from the CCP's political guide lines, and how may this deviation undermine the CCP's political goals? Third, what economic and social factors affect the political bias of Chinese newspapers? Addressing these questions is essential when assessing the effect of the media in China. More generally, it also illuminates the efficiency of firms with a politico-economic dual goal, such as state-owned enterprises.

Answering the questions above requires detailed data at the newspaper level. To this end, we assemble a comprehensive directory of all newspapers published in mainland China during the 1981-2011 period and combine it with newspaper content data. We focus on approximately 1000 general-interest newspapers, which account for the lion's share of readership. Per regulation, general-interest newspapers in China are all owned and supervised by the highest political decision-making bodies - the Chinese Communist Party Committee (CCPC) from the county to the national level. Our directory documents each newspaper's ownership, government supervision, editorial control, financial sources, and the timing of entry and exit. We classify these newspapers into three types based on the extent of financial and personnel control: Party Dailies, Evenings, and Subsidiaries; the latter two types are largely commercialized.

The content data are collected from WiseNews, a digital newspaper database operated by Hong-Kong institutions. We measure a newspaper's coverage of nine content categories. The first two capture the media's political goals as a CCP mouthpiece: the articles that mention political leaders or cite Xinhua (the CCP's authoritative news agency). The next four cover politically sensitive or negative information: articles on controversial issues that

[1] See Prat and Stromberg (2013), Gentzkow et al. (2016), and Puglisi and Snyder (2016) for recent surveys and the references therein.

are intensively covered by oppositional overseas Chinese media, and articles that report on corruption, disasters, and accidents. The final three measure commercially oriented content: articles that cover crimes, sports, and entertainment. Practically, we identify the nine content types by searching for relevant key words in approximately 17 million articles published by 117 mainstream general-interest Chinese newspapers from 1999 to 2010. We then calculate the proportion of each type of articles at the newspaper-by-year level.

This content classification reveals a clear pattern of product differentiation – some newspapers focus on political goals while others focus on commercial goals. For example, articles that mention CCP leaders account for 21 percent of the total articles in Party Dailies, but for only 5 percent of those in Subsidiaries. Thus, readers of commercial newspapers are exposed substantially less to CCP mouthpiece content. However, commercial papers do not systematically publish a greater amount of negative information on the Chinese government. In fact, compared with Party Dailies, commercial papers devote a smaller share of articles to the coverage of corruption, accidents and disasters.

We use principal component analysis (PCA) to consolidate the nine types of content above into a single dimension. Notably, the first component explains approximately 36 percent of the variation in content, and strongly predicts that a newspaper has low advertising revenues and is a Party Daily (as opposed to a commercial paper). The first component of PCA thus captures the weight that a newspaper puts on political goals relative to economic goals. This relative weight is our definition of "media bias." We show that such a bias measure exhibits a strong positive correlation with two independent measures of media control at the provincial level: the intensity of internet censorship reported in Bamman et al. (2012) and the share of government accounts on Chinese social media estimated by Qin et al. (2016).

These findings suggest that the less-biased newspapers reduce readers' exposure to propaganda content, thus undermining one of the CCPC's primary political goals. However, to the extent that readers dislike propaganda content, these newspapers provide an economic benefit. We find that a one-standard-deviation decrease in our measure of media bias is associated with an 80 percent increase in advertising revenues within the same newspaper market and year.

How does the Chinese government resolve such a strong dual-goal conflict? To address this question, we build a simple model of media bias in an autocratic hierarchy in which governments at multiple administrative levels compete in the same market. As the owners of newspapers, governments receive both political and economic benefits. While the economic benefits are private and fully internalized by local governments, the political benefits are considered to be a public good that generates geographic externalities within a CCPC's administration.

The main insight of the model is that vertical competition for economic benefits within the government hierarchy hinders the attainment of political goals. First, the model demonstrates that the politico-economic dual goal leads the government to differentiate its products – one

highly biased party paper that targets political goals and one less-biased commercial paper that targets economic goals. Second, because lower-level governments internalize fewer of the geographical externalities of political benefits and thus place greater value on political goals, they launch commercial papers earlier and party papers later and run less-biased newspapers than their higher-level counterparts. Third, the entry of commercial newspapers is facilitated by competition between governments at different levels because of a business-stealing effect. The presence of these less-biased newspapers reduces readers' exposure to propaganda content and undermines political goals. Finally, the model predicts that a greater advertising market reduces bias and promotes the entry of both party and commercial newspapers.

Guided by this model, we present evidence on how the political bias of newspapers is affected by the owner's administrative level, competition between CCPCs, the size of the advertising market, and readers' political preferences in a region. First, we find evidence that the hierarchical level of a CCPC is a key determinant of media bias. Within the same market, relative to their upper-level counterparts, lower-level CCPCs run newspapers that are less biased and launch commercial papers earlier and Party Dailies later. In a sample of 27 large provincial-capital markets in which provincial and prefectural CCPCs compete, we find that, in 23 of these markets, the higher-level CCPC owns the first Party Daily while the lower-level CCPC owns the first commercial newspaper. In a sample of 256 non-capital prefectures, we estimate that the average political damage caused by the entry of the first commercial newspaper is approximately RMB 11 million (USD 1.62 million) during the 1981-2011 period.

Second, product competition, which results from the introduction of various newspapers by different levels of CCPCs, affects the political bias of existing papers. Specifically, we explore a drastic reform in 2003, in which the Chinese central government closed more than 80 percent of the county-level Party Dailies for reasons that were exogenous to the newspapers' decisions. Using a difference-in-differences approach, we find that the reform increased the differentiation among the remaining newspapers. For example, we estimate that the reform reduced the share of articles citing the CCP official news agency in commercial newspapers by 3 percent (at a mean of 24 percent), while it increased the share of articles mentioning political leaders in party papers by 4 percent (at a mean of 12 percent).

Finally, economic and culture factors across regions are significantly related to media bias. We find that newspapers are more politically biased in CCP strongholds (i.e., the CCP revolutionary bases in the modern history of China) and less so in Treaty Port prefectures, which were historically controlled by Western powers. Moreover, we find that the size of the advertising market is strongly negatively correlated with newspaper bias in the cross-section, although such a correlation is not significant in the time dimension. Regarding the entry pattern, we demonstrate that commercial papers enter earlier in prefectures with relatively large advertising markets but later in CCP strongholds.

To the best of our knowledge, this paper is the first rigorous large-scale study of media bias in autocracies. It makes several contributions to the literature of media economics. We

construct a measure of bias that suits the media in autocracies. Economists have created a variety of media bias measures based on the typical ideology of think tanks that a media outlet quotes (Groseclose and Milyo 2005), "partisan" words (Gentzkow and Shapiro 2010), or the sentiments of words (Tetlock 2007). However, none of these measures can be directly applied to Chinese media because words that express opposition to or negative sentiment toward the official ideology are strongly suppressed. Our measure of media bias is issue-based, combining the rich content classification with the convenience of PCA. This approach can be adapted to measure media bias in other authoritarian regimes.

Moreover, this paper provides a coherent framework to analyze and estimate the effects of both political factors and market forces on media bias in an authoritarian setting. Our finding that the politico-economic trade-off of media control is a key determinant of media bias is broadly consistent with leading economic theories of media bias (e.g., Mullainathan and Shleifer 2005), media capture (e.g., Besley and Prat 2006), and press freedom under authoritarian regimes (Egorov et al. 2009, Lorentzen 2014). Departing from this literature, we place vertical competition between local governments in the heart of the analysis. In addition, we endogenize product entry, through which the political effect interacts with market competition to affect media bias. Our results also relate to a growing number of studies on the effects of government-controlled media in authoritarian countries including Russia (Enikolopov et al., 2011), Nazi Germany (Adena. et al., 2013), and Rwanda in the 1990s (Yanagizawa-Drott, 2014).

Finally, studying Chinese newspapers provides a rare opportunity to directly measure the politico-economic trade-off of government-controlled firms. These types of firms are common in developing countries and are generally believed to be inefficient (e.g., Shleifer and Vishny, 1994; Boycko et al., 1996). In the Chinese context, SOEs, which control a dominant share of critical resources in the economy, have political goals that include protecting national security, maintaining fiscal revenues, and sustaining social stability through employment or loans. How to resolve the dual-goal conflict has been regarded as crucial for SOE performance and economic reform (e.g., Cao et al. 1999; Lin and Tan 1999; Bai et al. 2006). In the existing literature on SOEs, the politico-economic trade-off is only indirectly inferred from firms' productivity and managerial practices. The media bias that we construct provides a direct measure of the politico-economic trade-off and can be used as an outcome when studying non-media firms that have dual goals. This measure can also be used to predict the political control of the economy. We show that our bias measure, aggregated at the provincial level, is highly correlated with a pro-market competency-index across regions in China (Fan and Wang, 2009).

2 Institutional background

In this section, we describe the main institutional features in the Chinese media. Our description focuses on the government control of newspapers and the objective function of newspapers. We leave the description of the industrial organization of Chinese newspapers to the next section when we present the data.

2.1 Owners and Markets

All Chinese newspapers are required to be completely or primarily owned by the state. They must be affiliated with a government supervisor who is responsible for licensing, appointing top personnel, and monitoring important editorial matters. Only a CCPC is eligible to obtain a license for a general-interest newspaper. Consequently, decisions regarding the entry of newspapers and content bias lie with top local politicians.

The Chinese newspaper ownership structure inherits the 4-level hierarchy of the CCPC system: nation, province, prefecture, and county. The control of newspapers, except for a handful of national newspapers, is decentralized to local governments. As a direct owner, a local CCPC monitors the newspapers under its administration and has the right to claim and distribute their residuals. With a few exceptions, the ownership and business operation of a lower-level newspaper is independent of its higher-level counterparts.

The most active newspaper markets are the 31 provincial capital cities, most of which are metropolises with populations of more than 5 million. In these markets, the provincial CCPC and the CCPC of the corresponding capital city own and run different sets of newspapers that compete for readership and advertising revenues. For example, in Chengdu, the capital city of Sichuan Province, the Chengdu prefecture CCPC owns three newspapers that compete with two papers owned by the Sichuan provincial CCPC.

The approximate 300 non-capital prefectures constitute another important type of market. Most of these prefectures have a population of over one million. In a typical prefectural market, the local CCPC operates a Party Daily and a commercial newspaper (either an Evening or a Subsidiary). Before 2003, many prefectures accommodated newspapers owned by county-level CCPCs. In 2003, the central government withdrew the licenses of most county-level newspapers.

2.2 Political and Economic Goals

Chinese newspapers have explicit political goals. The foremost political goal of Chinese newspapers is to implement the CCP's Party Line – a media policy that aims to sustain regime stability (Zhao, 1998, 2008). To this end, Chinese newspapers must carry out the tasks of propagating the CCP's ideology, maintaining the cohesion of CCP leadership, and informing cadres and the public of party decisions and government policies. To implement these tasks, the CCP Propaganda Departments regularly issue directives and convene meetings to direct

editorial policies. Numerous officers are employed to censor news content that is detrimental to CCP ideology and leadership. Failure to adhere to the Party Line leads not only to the withdrawal of circulated newspapers and the suspension of licenses but also to the imprisonment of journalists, the dismissal of editors, and the demotion of related government officials.

A less-known political role of the Chinese media is the so-called Mass Line, along which the media provide intelligence to top leaders about public sentiment and the performance of bureaucrats (Zhao 1998). Under the slogan "supervision by public opinion," the Mass Line permits media to report on the corruption and wrongdoing of lower-level party officials and government agencies. The objective is to mitigate the problem of inadequate and unreliable communication within the state bureaucracy and among self-interested government officials. A classic example of a breakdown of the Mass-line function is the media's failure to report on failing crops in the early 1960s (the Great Leap Forward), which resulted in severe famine and political instability.

Like SOEs, Chinese newspapers also have the economic goal of earning profit, most of which comes from advertising revenues. A newspaper's pursuit of economic profit yields two types of benefits to local politicians. First, newspapers' profits reduce local governments' subsidies and contribute to fiscal budgets through taxation and residuals. Second, lucrative newspapers provide opportunities for local officials to seek rents, including bribes, perks, business collusion, and private networking. Needless to say, the local CCPCs' preferences are not necessarily aligned with those of the central CCPC. The local CCPCs may care more about local economic performance and private rents and less about political goals, such as suppressing social unrest and promoting CCP ideology.

3 Data and Measurement

To provide an accurate description of the development of Chinese newspapers, we assemble a detailed directory of all the newspapers published in mainland China during the 1981-2011 period. We use four primary sources: (1) the Chinese Newspaper Directory (2003, 2006, 2010), published by the State Administration for Press and Publication (SPPA) – the authority that issues licenses for publishing newspapers; (2) the Annual China Journalism Yearbooks (1982-2011), published by the Chinese Academy of Social Science; (3) the China Newspaper Industry Yearbooks (2004-2011), published by a Beijing-based research institute; and (4) an eight-volume collection of the front pages of major newspapers on the date of first publication. For each newspaper, we track information about the location of its headquarter, publication periods (start, suspension, and termination dates), direct ownership, financing sources, government supervisor, administrative ranking within the Chinese government hierarchy, and type of readership (general or specialized).[2] To the best of our knowledge, our

[2]When relevant information from different sources is inconsistent or ambiguous, we verify the information with newspapers' internal documentation and from industry experts.

newspaper directory is the most comprehensive among existing data sources.

3.1 Newspaper Entry and Exit (1981-2011)

Newspaper types. Based on ownership and managerial autonomy, we classify the general-interest newspapers into three different categories. Per regulation, the general-interest newspapers in China come in variants that are indicated by their names (1) "Daily," (2) "Evening," and (3) "Metro" and similar names. A "Daily" is a CCPC's official mouthpiece. Its editorial policy is strictly controlled by the CCPC Propaganda Department. All government departments, government-affiliated organizations, and SOEs are required to subscribe to "Dailies" run by all the CCPCs that have power over them. By contrast, "Evenings" and "Metros" are under less control in terms of both editorial policies and managerial autonomy. Being oriented to a general audience, they carry more entertaining news and rely heavily on street vendors for circulation. Although they differ in terms of publication time ("Evenings" in the afternoon and "Metros" in the morning), these two types of newspapers share similar content, circulation, and managerial practices. In the 1990s, general-interest newspapers were permitted to own subsidiary newspapers. These subsidiary newspapers, typically named "Metros" or "Evenings," carried more consumer-orientated content. Financially, they actively absorbed non-state capital in addition to funding from their parent newspapers. In the empirical analysis, we will distinguish these "Subsidiaries" from the "Evening" and "Metro" newspapers that are directly owned by CCPCs.

Historical evolution. Based on the newspaper directory, Figure 1 depicts the historical evolution of the Chinese newspaper market. In 1981, when our sample period begins, there were 242 general-interest newspapers, 230 of which were the Party Dailies of central and provincial CCPCs. The number of Party Dailies increased continuously during the 1980s and 1990s. Three factors – regulatory changes, reduced subsidies to newspapers, and the encouragement of financing through advertising – spurred the entry of Party Evenings in the 1980s and then Subsidiaries in the 1990s and the early 2000s.

The impact of the economic reforms involving SOEs in general and newspapers in particular is clearly reflected in Figure 1. Indicated by the first vertical line, the number of Subsidiaries increased substantially after 1992 – a landmark year of Chinese economic reform of SOEs. Another notable change, indicated by the second vertical line, is the decline in Party Dailies in 2003 when the central government withdrew the licenses of most county-level newspapers. Thus, more than 80 percent of county papers exited the market. We will exploit this market consolidation to identify the effect of competition on media bias.

3.2 Content and Bias

Our content data are extracted from the digital archives of WiseNews, a Hong Kong-based data provider. We restrict our sample to the 1999-2010 period because WiseNews contains

only partial content of a few newspapers before 1999. During the sample period, the WiseNews database covers 117 general-interest newspapers published in mainland China, but the number of newspapers varies slightly over years (see Table 1). As summarized in Table 2, among these 117 newspapers, 40 are Party Dailies, 12 are Evenings, and 65 are Subsidiaries; in terms of administrative rank, 5 are national, 71 are provincial, and 41 operate at the county level. Geographically, these newspapers cover major prefectural areas in 26 of the 31 provinces in mainland China. Therefore, our sample largely represents the newspaper markets in urban areas, which comprise the majority of readership in China.

3.2.1 Content Capturing Political and Economic Goals

We count the number of articles per newspaper and year using nine content categories, including three categories for each of the three functions: Party Line, Mass Line and Bottom Line. Here, we briefly describe the keywords used to identify articles in each category. A detailed description can be found in the online appendix.

The Party Line. We code three types of content to capture a newspaper's adherence to the Party Line. First, we calculate the number of articles that mention the names of 2,111 political leaders during our sample period.[3] Second, we calculate the number of articles that are provided by or cite Xinhua News Agency, which is a key instrument for the CCP to enforce its propaganda objectives. Third, we identify articles covering the annual top 10 news events listed by two extreme media outlets – Xinhua News and the Epoch Times. The latter is an overseas-based Chinese newspaper sponsored by anti-CCP organizations. We use the ratio of the numbers of these two types of articles to capture the omission of negative news relative to the inclusion of positive news. Because the Epoch Times started to list its top 10 news events in 2002 – one year after Xinhua News, we use the 2002 data to fill the missing observations for this measure from 1999 to 2001.

The three content categories above are closely related to existing measures of media bias in the US. For instance, news stories that cover politicians from a specific party are commonly used to measure media bias favoring that party (e.g., D'Alessio and Allen 2000; Durante and Knight 2009). The articles that cite Xinhua News are in the spirit of Groseclose and Milyo's (2005) bias measure, which is based on the share of articles that cite think tanks. Coverage of positive news is another common measure of bias that favors incumbent politicians (Larcinese et al. 2007).

The Mass Line - Investigate Reporting. As discussed in Section 2.2, Chinese newspapers are required to report the public's concerns about local policy makers and outcomes to improve their accountability to higher-level politicians. We identify three types of reports that relate to this aspect – reports on corruption, disasters, and accidents. Corruption obviously relates to (upward) accountability. Significant disasters and accidents, particularly

[3] Among these leaders, 108 individuals are at the central level, 816 at the provincial level, and 1187 at the prefectural level.

those caused by human error or wrongdoing, are often regarded as reflecting the incompetence of government officials. Media reports on local governments' inadequate actions to rescue victims, protect public property, and mitigate losses can lead to the dismissal of bureaucrats and the demotion of officials. Examples include floods caused by poorly-managed drainage systems and public-transportation crashes due to faulty systems and management failures.[4] We extract data on the occurrence of disasters and accidents in China that involve more than 30 fatalities from the EM-DAT database of the Center for Research on the Epidemiology of Disasters in Brussels. During our sample period, we identify 226 such events, 129 of which were caused by human factors. We then search for articles that cover these disasters/accidents within a certain time frame around their occurrence.

Because this type of news may reflect poorly on the CCP, one may doubt whether party papers, which are strictly controlled by local CCPs, actually practice Mass Line journalism. Furthermore, given that local governments may suppress Mass Line material, commercial newspapers may cover it more extensively.

The Bottom Line. Soft journalism is an important part of the efforts of general-interest newspapers worldwide to compete for readership and advertising revenues. We measure three types of soft journalism: sports, entertainment (e.g., movies and music), and criminal news stories. These three are the most-searched-for topics on Baidu, the leading search engine in China.

Summary Statistics. Based on the above content categories, we define nine variables: *Leader Mentions, Xinhua Cites, Epoch Stories, Corruption, Disasters, Accidents, Sports, Entertainment*, and *Crime*. These variables are measured based on the proportion of articles belonging to a content category (of the total number of articles) in WiseNews, except for "Epoch Stories," which is measured by the ratio of the number of articles that cover the top events listed by the Epoch Times to the number of articles that cover the top events listed by either Xinhua News or the Epoch Times.

Table 3 presents summary statistics of these nine variables at the newspaper-by-year level. A large number of articles concern the Party Line. Specifically, 10.98 percent of all articles mention a political leader, which corresponds to 1.86 million articles. We find 3.9 million articles that mention Xinhua News. We find 0.5 million articles covering the Epoch Times' top stories and 1.2 million articles covering the Xinhua top stories. Regarding the Mass Line, 26,909 articles cover corruption cases that are not part of government officials' speech or anti-corruption activities.[5] We find 84,156 stories about disasters and 19,796 stories about accidents. Bottom Line stories included 1.1 million articles on sports, 2.12 million articles on

[4]For example, in July 2011, two high-speed trains collided in Wenzhou, Zhejiang province, killing 40 people. The Ministry of Railways issued directives to restrict media coverage, which was met with limited compliance from newspapers beyond its control. Eventually, three high-rank railway officials were dismissed under charges of corruption. Source: http://www.guardian.co.uk/world/2011/jul/25/chinese-rail-crash-cover-up-claims

[5]These articles on corruption are mostly related to low-level officials. We only identify 13 cases concerning prominent political leaders, an extremely small fraction in our sample of 2111 political leaders who are intensively covered.

entertainment, and 89,711 articles on crime.

3.2.2 Measuring Bias

We compress the nine content categories above into one scalar measure that aims to capture how strongly a newspaper's content reflects its political goals, as opposed to its economic goals. This aim can be accomplished in several ways. First, in the spirit of Groseclose and Milyo (2005) and Gentzkow and Shapiro (2010), the similarity between a newspaper's content and a known focus on a particular goal can be used. Given our strong prior belief that Party Dailies focus on political goals, a newspaper that has a news mix that is characteristic of Party Dailies is likely to target its content toward political goals. Thus, a measure of the weight placed on political goals could be the predicted probability that a newspaper is a Party Daily based on its coverage of our nine categories. Second, similar to the first approach, a measure of the weight placed on economic goals by a newspaper could be its expected advertising revenues based on its mix of coverage. Third, if the trade-off between political and economic goals is indeed a primary dimension of product differentiation, PCA should identify it. This last approach is similar to NOMINATE scores, which are used to measure the left-right dimension in the US Congress.

We use all three approaches. First, we regress a dummy indicator for a newspaper being a Party Daily on the content variables, controlling for prefecture-by-year fixed effects. From this regression, we compute the probability that a newspaper is a Party Daily based on its content alone. Second, we regress the logarithm of a newspaper's advertising revenues on the nine content variables, again controlling for prefecture-by-year fixed effects. We use this regression to compute the newspaper's expected advertising revenue based on its content alone. Finally, we employ PCA to construct a single-dimensional measure that captures the most important variation in our nine content categories.

These three methods produce very similar results. Table 4 presents the PCA results, where first component explains 36 percent of the variation in news coverage. Figures 2 and 3 demonstrate how the PCA estimates are related to those using the other two methods. Figure 2 shows a linear and almost perfect relationship between the predicted probability that a newspaper is a Party Daily (and the expected advertising revenues) and the first principal component. Figure 3 plots the t-statistic on each content category against the factor loadings of the PCA first component. The content categories with positive factor loadings are all individually positively correlated with the probability of being a Party Daily and negatively correlated with advertising revenues, and vice versa for those with negative loadings. Notably, it is not the case that some categories are important for predicting advertising revenues and others are important for predicting whether a newspaper is a Party Daily. Instead, the content categories all line up along one dimension, captured by the PCA first component. Consequently, the PCA first component unsurprisingly predicts advertising revenues almost as well as the unconstrained nine content categories.

The factor loadings are also sensible given our previous discussion of how Chinese newspapers' political goals would shape their content. For the Party Line, the *Leader Mentions* variable has the strongest positive factor loading, followed by *Xinhua Cites*, while *Epoch Stories* has a sizeable negative factor loading. All three Bottom Line measures, namely, *Entertainment*, *Crime,* and *Sports,* have strong negative loadings. Concerning the Mass Line measures, *Corruption* and *Disasters* have strong positive factor loadings, while the loading of *Accidents* is modest.

Because of the analytical convenience of the PCA approach, we will use the PCA first component as our measure of newspaper bias. To further verify its credibility, we examine this bias measure for individual newspapers and for newspapers in a region.

Regarding the bias of individual newspapers, Table 5 lists the top 10 and bottom 10 papers in terms of our bias measure. The 10 most-biased papers include 9 provincial Party Dailies and People's Daily – the mouthpiece of the CCP central committee. Except for Anhui Daily (No. 4 on the list), the other 8 provincial Party Dailies are from inland provinces, in which the media are believed to be less open than those in coastal provinces. The newspapers with the lowest bias are all Subsidiaries from large metropolitan areas, consistent with the common belief that metropolitan areas breed the most commercial and free media in China. Figure 4 shows the distribution of the bias measure across the three types of newspapers: Party Dailies, Party Evenings, and Subsidiaries. The bias distribution of Party Dailies is generally located to the right (political) side of the distributions of the other two types of newspapers. One exception is Guangzhou Daily, which is the least-biased Party Daily and earns the largest advertising revenues in China. Interestingly, the Chairman and Editor-in-Chief of this newspaper, Yuanjiang Li – a well-known newsman who led the newspaper during the rising tide of commercialization – was prosecuted and sentenced to a 12-year term for "corruption" in 2004.[6]

Furthermore, we examine whether our bias measure can capture differences in the weight placed on political goals across markets and regions. Previously, we showed that the bias measure explains which newspapers are Party Dailies and have low advertising revenues within a given market and year. However, Figure 4 reveals that some Evenings and Subsidiaries are even more biased than some Party Dailies. This result may reflect regional differences. Thus, we compare our method to other measures of political control of the media and firms at the regional level. To this end, we calculate the average value of the PCA first component for all newspapers within a province. Figure 5a demonstrates that this measure of average bias has a strong negative correlation with an index of regional competency constructed by Fan and Wang (2009), which is largely based on the degree of government involvement in the economy (e.g., the share of SOEs) and the role of markets in resource allocation (e.g., the development of capital and labor markets). This measure is also strongly positively correlated with the

[6]According to Zhao (2008, P116), Yuanjiang Li fell from favor because of critical reporting on local affairs and defying the orders of Guangzhou municipal party officials.

share of deleted posts (Bamman et al. 2012) and the share of government accounts (Qin et al., 2016) on Sina Weibo – the most prominent online public platform in China. See Figures 5b and 5c, respectively.

We conclude this section by highlighting several findings. First, we find a strong product differentiation among newspapers along the politico-economic dimension. We consider a newspaper politically biased when it does not simply try to attract readers but also directs content toward the CCP's political goals. In this sense, the PCA first component is an appropriate measure of media bias. Second, commercially oriented newspapers act much less as mouthpieces. For example, while Party Dailies mention party leaders in 21 percent of their articles, Subsidiaries only mention them in 5 percent of their articles. This difference implies that the massive entry of commercial newspapers in the 1990s (recall Figure 1) is likely to reduce readers' exposure to propaganda. However, commercial papers do not cover more sensitive material such as corruption and disasters. In fact, they cover these topics less than Party Dailies do. These results suggest that the entry of commercial papers is unlikely to increase information that is relevant to political accountability. Third, we find a very strong negative correlation between advertising revenues and political content when comparing newspapers in the same market and year. In particular, increasing political bias by one standard deviation is associated with an 80-percent decrease in advertising revenues, which likely reflects the tension between political and economic goals.

4 Theory

How does political-economic tension in the real world shape the political bias of newspapers in China? This is a complex question because political-economic tension is ingrained in a decentralized government hierarchy with discordant preferences across layers and is further complicated by market competition. To answer this question and guide our empirical analysis, we develop a simple theoretical model.

Our model incorporates firms (or political entities) with a politico-economic dual goal into an otherwise standard industry organization framework. Newspapers generate profits from advertising but also deliver political value by exposing their audience to political content intended, for example, to maintain regime stability.[7] Firms choose their newspapers' positions (the degree of media bias) to further these goals on in a Hotelling line of product placement as in Mullainathan and Shleifer's (2005) model of media bias. We also model the entry of different types of newspapers, which is empirically important because the number of both highly controlled and commercial newspapers has increased tremendously (recall Figure 1).

[7]We do not explicitly model how these political goals are affected by biased content. There exists evidence from other settings that biased news content has effects (e.g., Enikolopov et al. 2011; Adena et al. 2013) and that these effects are too complex to capture in a rational information framework (e.g., Stockmann, 2012; Bai et al. 2015).

Consumers and Market Demand. There exists a continuum of consumers with newspaper-content blisspoints, x_i, which is uniformly distributed on $[0, 1]$. On this continuum, a position closer to one indicates a stronger political preference for content in alignment with the CCP propaganda policy, while a position closer to zero indicates a preference for commercial content. Consumers who prefer commercial content have an aversion to a newspaper full of reports about government officials and political slogans, while some other consumers, such as CCP cadres or employees in public sectors, dislike newspapers that publish "no serious stuff." A consumer with blisspoint x_i derives utility from a newspaper, n, at position x_n:

$$u\left(x_i, x_n\right) = \frac{1}{2} - \left|x_i - x_n\right|.$$

Here, the utility of consuming a newspaper depends on the match between the consumer's own preferred position and the newspaper's position, as in Mullainathan and Shleifer (2005).

The subscription and retail prices of Chinese newspapers are strictly regulated, and the revenues from circulation only account for a small fraction of a newspaper's total revenues. Thus, the prices of newspapers are assumed to be constant, and, for simplicity, are set to zero. We further assume that a consumer reads only one newspaper – the one that delivers the highest positive utility. Without loss of generality, let $x_n \in [\frac{1}{2}, 1]$. The market demand for a monopolistic newspaper located at x_n is

$$X\left(x_n\right) = \frac{1}{2} + (1 - x_n).$$

To maximize demand, this newspaper locates at the center and covers the entire market: $X\left(\frac{1}{2}\right) = 1$.

Newspaper Owners' Objectives A CCPC has a politico-economic dual goal. When assessing the economic goal, we assume that a newspaper's revenue is proportional to the total value of the advertising market it faces, denoted by R, and that the profit for a newspaper at position x_n is $X\left(x_n\right) R$. When assessing the political goal, we assume that the CCPCs blisspoint is $x_n = 1$. We model a newspaper's political bias, b, as the deviation from the profit-maximizing position, $b\left(x_n\right) = x_n - \frac{1}{2}$. We assume that a CCPC values the average bias of newspapers, to which readers in the market are exposed. A newspaper has no political value if it is unbiased, however it will also have little political value if it is highly biased and has no readership. Consider a market with N newspapers, in which a CCPC, superscripted by J, owns a set of papers N^J. Thus, $N - N^J$ is the number of newspapers owned by other CCPCs. Then, the utility of $CCPC^J$ is:

$$U^J = \underbrace{\sum_{n \in N^J} X_n\left(x_n\right) R}_{\text{revenue}} + \alpha^J \underbrace{\sum_{n \in N} X_n\left(x_n\right) b\left(x_n\right)}_{\text{political value}}.$$

The parameter α^J measures the importance of the political bias for $CCPC^J$.

A key feature of the above utility function is the nature of political value, which is akin to that of a public good (within the CCP), indicated by the second term. Specifically, if one newspaper of a CCPC exposes readers to biased content, all CCPCs in the market will benefit. This captures the fact that essential parts of newspapers' political value such as regime stability can be used non-exclusively by other CCPCs in an area.

When we later introduce multiple levels of CCPCs, we will further assume that the political value has geographic externalities. This is because the negative effects of events that may affect regime stability – such as political unrest and protests – are likely to spill over across regions. Based on this assumption, a higher-level CCPC will internalize a larger share of spillover and hence have a larger α^J. This is analogous to the argument in the study of federalism (e.g., Oates 1972; Inman and Rubinfeld 1997), in which local governments internalize less of the externalities of national security.[8]

Bias and Entry Choice Consider a monopolistic CCPC with one newspaper. When increasing the bias, the monopolist trades off a decrease in profits and the audience who are exposed to the bias against the remaining audience's increased bias exposure. The optimal bias is

$$x_n^* = 1 - \frac{R}{2\alpha^J}, \text{ for } 0 \leq \frac{R}{\alpha^J} \leq 1. \tag{1}$$

With such an interior solution, the optimal position, and thus the bias $b(x_n)$, decreases in the size of the advertising market, R, while increasing in the CCPC's political valuation α^J. This implies that the political bias will be lower in areas with larger advertising markets. In the presence of geographic externalities, a lower-level CCPC will produce less-biased newspapers. When the political valuation is sufficiently small relative to advertising revenues, the optimal position is a corner solution $x_n^* = \frac{1}{2}$, in which case the newspaper maximizes profit, and the political bias disappears.

Now, suppose two CCPCs compete in a market: one at a higher level, $J = H$, and one at a lower level, $J = L$. To save on notation, we will refer to $CCPC^H$ simply as H and $CCPC^L$ as L. To capture that the higher-level CCPC internalizes more of the political benefits, we assume that $\alpha^H > \alpha^L$.

The two CCPCs non-cooperatively decide 1) whether to launch a newspaper and 2) what type of newspaper to launch. To make the analysis tractable, we assume that a newspaper's position is a binary choice: $x_n \in \{\frac{1}{2}, 1\}$. Recall that when $x_n = \frac{1}{2}$(or $b_n = 0$), the newspaper is a profit-maximizer; when $x_n = 1$ (or $b_n = \frac{1}{2}$), the newspaper attains the highest level of political bias. We will call these two newspaper formats "Party paper" and "Commercial

[8]To see the geographic externality effect clearly, consider an example of two prefectures, A and B, within a province.A newspaper in prefecture A is located at position x_n and thus generates political value $X_n(x_n)\, b(x_n)$. The geographical externality means that it also generates political value in prefecture B, for instance, by a factor $\varepsilon \in (0,1)$ of the effect in prefecture A. In this case, the provincial CCPC's value of the political effect of this newspaper is $(1+\varepsilon)X_n(x_n)\, b(x_n)$ because it internalizes the externaltiy on prefecture B.

paper" and superscript them with P and C when necessary.

To capture the development of the Chinese newspaper market, we model newspaper entry in response to the growth of advertising markets. The analysis proceeds sequentially: we start with a zero-newspaper situation in which we identify the first newspaper entry (at the point with the smallest possible advertising revenue). Given this first newspaper, we then consider which newspaper would enter next, and so on. To simplify the analysis, we make the following assumptions. First, after paying a fixed cost c, a CCPC chooses a newspaper format with which to enter the market. The cost of changing the newspaper format is high enough that a newspaper never relocates. Second, when determining market entry, newspapers only consider current profits without strategically deterring future entry. This assumption is reasonable because local politicians who control newspapers are subject to frequent promotion evaluation and usually have a short time horizon. Third, to avoid uninteresting cases with only commercial newspapers in the market, we assume that the valuation of political bias is above a minimum threshold: $\alpha^H > c$.

Round 1: No Newspapers. Without competing products, $CCPC^J$ that launches a Party paper obtains both advertising revenues and political benefits: $U_P^J = \frac{1}{2}\left(R + \alpha^J\right)$. If it launches a Commercial paper instead, it will receive larger economic benefits but no political benefits: $U_C^J = R$. Given that the initial advertising market is small, $CCPC^J$ prefers the Party paper and will enter if

$$\frac{1}{2}\left(R + \alpha^J\right) = c. \tag{2}$$

Because the higher-level CCPC internalizes more of the geographic externality, it values the political bias more and will enter the market first.

Round 2: One Incumbent H-Party Paper. The market now has an incumbent Party paper produced by H. It faces a trade-off when introducing a new product. Specifically, launching a Commercial paper will increase its profits because the market expands to consumers who previously did not read any newspapers. However, the commercial paper will incur a political cost as it steals readers from the Party paper, which reduces the exposure of political bias. Thus, H will benefit from starting a Commercial paper if

$$\Delta U_C^H = \underbrace{\frac{1}{2}R}_{\text{market expansion}} - \underbrace{\frac{1}{4}\alpha^H}_{\text{political cost}} \geq c. \tag{3}$$

Consider the entry decision of the lower-level CCPC, L. It will launch a commercial paper if

$$\Delta U_C^L = \underbrace{\frac{1}{2}R}_{\text{market expansion}} + \underbrace{\frac{1}{4}R}_{\text{business stealing}} - \underbrace{\frac{1}{4}\alpha^L}_{\text{political cost}} \geq c. \tag{4}$$

In addition to the market expansion effect, this *L-Commercial* will steal business from the incumbent *H-Party*. The entry of *L-Commercial* also imposes a political cost on L because

it destroys part of the political value (the public good) that was created by *H-Party*. Given $\alpha^L < \alpha^H$, L has a stronger incentive to launch a Commercial paper than H.

Instead of a Commercial paper, L can launch a Party paper. This decision will be made if

$$\Delta U_P^L = \underbrace{\frac{1}{4}R}_{\text{business stealing}} \geq c. \tag{5}$$

Here, L enters with the same newspaper type as the incumbent H-Party, and thus no market expansion effect occurs. Because of the public good characteristics of the political value generated by H, the entry of *L-Party* does not create additional political value for L. A comparison between (4) and (5) reveals that L will launch a Commercial paper if the market expansion effect dominates the political cost. Formally, *L-Commercial* will enter the market earlier than *L-Party* if $\alpha^L < 8c$, that is, the political value of bias is sufficiently low for L.

Round 3: Two Incumbents, (H-Party, L-Party) or (H-Party, L-Commercial). In the first case, there are two Party papers in the market. The incentive to introduce a Commercial paper is symmetric between H and L. Launching a Commercial paper, by either $CCPC$, results in market expansion and business stealing as well as a political cost. Because it has a lower political cost, L will launch a Commercial paper first. In the second case, *H-Party* and *L-Commercial* are in the market. Additional newspapers will only affect profits, and the profit increment resulting from launching a commercial paper is greatest. Hence, H will launch a Commercial paper (when $\frac{3}{8}R \geq c$). Following the entry of *H-Commercial*, L will enter with a Party paper (when $\frac{1}{8}R \geq c$). The following proposition characterizes the above entry pattern.

Proposition 1 ***(Entry and hierarchical competition)*** *Consider a market with a higher-level CCPC, H and a lower-level CCPC, L. Suppose that H's political valuation of media bias is higher than L's (i.e., $\alpha^H > \alpha^L$).*

a. The first paper in the market will be a Party paper owned by the higher-level CCPC.

b. The first commercial paper in the market will be owned by the lower-level CCPC.

c. Competition between CCPCs triggers early entry of commercial newspapers..

Corollary 1 *There are two equilibrium newspaper entry sequences: 1) H-Party, L-Party, L-Commercial, and H-Commercial; and 2) H-Party, L-Commercial, H-Commercial, and L-Party.*

Note that the entry of commercial newspapers is facilitated by the competition between CCPCs. This can be observed by comparing Equations (3) and (4). In Equation (3), a monopolistic CCPC trades off the market expansion effect against the political cost. In (4), because of the existence of an incumbent competing Party paper, an additional business stealing effect occurs, which induces L to introduce a commercial paper earlier than it might

have if it had been a monopolist. Similarly, the existence of *L-Commercial* will spur the entry of *H-Commercial,* because the political cost of having a commercial paper in the market has already been inflicted.

Proposition 1 describes why both the hierarchical structure and competition hinder the fulfillment of political goals. The hierarchical structure matters because the CCPC with the minimum political valuation in a market will be the first to enter with a commercial paper, which steals readership from the Party paper and reduces its political impact. Competition hinders political goals because the business stealing effect induces the early entry of commercial papers. From the perspective of media control, one natural response is to forbid lower-level CCPCs from producing commercial papers, as observed in the Chinese media context.

As discussed in Section 2, in most non-capital prefectures the lower-level (county) CCPC may only run Party newspapers, while the higher-level (prefecture) CCPC may also run Commercial newspapers. We now examine the theoretical mechanism in this more restricted setting. According to the model, the first paper will be a Party paper launched by H. The remaining entry sequence is either L-Party and then H-Commercial or the reverse. The entry decision of H-Commercial is determined by an inequality of the same form as (3) and the entry decision of L-Party is determined by an inequality of the same form as (2).[9] Thus, the following result is obtained.

Proposition 2 ***(Entry and political/economic factors)*** *Consider a market with two CCPCs, H and L, such that $\alpha^H > \alpha^L$. Suppose that H can launch both Party and Commercial newspapers while L can only launch a Party newspaper.*
a. For H, the entry of the Party paper is facilitated by both advertising revenues and political valuation, while the entry of the Commercial paper is facilitated by advertising revenues but hindered by political valuation.
b. For L, the entry of the Party paper is facilitated by advertising revenues but is unaffected by political valuation.

Absent any existing newspaper, launching a party newspaper yields a double dividend of both political and economic benefits; see Equation (2). Thus, the entry of the first paper, *H-Party*, increases with both types of benefits. By contrast, a Commercial newspaper imposes a political cost, and thus the entry of *H-Commercial* is delayed by a higher political valuation; see 3. The entry of *L-Party* is independent of the political value; see Equation (5). This is a direct consequence of the assumption that the political value is a public good and the fact that it was already provided by the higher-level Party newspaper.

[9]More precisely, if L-Party enters earlier than *H-Commercial*, its entry decision is described by inequality (5). If L-Party enters laster, its decision is described by a an inequality with the same terms as (5), but with a smaller business stealing effect ($\frac{1}{8}R$). For H, if H-Commerical enters earlier than L-Party, its entry decision is described by inequality (3). If H-Commercial enters after L-Party, H's decision is described by an inequality with the same terms, only adding a business stealing effect ($\frac{1}{8}R$), which captures the audience it steals from L-Party.

In the above analysis, Equation (3) makes explicit the condition of the entry of a commercial paper in the presence of its sibling party paper. Thus, it provides guidance in estimating an upper bound of the political cost incurred by the entry of Commercial newspapers. In particular, for a monopolistic CCPC, this equation determines the entry of the first commercial paper, when the political cost exactly equals the difference between the increased advertising revenue due to market expansion and the entry cost. Hence, the value of market expansion defines an upper bound for the CCPC's perceived political cost of introducing commercial paper.

Another empirically important point is that advertising revenues may cross-subsidize media bias. This is because larger advertising revenues allow a CCPC to subsidize the entry of highly-biased Party papers. Although the political value of a newspaper is lower than the cost of entry, an increase in advertising revenues will induce the CCPC to launch the first Party paper; see Equation (2) again. Thus, the expansion of advertising markets may fuel the growth of propaganda outlets.

Effect of entry on bias We have focused on the entry of newspapers with fixed positions. On top of this extensive margin, existing newspapers may change their content in response to increased competition due to market entry. In China, it is rare that a Party paper switches to a Commercial paper or the other way round. Nevertheless, a Chinese newspaper can fine tune its content without changing its basic type. We will empirically examine this effect on the intensive margin in a setting similar to that in Proposition 2. To guide the investigation, we sketch the intuition below.

Consider that each of the two newspaper types – Party and Commercial papers – exists in two variants and that the two variants of the same newspaper type are much closer than two variants across types. Suppose that H produces a Party paper, P^H and a Commercial paper C^H. Now, L enters the market with a Party paper, P^L, of the less-biased variant, because L values the political bias less. In this setting, P^H and P^L are close substitutes in the Party-paper segment, while C^H and P^L lie in different segments and are not close substitutes. Upon the entry of P^L, H has an incentive to reallocate P^H toward P^L to mitigate the business-stealing effect created by the new competitor. Meanwhile, H will also reallocate C^H toward P^L to a more-biased variant because the stealing of its own business is mitigated by the presence of P^L. Applying this argument to the empirical setting leads to the following testable prediction.

Claim 1 ***(Bias and competition)*** *Suppose a monopolistic CCPC operates in a local market with a Party paper and a Commercial paper. The entry of a Party paper owned by another CCPC will decrease the political bias of the incumbent Party paper while increasing the bias of the incumbent Commercial paper.*

The general point here is that the existence of a rival product reduces the incentive of a two-product owner to differentiate its products, resulting in an ambiguous effect of competition on the average media bias. This insight is particularly important for understanding the impact of market competition on media bias when producers with multiple media outlets compete with one another, as in the current setting.

5 Empirical Analysis

This section investigates our main theoretical predictions regarding newspaper entry and political bias using the newspaper content and directory data that we construct. A main theoretical point is that competition between governments at different administrative levels will reduce readers' exposure to media bias because the lower-level government will run less-biased papers and enter early with commercial papers. We will also investigate how advertising revenues and historical political preferences relate to media bias and product entry. Finally, we will test whether competition has an impact on the bias of existing papers using the 2003 reform.

5.1 Bias

We describe how different factors are associated with the political bias of newspapers. Following equation (1), we estimate the following econometric specification:

$$bias_{ijt} = \alpha_t + \beta_1 level_i + \beta_2 type_i + \beta ads_{jt} + \gamma' pol\_pref_j + X_j'\delta + \epsilon_{ijt}. \tag{6}$$

The variable $bias_{ijt}$ is our measure of newspaper bias for newspaper i in prefecture j at year t. The variables $level_i$ and $type_i$ are newspaper i's administrative level and type, respectively. The variable ads_{jt} is the size of advertising market in a prefecture. Because data on advertising revenues are not available at the prefecture level, we proxy this measure by scaling the prefecture-level GDP with ratio of newspaper advertising revenues to GDP at the national level. Two measures are included in pol_pref_j. The first is $CCP\_Stronghold_j$, which is the share of counties in prefecture j that were passed by the CCP Red Army Long March of 1933-1935 or were part of a CCP Revolution Base (Soviet) before 1949. The second is a dummy variable, $TreatyPorts_j$, which is equal to one if prefecture j was ever conceded to Western powers from 1840 to 1910 as constructed by Jia (2014). Historically, these areas had greater exposure to Western culture and a free press. The vector X_j includes a prefecture's distance to Beijing, its latitude and longitude and the number of newspapers in a prefecture in 1895. Standard errors are clustered at the prefecture level.

Table 6 reports the results. The first column includes only year-fixed effects; the second column includes year- and prefecture-fixed effects; and the third column includes year-by-prefecture fixed effects. Administrative level strongly predicts newspaper bias. The provin-

cial papers are significantly less biased than the central papers. A comparison between the coefficients of provincial and prefectural newspapers, followed by an F-test for equal coefficients (see the bottom rows of Table 6), demonstrates that the prefectural newspapers are less biased than the provincial newspapers. The regressions also confirm that Party Dailies are significantly more biased than Evenings, which are significantly more biased than Subsidiaries.

Among the political and economic factors, newspapers in historical CCP strongholds are more biased, whereas newspapers in former Treaty Port areas are less biased. Newspapers in areas with larger advertising revenues are less biased. However, when the prefecture-fixed effects are included in the regression, the coefficient is reduced by half while the standard error increases dramatically, making it statistically insignificant. We cannot precisely estimate the coefficient on the advertising market using prefecture-fixed effects, possibly because the variation over time is not strong enough during the sample period.

5.2 Entry

The newspaper type (Party Daily, Party Evening, or Subsidiary) explains 56 percent of the variation in the bias measure. Thus, understanding why different newspaper types enter in different markets goes a long way in explaining the variation in readers' exposure to media bias. Additionally, we observe newspaper entries and exits for a much longer period (1981-2011) than we do for our content-based bias measure. Thus, we can better explore the time-series variation to facilitate identification.

We study two samples separately: one from the provincial capitals and the other from non-capital prefectures. In the provincial capitals, we observe that higher and lower levels of CCPCs enter the market with both party and commercial papers. Thus, we can investigate the way that hierarchical competition affects entry (i.e., Proposition 1). In the non-capital prefectures, because of the restriction of the entry of low-level commercial newspapers, we are unable to examine the effects of hierarchical competition. However, these prefectures provide a much larger and relatively homogenous sample, which allows us to investigate the effects of political and economic factors on product entries (i.e., Proposition 2).

5.2.1 Hierarchical competition

As described in Section 2.1, the provincial capital cities are the major newspaper markets. In these markets, a provincial CCPC and a prefectural CCPC compete with both Party and Commercial newspapers. We analyze the sequence of newspaper entries in 27 provincial capital cities, excluding four provincial cities (i.e., Beijing, Chongqing, Shanghai and Tianjin).

Table 7 displays the market configurations and transitions in the 27 provincial capital markets above. Market configuration is described using a sequence of letters with a maximum of four elements (PCpc), where the letter indicates whether there is a party or commercial newspaper and the case indicates whether the upper or lower level (province or prefecture)

runs the paper. For example, "P" means that the only paper is a provincial party paper; Pp indicates a provincial and a prefecture party paper; and "Pc" means that the market has a provincial party paper and at least one prefecture commercial paper.

The first column and the last row of Table 7 show the market configurations in 1981 and 2011, respectively. In 1981, the beginning of our sample period, all markets had a provincial party paper. Such provincial Dailies faced no competition in 7 markets (configuration P), competed with a prefecture commercial paper in another 7 markets (configuration Pc), and competed with a prefecture party paper in 11 markets (configuration Pp). Note that in two markets, Guangzhou (configuration PCp) and Kunming (configuration PC), the provincial CCPCs already had a commercial paper in 1981, indicating the later entry of prefectural commercial newspapers. One likely reason is that these two cities had well-developed newspaper markets before 1950. For example, in Guangzhou, Yangcheng Evening News (provincial level) was already well established in the 1950s. The bottom row of Table 7 shows that, in 2011, at the end our sample, both levels of government had both party and commercial papers (configuration PCpc) in 21 markets.

The remaining part of Table 7 illustrates the dynamics of market entry. All 7 markets that started with a monopolistic provincial party paper witnessed the entry of a prefecture commercial (P to Pc). This market configuration also holds in the 7 markets that started with configuration Pc in 1981. After the entry of a provincial commercial paper (Pc to PCc), these markets all ended up in configurations PCc or PCpc. Of the 11 markets that started with party papers from both provincial and prefectural CCPCs, 8 witnessed the entry of a prefectural commercial paper, followed by the entry of a provincial commercial paper. These market entry patterns are all consistent with Corollary 1. The only inconsistency comes in two markets – Nanjing and Hangzhou – where a provincial commercial paper entered earlier than a prefectural one (Pp to PCp before PCpc).

In sum, the entry patterns in the provincial capitals square with the theoretical predictions. In all 7 markets in which the entry of the first paper is observed, this first paper is a provincial Party Daily. This result confirms that province-level CCPCs value political goals more than prefecture-level CCPCs. In 23 of 27 markets, the first commercial paper is run by the prefectural CCPC. The latter result suggests that compared to the provincial CCPCs, the prefectural CCPCs put a smaller weight on political goals, consistent with our previous finding that they run less-biased newspapers within a given newspaper type.

5.2.2 Economic and political factors

We examine how economic and political factors affect the entry of newspapers. To obtain a relatively large and homogenous sample, we restrict our attention to the 256 non-capital prefectures in which newspapers are operated by either a monopolist prefectural CCPC or by a prefectural CCPC and a county CCPC (before 2003). Because prefecture-level GDP information is missing for 1992 and 1993, we use data from 1987-1991 and 1994-2011. In

these markets, the entry of newspapers typically follows the pattern of "no newspaper – Party Dailies – an Evening or Subsidiary" – a pattern in alignment with the predictions implied by Proposition 2.

Formally, we test Proposition 2 by regressing the number of commercial and party newspapers in each market on our measures of the advertising market and political preferences. Table 8 reports the results. The first three columns present the results from the ordered probit regressions for three dependent variables: 1) the number of prefecture-party papers, 2) the number of prefecture-commercial papers, and 3) the number of county-party papers. Note that, in Column III, we only include observations before 2003 because most county papers were closed in 2003. In the last three columns, we regress the same three dependent variables, using the ordinary-least-squares estimation to control for the prefecture fixed effects as a robustness check.

We measure the size of the advertising market as in (6). To measure the political preferences within a region, we use the expected political valuation for newspaper bias, calculated as the sum of the TreatyPort and CCPstronghold variables multiplied by their estimated coefficients in Table 6. Two main results emerge. First, the size of an advertising market is positively correlated with the number of newspapers in both the sample of prefecture-commercial papers and that of county-daily papers. However, the correlation is only marginally significant in the sample of prefecture-daily papers. Second, the political preferences of the readers within a region are positively correlated with the entry of prefecture-party papers, negatively correlated with the entry of prefecture-commercial papers, and unrelated to the entry of county-party papers.

The two results above are consistent with Proposition 2, except that the size of an advertising market is barely correlated with the entry of prefecture-daily papers. One implication of these results is that, although the growth of an advertising market may not have a negative impact on the bias of existing newspapers (as in Table 6), it can reduce readers' exposure to media bias by introducing new commercial newspapers.

Furthermore, we evaluate the threshold value of advertising market size at which commercial newspapers enter the market. Such a threshold value can be computed from the ordered-probit regression.[10] Table 9 displays the average estimated threshold value for all markets that have at least one commercial paper. The first commercial paper enters when the newspaper advertising market is worth approximately 52 million in constant RMB 2011 prices. The threshold value for the entry of the second commercial paper is approximately

[10]Such an estimation gives the threshold value $\widehat{\gamma}$ and coefficients $\widehat{\beta}$ such that CCPC i in year t does not have any commercial papers if

$$\widehat{\beta}_1 R_{it} + X'_{it}\widehat{\beta} + u_{it} < \widehat{\gamma}_0,$$

where u_{it} is distributed as a standard normal. From this inequality, we compute the threshold value of the size of advertising market:

$$\widehat{R}_{it} = \left(\widehat{\gamma}_0 - X'_i\widehat{\beta}\right)/\widehat{\beta}_1.$$

RMB 514 million, nearly ten times as large as that of the first commercial paper. One likely reason is that the expansion in total demand after adding an additional commercial paper is small. We estimate that the first threshold for entry is approximately 69 percent higher in CCP strongholds and approximately 23 percent lower in Treaty Port prefectures.

Finally, we use the theoretical model to uncover a CCPC's valuation of the political damage caused by the entry of commercial newspapers. According to the model, a prefectural commercial paper enters the market when the increased advertising profit (after subtracting the sales loss incurred to a Party Daily by the same owner) is sufficient to cover the political loss due to reduced exposure to media bias (in addition to the entry cost). We can use this insight to perform a back-of-the-envelope calculation of this political loss. Our data show that, in the same market, a commercial newspaper earns approximately 5 times as many advertising revenues as a party paper. This finding implies that the expected advertising revenue of the commercial paper at entry is approximately $52 * 5/6 = RMB$ 44 million. This revenue is partly due to market expansion and partly due to the market stealing from the party paper that is run by the same CCPC (and from other CCPCs). Thus, the net increase in advertising revenue is smaller. Anecdotal evidence suggests that the market-stealing effect is approximately 1/4 of the total revenue increase (Chengju, 2010). Suppose further that the ratio of profits to advertising revenue is 1/3. The implication is that for the CCPCs, the average value of the political damage caused by the entry of a commercial paper is $52 * \frac{5}{6}\frac{3}{4}\frac{1}{3} = RMB$ 11 million. Although this amount is a small fraction of the total income (or local government budgets), it accounts for nearly half the average expenditure of the prefectural CCP Propaganda Departments in 2016.

5.3 Competition and bias

Despite the substantial theoretical interest in the effect of competition on media bias, empirical evidence on this topic is scant, largely because of the hurdle of identification. In this subsection, we use a reform that led to drastic exits of county newspapers to estimate the causal effect of competition on the bias of Chinese newspapers.

A large number of county CCPCs ran their own newspapers. These counties are usually the central part of a prefecture. Therefore, the market demand of a prefectural paper largely overlapped with that of newspapers that were run by its subordinate county CCPCs. In terms of content and editorial style, many county newspapers imitated their prefectural counterparts. Because digital archives of county newspapers are not available, we are unable to measure the political bias of the county-level newspapers. However, interviews with industry experts suggest that county dailies were likely to be less biased than prefectural dailies because the former reported less on the top political leaders and covered more county-specific events.

In 2003, the central government withdrew the licenses of most county-level newspapers. The stated purpose of this reform was to reduce the fiscal burden of local governments that

financed the county Dailies.[11] More than 80 percent of the county papers were shut down in 2003.[12] As a result, the number of county newspapers dropped from 325 in 2002 to 75 in 2004 (see Figure 1). Within the prefectures for which content data are available in WiseNews, there were nearly 60 county Dailies in 2002, but the number had dropped below 10 by 2004.

The 2003 reform generated variation in competitiveness that allows us to estimate the effect of the reduced competition on the bias of the newspapers that remained in the market. Specifically, we create a variable, *Reform_2003,* which we define as the interaction of the number of county-level newspapers in a prefecture in 2002 and an indicator variable for the year 2003 or later. This interaction term measures the decline in the number of newspapers if all county papers that existed in 2002 were closed due to the reform.

Consider the example of the Shenzhen prefecture. In 2002, four CCPCs were competing in this newspaper market: one prefectural CCPC and three county CCPCs. The WiseNews sample includes four prefectural papers: one Party Daily, one Evening, and three Subsidiaries. By 2004, all three county newspapers were closed. Thus, the Reform_2003 variable is zero before 2003 and then three in 2003 and thereafter. We estimate the effect of the reform on the bias of the remaining four prefectural papers. According to Claim 1 in the theory section, the exit of county newspapers would increase the political bias of their close-substitute – the prefectural Party Daily – but decrease the bias of their non-close substitutes – the prefectural commercial newspapers.

Table 10 presents the main results. The first two columns show the average effect of the reform across all newspapers. The first column presents the baseline regression in which we include only newspaper and year fixed effects. The second column adds the following controls in logarithm: population, GDP, total employment, real foreign direct investment (FDI), the number of university students, the industrial share of GDP, and government expenditure. The estimated effect of the reform is small and insignificant in both specifications.

The absence of an average effect can arise if the reform has opposite effects on different types of newspapers. The last two columns of Table 10 display such differential effects across newspaper types. The main effect (the effect for the Party Dailies) is positive and significant whereas the reform's interaction with a dummy variable that indicates commercial newspapers (either Party Evenings or Subsidiaries) is negative and significant at the 1% level. The F-test of the zero sum of the main and interaction effects (see the bottom row of Table 10) reveals that the estimated effect of the reform on the bias of the commercial papers is negative and significant. All these results are consistent with Claim 1.

The key assumption for identification is that, absent the 2003 reform, a common trend exists in the newspaper bias across prefectures with different numbers of county newspapers.

[11] Another stated reason was that some county governments mandated the residents, mostly farmers, under their administration, to subscribe to their newspapers, which caused massive protests.

[12] Exceptions include newspapers that were launched before 1949; those published by county-level, autonomous, ethnic minority administrations or in ethnic minority languages; and those in counties with a population of at least half a million, a GDP of RMB 10 billion, a volume of consumer goods sales of at least RMB 3 billion, and a party's advertising revenue in excess of RMB 4 million. See Zhao (2008) for more detail.

Although this assumption is not directly testable, we examine the existence of a pre-trend in the data. Specifically, we add a placebo reform in 2002 to the basic regression. As shown in Table 11, the coefficient of the Reform_2002 variable is insignificant, as are its interactions with newspaper types. In the same table, we also present the dynamic effects of the reform by lagging the reform variable by one year. That is, we add Reform_2004 and its interaction with the commercial newspapers to the regressions. The result suggests that the effect of the reform is largely absorbed in 2003.

Another possible concern is that prefectures with many county dailies would have had a different trend-shift than other prefectures after 2003, even without the reform. To test this possibility, we predict the number of county dailies in 2002 based on our controls. We then interact the predicted number of county papers with the reform dummy variable. Using these extended controls has little impact on our estimated effects; see Columns III and VI of Table 11.

To connect the reform to outcomes that are easier to interpret, we analyze its effect on each of the nine content categories from which our bias measure is constructed. Using the specification in Column IV of Table 10, we show that the effects of the reform on individual content categories line up along one dimension. Figure 6 plots the t-statistics of the main and (negative) interacted reform variable against the PCA factor loadings. For example, Leader Mentions has a positive main reform effect and a negative interaction effect, both with t-statistics of approximately 4. Four individual content categories have a significant coefficient: two Party Line categories (Leader Mentions and Xinhua Cites), one Mass Line category (Disasters), and one Bottom Line category (Entertainment).

The effects of the reform on the four content categories above and our bias measure (the PCA first component) are not only statistically significant but also sizeable in magnitude. Table 12 shows the rescaled coefficients to capture the average effect of the reform (the coefficients are multiplied by 2.7 – the average number of county papers in areas with positive numbers of county papers in 2002). The second column shows that the reform increased Leader Mentions in party papers by 4.2 percent and increased the difference in Leader Mentions between party and commercial papers by 5.3 percent. The reform is estimated to have caused a decline in Leader Mentions of 1.1 percent in the commercial papers, which is significant at the 5 percent level. This result is shown in the two rows labeled "Commercial" and "Commercial p-value" in Table 12, which display the sum of the main and interaction effects and the p-value for an F-test of the zero sum. More significantly, the reform is estimated to have reduced the share of articles in commercial papers that cite Xinhua News by 3.3 percent.

The last three rows of Table 12 present numbers that relate to the magnitude of these effects. For example, political leaders are mentioned in 11.5 percent of the articles in this sample (standard deviation of 12.0), while the average difference in Leader Mentions between commercial and party papers is 16.5 percent. Hence, the estimated increased gap between party and commercial papers (5.3) is approximately one-third of the average gap (16.5). The

same relations hold for our overall bias measure.

6 Discussion and Conclusions

In this paper, we construct a novel measure of media bias for Chinese newspapers, exploiting a large amount of textual data in combination with PCA. Although it does not measure ideological opposition or the suppression of information, our bias measure captures how much weight a newspaper places on the CCP's political goals relative to economic goals. This relative weight characterizes the stark content differentiation in Chinese newspapers – the highly biased newspapers focus on political goals by publishing many more propaganda and articles that act as a CCP mouthpiece, while the less-biased newspapers focus on economic goals by publishing much more entertaining content. Such product differentiation corresponds to the regular classification of newspapers as party or commercial papers based on financial independence and managerial autonomy.

Newspapers in China are owned by governments (CCPCs) that have a dual politico-economic goal. The political goal has the nature of a public good with geographical spill-overs. There exists vertical competition between different levels of CCPCs within the same geographic area. We build a simple model with these institutional features to analyze the determinants of political bias in Chinese newspapers. We find three main insights, derived from the model and supported by empirical evidence.

First, vertical competition for economic benefits between multiple levels of governments erodes the CCP's political goals, resulting in a reduction of political bias of newspapers. Theoretically, because the benefits of attaining political goals, such as regime stability, have geographical externalities, lower-level CCPCs internalize these benefits less and put more weight on economic goals. This drives lower-level CCPCs to run less-biased newspapers and to launch commercial newspapers earlier. The entry of lower-level commercial newspapers then spurs the entry of higher-level commercial newspapers. Empirically, we find that within the same market and year, newspapers owned by lower-level CCPCs are significantly less biased. In terms of entry patterns, the first newspaper in a market is typically a Party Daily owned by a higher-level CCPC, while the first commercial newspaper is typically launched by lower-level CCPCs.

Economists have contended that a regionally decentralized authoritarian system drives the Chinese style of economic reform and development (e.g., Xu 2011). For example, Maskin et al. (2000) argue that, through relative performance evaluation, the Chinese system with horizontal competition between local leaders for political promotion effectively provides information to top leaders, which in turn promotes yardstick competition and strong incentives. We show that, in addition to the horizontal political competition for promotion, local governments engage in vertical economic competition for profits within the same geographic markets. We find that such vertical competition within the government hierarchy erodes the

central government's political goals.

One point of particular interest is the externality of political benefits, which leads lower-level governments to deviate from political goals and amplifies economic competition among them. This insight can be generalized to many other settings. For instance, in recent years, the Chinese central government has been urging SOEs in the steel and mining industries to reduce pollution. Complying with this policy, SOEs owned by higher-level governments invest substantially in green technology to reducing pollution. This investment creates externalities to firms (including lower-level SOEs and private firms) within the same region, which then decrease their incentives to reduce pollution. Thus, the implementation of a pollution-reduction goal induces the excessive entry of firms with highly polluting products.

A second empirical finding is that product competition affects media bias through media owners' incentives to differentiate their products. In the current setting, media owners – the different levels of the Chinese government – target one newspaper toward political goals and one newspaper toward economic goals to better achieve their dual goal. When a competing product enters the market, this incentive of product differentiation decreases. Empirically, we estimate the causal effect of competition on the bias of existing papers. We find that the exits of Party Dailies significantly increased the differentiation among the remaining newspapers. More generally, our finding suggests that market competition in one segment will affect the bias of a newspaper in another segment as long as the owner aims to differentiate its products.

Third, even in a country with strict media control, such as China, economic development has a significant impact on media bias by changing the industry organization of the market. Given the politico-economic trade-off, the growth of the advertising market tends to reduce the political bias of existing newspapers and induce the entry of commercial newspapers. We find that the bias of existing papers decreases with the size of the advertising market in the cross-section, although the result does not have enough statistical power in the time dimension. We find strong evidence that a larger advertising market is correlated with the entry of commercial papers. These findings demonstrate that, with economic development, maintaining political control over the media becomes increasingly costly for an autocratic government.

Alongside the size of the advertising market, historical factors that influence readers' political preferences also affect the political bias of newspapers. We find that regions with lower valuations of the CCP's political goals (e.g., Treaty Ports historically conceded to Western powers) are correlated with less bias in existing newspapers, the earlier entry of commercial papers, and the delayed entry of the first party paper, whereas we observe the opposite pattern in regions with higher political valuation (e.g., historical CCP strongholds). These results suggest that exposure to democratic ideology can provide an important channel through which to decrease the political bias of media in autocracies.

We conclude this paper with a depiction of the trend in newspaper bias in China. In Figure 7, we depict our measure of the political bias of newspapers and readers' exposure to

this bias, as implied by newspaper entries and exits from 1981 to 2011.[13] Since news content data are available only during the 1999-2010 period, we assume that the bias is constant within the newspaper type and the level of CCPCs. The red line indicates the average bias across newspapers. It demonstrates an obvious downward trend, particularly after 1990. The implied change in our newspaper bias measure from 1981 to 2011 is .08, which corresponds to a decline in the number of articles that cover political leaders from 20 percent in 1980 to 12.5 percent in 2011. The blue line indicates our estimate of readers' average exposure to media bias. Within prefectures, bias exposure is weighted by each newspaper's expected advertising revenue[14], whereas across prefectures, the bias exposure is weighted by population. As can be clearly seen, bias exposure initially increases because of the massive entries of highly biased Party Dailies; it starts to decline in the late 1990s because of the influx of less-biased commercial newspapers. One general implication of this trend is that, to the extent that advertising revenues subsidize the entry of highly biased newspapers, readers' exposure to the political bias of newspapers does not necessarily decrease with advertising revenues. This is an important caveat when examining the effect of economic development on media bias.

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Table 1. Number of general-interest newspapers in WiseNews, by year

year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Freq.	8	76	82	79	84	88	78	76	81	115	88	57

Data source: Wisenews.

Table 2. Number of general-interest newspapers in WiseNews, by type and administrative rank

Admin. Rank	Party Dailies	Party Evenings	Subsidiaries	Total
Central	2	1	2	5
Province	22	4	45	71
Prefecture	16	7	18	41
Total	40	12	65	117

Data source: Chinese newspaper directory constructed by the authors and Wisenews.

Table 3. Summary statistics

VARIABLES	N	mean	sd	min	max
Leader Mentions	912	10.98	11.66	0.00	83.48
Xinhua Cites	912	23.02	15.16	0.00	86.07
Epoch Stories	905	23.29	14.17	0.00	57.36
Corruption	912	0.16	0.10	0.00	0.75
Disasters	912	0.50	0.69	0.00	9.12
Accidents	912	0.12	0.11	0.00	0.88
Sport	912	6.45	2.90	0.00	30.63
Entertainment	912	12.48	4.88	2.48	34.16
Crime	912	0.53	0.36	0.00	2.41
Total number of articles	912	18,641	13,838	289	104,240

Notes: All measures are at newspaper by year level. *Leader Mentions*: percentage of the articles that mention the top leaders. *Xinhua Cites*: percentage of the articles that cite or mention Xinhua News Agency. *Epoch Stories*: the proportion of articles covering the annual top 10 events listed by the Epoch Times of the articles covering the top 10 events listed by either Xinhua News or the Epoch Times. *Corruption*: percentage of the articles that cover corruption cases. *Disasters* (%) and *Accidents* are, respectively, the percentage of the articles that cover the natural disasters and accidents with more than 30 fatalities that caused by human errors in China during 1999-2010. *Sport*, *Entertainment*, and *Crime* are, respectively, the percentage of the articles covering sports, entertainment, and crime stories.

Table 4 Principal Components Analysis

Component	Eigenvalue	Proportion	Variable	Comp1
Comp1	3.211	0.3568	Leader mentions	0.4947
Comp2	1.421	0.1578	Xinhua Cites	0.4235
Comp3	1.090	0.1211	Epoch Stories	-0.2557
Comp4	0.826	0.0917	Corruption	0.2951
Comp5	0.709	0.0788	Disasters	0.2986
Comp6	0.682	0.0758	Accident	0.0691
Comp7	0.481	0.0535	Sports	-0.2346
Comp8	0.350	0.0389	Entertainment	-0.3773
Comp9	0.230	0.0255	Crime	-0.3636

Notes: The principal components analysis uses the residuals from a regression of content categories on prefecture by year fixed effects. The last column reports the factor loading for each variable.

Table 5. Media Bias by Newspaper

Rank	Bias	Newspaper	Type	Admin. Rank	Province	Prefecture
1	0.593	QINGHAIDAILY	Party Daily	province	Qinghai	Xining
2	0.523	NINGXIADAILY	Party Daily	province	Ningxia	Yinchuan
3	0.520	GANSUDAILY	Party Daily	province	Gansu	Lanzhou
4	0.504	ANHUIDAILY	Party Daily	province	Anhui	Hefei
5	0.477	SHANXIDAILY	Party Daily	province	Shanxi	Taiyuan
6	0.476	YUNNANDAILY	Party Daily	province	Yunnan	Kunming
7	0.475	PEOPLESDAILY	Party Daily	central	Beijing	Beijing
8	0.469	SICHUANDAILY	Party Daily	province	Sichuan	Chengdu
9	0.467	JIANGXIDAILY	Party Daily	province	Jiangxi	Nanchang
10	0.460	GUANGXIDAILY	Party Daily	province	Guangxi	Nanning
107	0.162	YANZHAOEVENINGNEWS	Subsidiary	prefecture	Hebei	Shijiazhuang
108	0.162	WUHANMORNINGPOST	Subsidiary	prefecture	Hubei	Wuhan
109	0.146	WUHANEVENINGNEWS	Subsidiary	prefecture	Hubei	Wuhan
110	0.142	MIRROR	Subsidiary	province	Beijing	Beijing
111	0.140	LIAOSHENEVENINGNEWS	Subsidiary	province	Liaoning	Shenyang
112	0.137	BEIJINGEVENINGNEWS	Subsidiary	province	Beijing	Beijing
113	0.128	THEFIRST	Subsidiary	province	Beijing	Beijing
114	0.124	YANGCHENGEVENINGNEWS FOSHAN	Subsidiary	province	Guangdong	Foshan
115	0.109	YOUTHEXPRESS	Subsidiary	central	Beijing	Beijing
116	0.100	YANGCHENGEVENINGNEWS DONGGUAN	Subsidiary	province	Guangdong	Dongguan
117	0.004	BEIJINGDAILYMESSENGER	Subsidiary	province	Beijing	Beijing

Data Source: Chinese newspaper directory data constructed by the authors and Wisenews.

Table 6. Dependent variable: Newspaper bias

	I	II	III
Province	-0.106***	-0.117***	-0.116***
	(0.009)	(0.005)	(0.006)
Prefecture	-0.148***	-0.167***	-0.165***
	(0.011)	(0.010)	(0.013)
Party Evening	-0.124***	-0.131***	-0.131***
	(0.013)	(0.012)	(0.016)
Subsidiary	-0.176***	-0.173***	-0.173***
	(0.011)	(0.012)	(0.015)
Newsp Ad Mkt (log10 RMB 2011)	-0.036**	-0.010	
	(0.014)	(0.084)	
Treaty Port	-0.025**		
	(0.010)		
Long March	0.049***		
	(0.010)		
Observations	905	905	905
R-squared	0.672	0.707	0.781
Fixed Effects	Year	Year and Prefecture	Year by Prefecture
Province = Prefecture (p-value)	0.000	0.000	0.000
Evening = Subsidiary (p-value)	0.000	0.001	0.007

Notes: The unit of analysis is newspaper by year. The regression in column I include controls for distance to Beijing, Latitude and Longitude. The last two rows report the p-value of F tests. Standard errors clustered by prefecture in parenthesis: *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Market structure transition matrix in provincial capitals

Market structure, year t-1	Market structure, year t								
	1981	P	Pc	PCc	Pp	Ppc	PC	PCp	PCpc
P	7	7	7	0	0	0	0	0	0
Pc	7	0	14	13	0	0	0	0	1
PCc		0	0	12	0	0	0	0	7
Pp	11	0	0	0	11	8	0	2	1
Ppc		0	0	0	0	8	0	0	8
PC	1	0	0	0	0	0	1	1	0
PCp	1	0	0	0	0	0	0	4	4
PCpc		0	0	1	0	0	0	0	21
	2011			6					21

Notes: The blue and the green colors mark the two equilibrium newspaper entry sequences in the theory section (Corollary 1). The orange-colored observations are inconsistent with the theoretical predictions of product entry.

Table 8. Dependent variable: Number of Newspapers

	Ordered Probit			OLS		
Admin. level	Prefecture	Prefecture	County	Prefecture	Prefecture	County
Newspaper type	Party	Commercial	Party	Party	Commercial	Party
	I	II	III	IV	V	VI
Advertising Mkt	0.436*	1.928***	1.696***	0.007	0.407**	0.893**
(log10 RMB 2011)	(0.249)	(0.233)	(0.233)	(0.077)	(0.198)	(0.347)
Expected political value	10.967**	-8.886**	-3.633			
	(4.788)	(3.744)	(4.177)			
Fixed Effects	Year	Year	Year	Year & Prefecture	Year & Prefecture	Year & Prefecture
Observations	4,742	4,742	2,823	4,742	4,742	2,823
R-squared				0.632	0.724	0.834

Notes: The results of column I to III are from ordered probit regressions and results of column IV to VI are from OLS regressions. The unit of observation is prefecture and year. In columns I and IV, the dependent variable is the number of Party Daily newspapers at the prefecture level. In columns II and V, the dependent variable is the number of Party Evenings and Subsidiary newspapers at the prefecture level. In columns III and VI, the dependent variable is the number of Party Dailies at the county level (in the prefecture). *Advertising Mkt* is the predicted advertising revenue. *Expected political value* is the predicted media bias based on the Treaty Port and CCPstronghold variables from the bias regressions in Table 6 and aggregated at prefecture level. Standard errors clustered by prefecture in parenthesis: *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Estimated value of advertising market at entry (RMB Million)

	Prefecture Evenings & Subsidiaries
Cut 1	52
Cut 2	514
Cut 3	2,004
Cut 4	4,276
Cut 5	14,191

Notes: The thresholds are estimated by the ordered probit model in column II table 8.

Table 10. Dependent variable: *Newspaper Bias*

	I	II	III	IV
Reform_2003	-0.004	-0.003	0.013**	0.016***
	(0.003)	(0.002)	(0.006)	(0.006)
*Commercial Paper * Reform_2003*			-0.022***	-0.023***
			(0.006)	(0.006)
Observations	782	782	782	782
R-squared	0.840	0.842	0.846	0.849
Controls	No	Basic	No	Basic
Fixed Effects	Newspaper and Year	Newspaper and Year	Newspaper and Year	Newspaper and Year
Commercial			0.002	0.001

Notes: The dependent variable is our measure of newspaper bias. Basic controls include GDP, population, industrial share of GDP, real FDI, number university students, number employees, total government expenditure. Standard errors clustered by prefecture in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11. Dynamic effects of the reform (dependent variable: newspaper bias)

	I	II	III	IV	V	VI
Reform_2002	0.004	0.006	0.006	0.004	0.006	0.006
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Reform_2003	0.011*	0.013**	0.013**	0.011***	0.011***	0.011**
	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)
Reform_2004				0.000	0.002	0.003
				(0.006)	(0.006)	(0.006)
*Commercial Paper * Reform_2002*	-0.006	-0.007	-0.008	-0.006	-0.007	-0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
*Commercial Paper * Reform_2003*	-0.018***	-0.019***	-0.019***	-0.012***	-0.013***	-0.012***
	(0.007)	(0.006)	(0.007)	(0.003)	(0.003)	(0.003)
*Commercial Paper * Reform_2004*				-0.007	-0.008	-0.008
				(0.005)	(0.006)	(0.006)
Fixed Effects	Newspaper and Year	Newspaper and Year	Newspaper and Year	Newspaper and Year	Newspaper and Year	Newspaper and Year
Controls	No	Basic	Extended	No	Basic	Extended
Observations	782	782	746	782	782	746
R-squared	0.846	0.849	0.849	0.847	0.850	0.850

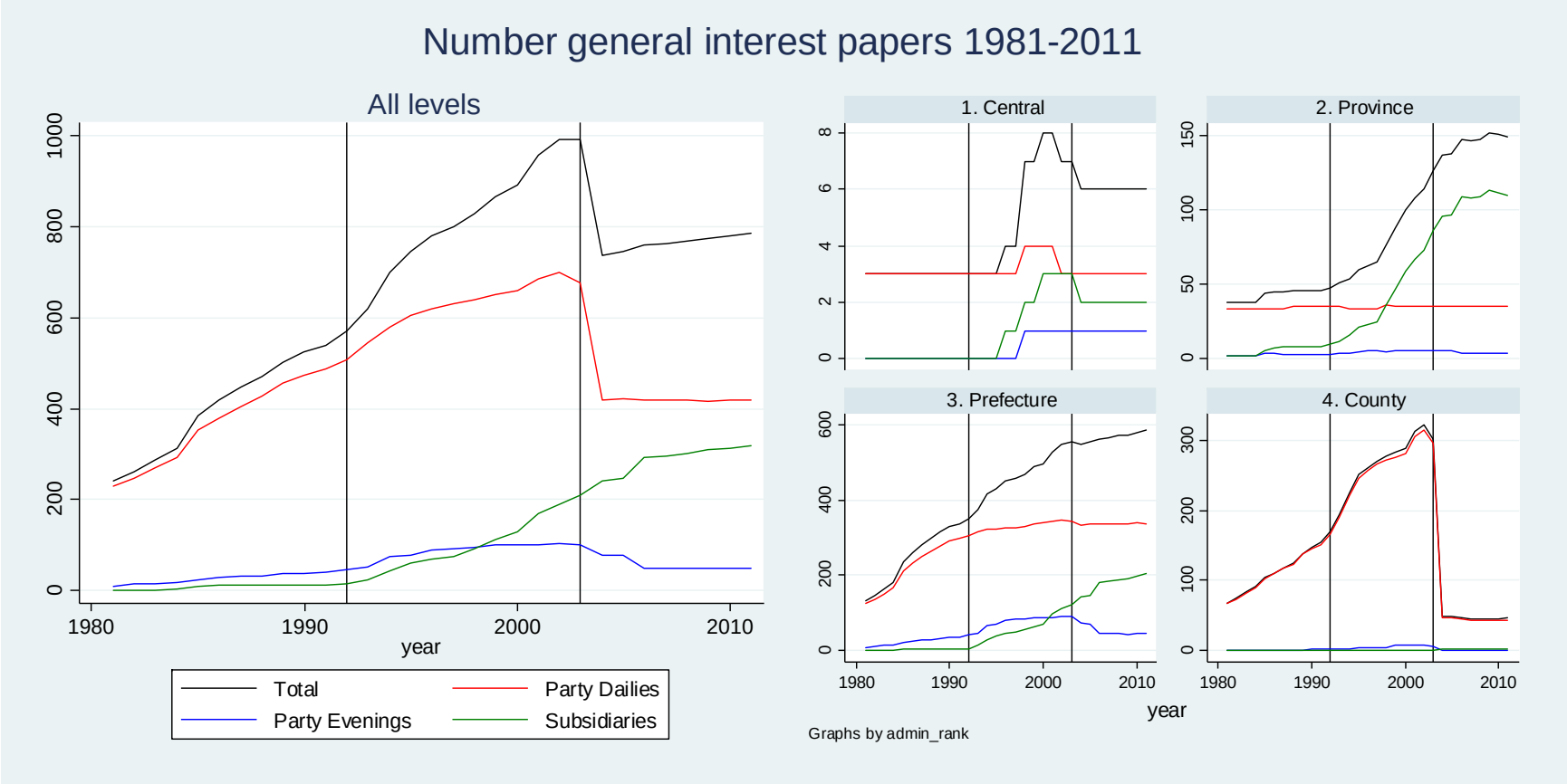
Notes: Basic controls include GDP, population, industrial share of GDP, real FDI, number university students, number employees, and total government expenditure. Extended controls also include the interaction term between the predicted number of county dailies in 2002 based on our controls and the reform dummy variable. Standard errors clustered by prefecture in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12. Dependent variables: *Newspaper Bias* and Individual Content Categories

Dependent Variable	I Newspaper bias	II Leader Mentions	III Xinhua Cites	IV Epoch Stories	V Disasters	VI Entertainment
Reform_2003	0.044**	4.215***	2.372	-3.954	0.161***	-1.184***
	(0.017)	(1.138)	(3.110)	(3.172)	(0.049)	(0.404)
*Commercial Paper * Reform_2003*	-0.066***	-5.265***	-5.652**	4.140	-0.234***	1.834***
	(0.017)	(1.393)	(2.783)	(3.057)	(0.080)	(0.429)
Observations	782	782	782	782	782	782
R-squared	0.849	0.846	0.859	0.789	0.684	0.830
Commercial	-0.022	-1.050	-3.280	0.186	-0.073	0.650
Commercial p-val	0.000	0.041	0.006	0.889	0.081	0.019
Mean	0.281	11.509	24.075	24.821	0.533	12.976
Std. Dev.	0.117	12.021	15.221	13.588	0.728	4.895
Commercial-Party difference	-0.172	-16.549	-15.138	4.513	-0.218	3.330

Notes: To capture the average reform effects, the reform-variable coefficients are multiplied by 2.7, the average number of county papers in areas with positive numbers of county papers in 2002. All regressions include newspaper- and year-fixed effects, as well as our set of basic controls: GDP, population, industrial share of GDP, real FDI, number university students, number employees, total government expenditure. Standard errors clustered by prefecture in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 1. General-interest newspapers during the 1981-2011 period



Data source: Chinese newspaper directory data constructed by the authors. The first vertical line indicates 1992, which is a landmark year of Chinese economic reform; the second vertical line indicates 2003, when the central government withdrew the licenses of most county-level newspapers.

Figure 2. Probability to be Party Daily and the Expected Advertising Revenue Vs. PCA 1st component

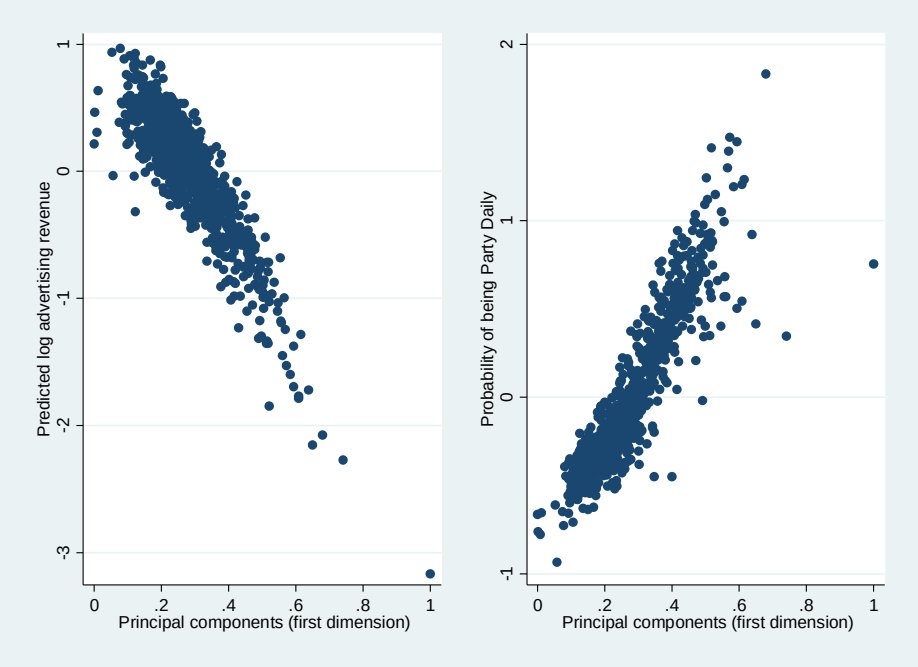
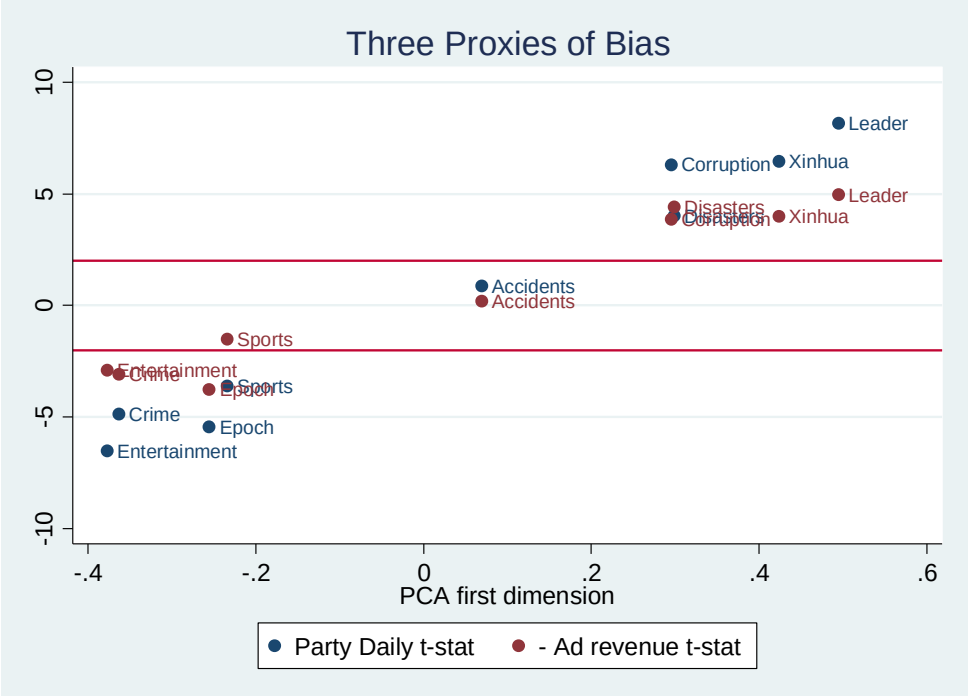


Figure 3. Content loadings in three bias measures



Notes: The y-axis shows the t-statistic for the coefficient of the *Party Daily* dummy-variable (or negative *Adv. revenue*) in a regression of each content variable on it, controlling for prefecture-by-year fixed effects. This is plotted against the factor loading for each content variable (Table 4).

Figure 4. Newspaper bias by newspaper type

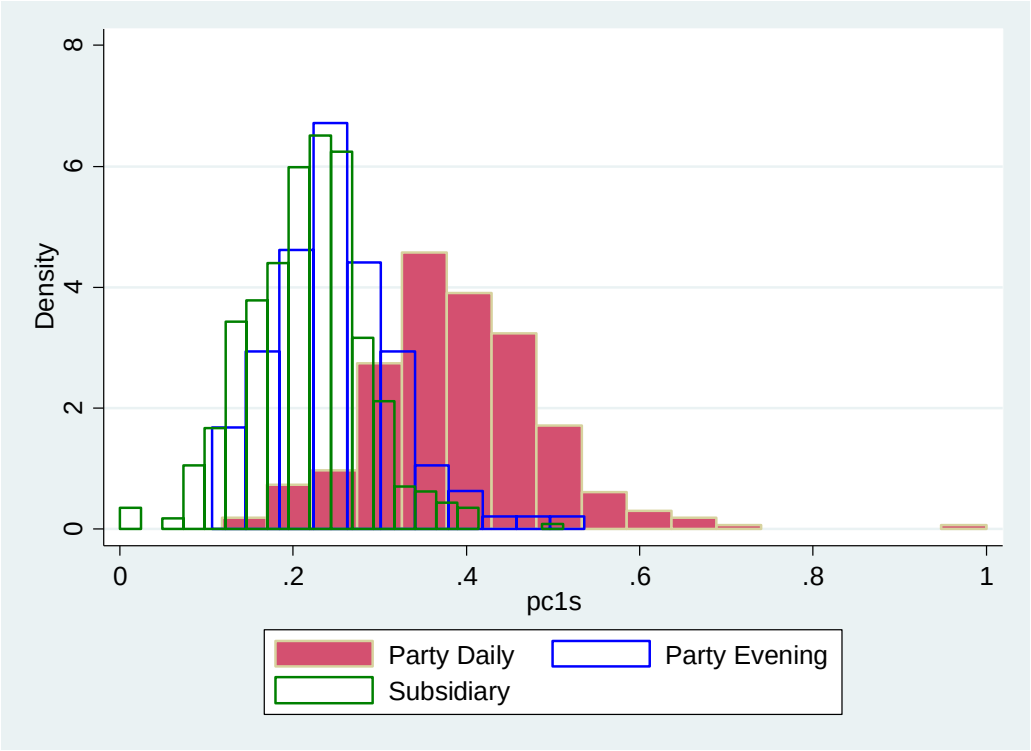


Figure 5. Newspaper bias and political control of media and firms

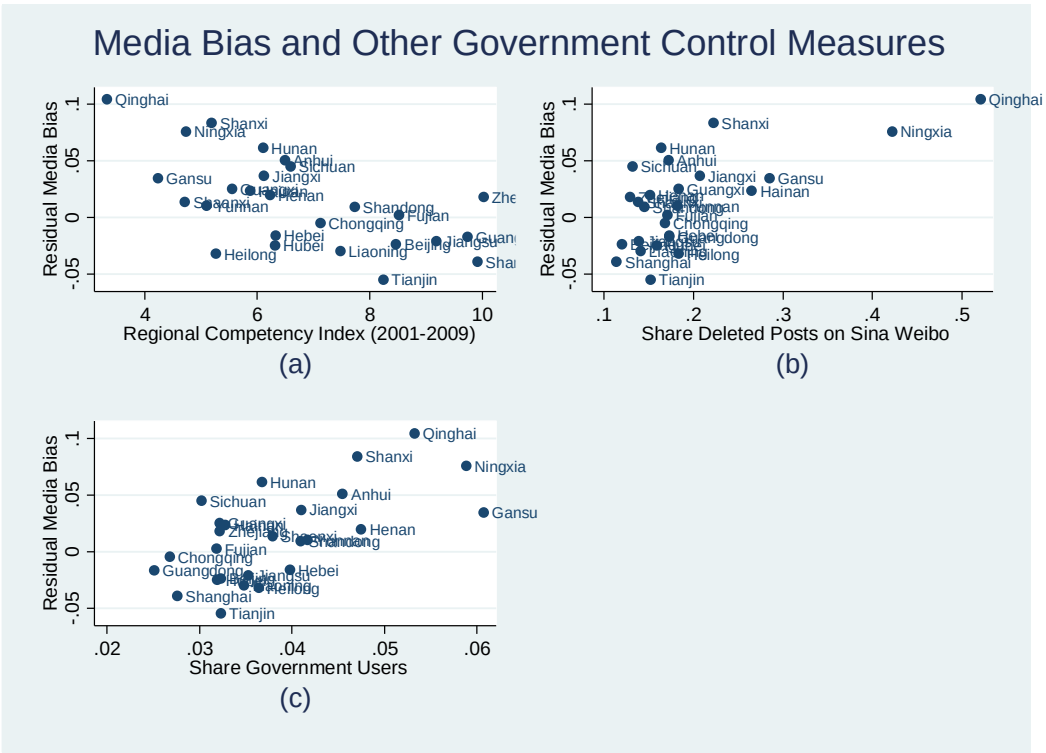


Figure 6. Effect of reform on content vs. PCA factor loadings.

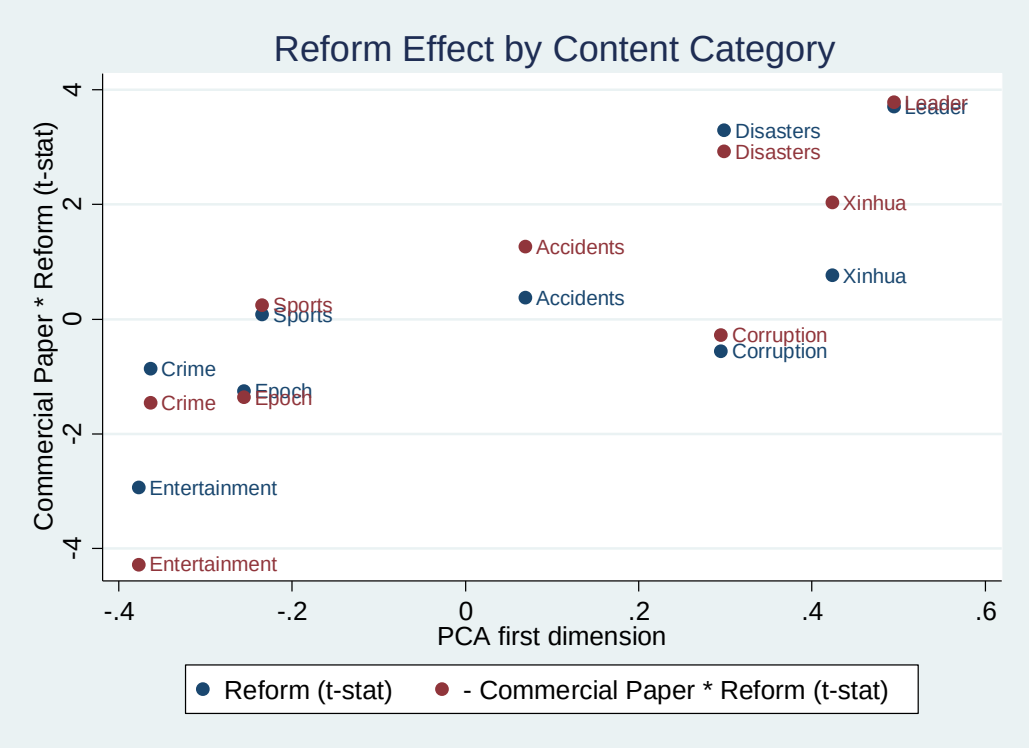
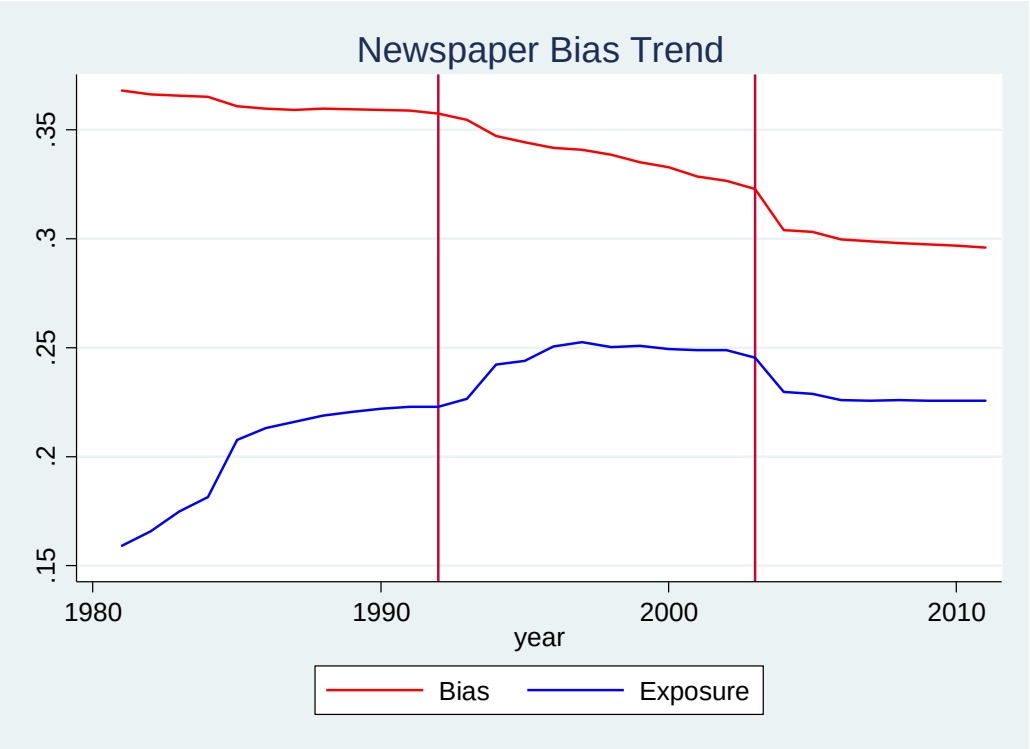


Figure 7 Trend in newspaper bias implied by entry and exits



Notes: The newspaper bias trend in years before the newspaper content available (in Wisenews) is predicted based on the number of newspapers with different types and the administrative levels. The "Exposure" trend is the average exposure to newspaper bias across readers, which is weighted by each newspaper's expected advertising revenue within prefectures and weighted by population across prefectures.