

Media Bias in China

Bei Qin*

David Strömberg[†]

Yanhui Wu[‡]

November 2016

Abstract

This paper measures the political bias of Chinese newspapers by analyzing the content of 117 mainstream newspapers in China during 1998-2010. We model media bias in an autocracy where media owners are governments at different administrative levels and have a politico-economic dual goal. The model predicts that lower-level governments and competition erode the attainment of the political goal. Empirically, we find a strong differentiation between high- and low-bias (commercial) newspapers in the same market. The latter carry less mouthpiece material but not more information relevant for accountability. Consistent with the model, we find that lower-level governments produce less-biased newspapers and launch commercial newspapers earlier. Exploiting a reform to close down all county-level newspapers, we show that product competition reduces newspaper differentiation. For example, we estimate that the reform reduced the share of articles that cite Xinhua news by 3.1 percentage points in commercial papers while increasing Xinhua citations in party papers by the same amount.

*University of Hong Kong; Email: beiqin@hku.hk.

[†]University of Stockholm; Email: david.stromberg@iies.su.se

[‡]University of Southern California; Email: yanhuiwu@marshall.usc.edu

1 Introduction

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

It is hardly surprising that Chinese media are biased towards the ruling party – the Chinese Communist Party (CCP for short). All Chinese newspapers require a dominant state ownership and government supervision. In terms of press freedom, China has been consistently ranked among the lowest by Reporters Without Borders. 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, only behind US and Japan. Many newspapers in metropolitan areas publish punchy tabloids selling entertaining reports mixed with investigative journalism. These facts suggests a politico-economic tension in the Chinese newspaper market.

Several questions arise. First, is there a trade-off between newspapers' political and economic goals, or is market demand inelastic 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? Answering these questions is key to assessing the effect of media in China. More generally, it also sheds light on the efficiency of firms with a politico-economic dual goal, such as state-owned enterprises.

To answer these questions, we assemble a comprehensive Chinese newspaper directory and combine it with newspaper content data. To accurately describe the political control and industrial organization of Chinese newspapers, we compile a directory of all newspapers published in mainland China during the 1980-2011 period. We focus on approximately 1000 general-interest newspapers, which account for a lion share of readership. By regulation, they are all owned and supervised by the highest political decision-making bodies in China - the Chinese Communist Party Committee (CCPC for short), from the national to county level. Our directory documents each newspaper's ownership, government supervision, editorial control, financial sources, and the timing of entry and exit. According to the extent of financial and personnel control, these newspapers can be classified into three types: Party Dailies, Evenings, and Subsidiaries – the latter two are largely commercialized.

We collect content data 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 goal as a CCP mouthpiece: the articles mentioning political leaders or citing Xinhua (the CCP's authoritative news agency). The next four

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

cover capture controversial or negative information: articles reporting controversial issues that are intensively covered by oppositional overseas Chinese media, and those reporting on corruptions, disasters, and accidents. The final three measure commercially oriented content: articles covering crimes, sports, and entertainment. In practice, we identify the above nine content types by searching relevant key words over 16 million articles published by 117 mainstream general-interest Chinese newspapers from 1998 to 2011. We then calculate the fraction of each type of articles over the total number of articles at the newspaper-by-year level.

This content classification reveals a clear product differentiation – some newspapers focus on the political goal and others on the commercial goal. For example, while Party Dailies articles mentioning CCP leaders account for 22 percent of their total articles in Party Dailies, but only 5 percent in Subsidiaries. Thus, readers of commercial newspapers are exposed substantially less to CCP mouthpiece content. However, commercial papers do not systematically cover more controversial or negative information. In fact, the fractions of coverage of corruption, accidents and disasters are smaller in commercial papers than in Party Dailies.

We compress the aforementioned nine types of content into a single dimension using principal component analysis (PCA). The first component explains approximately 40% of the variation in content. Importantly, it strongly predicts that a newspaper has low advertising revenues and is a Party Daily (as opposed to a commercial paper). The PCA first component thus captures the weight that a newspaper puts on the political goal, relative to the economic goal. We refer to this relative weight as "media bias." We show that this bias measure exhibits a strong positive correlation with two independent measures of media control at the provincial level: the share of censored posts reported in Bamman et al. (2012) and the share of government accounts on Chinese social media estimated by Qin et al. (2016).

The above findings suggest that the less-biased newspapers reduce readers' exposure to propaganda content, thus undermining a primary political goal of the CCPC. However, to the extent that readers dislike propaganda content, they also provide an economic benefit. We find that a one-standard-deviation decrease in our measure of media bias is associated with an 80% 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 with governments at multiple administrative levels competing in the same market. As 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 have the nature of a public good within the CCP and generate geographic externalities.

The main insight of the model is that competition for economic benefits within the government hierarchy hinders the attainment of the political goal. First, since they internalize more of the geographical externalities and thus value the political goal more, lower-level governments run less-biased newspapers and launch party papers later and commercial papers

earlier. Second, the entry of commercial newspapers is facilitated by competition between governments because of a business-stealing effect. The presence of these less-biased newspapers will reduce readers' exposure to propaganda content and undermine the political goal. The model also shows that the politico-economic dual goal leads the government to differentiate its products – one highly-biased party paper targeting the political goal and one less-biased commercial paper targeting the economic goal. Finally, the model predicts that a greater advertising market reduces bias and promotes the entry of both party and commercial newspapers.

Guided by the 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 advertising market, and readers' political preferences in a region. First, we find strong evidence that the administrative rank of a CCPC is a key determinant of media bias. Within the same market, lower-level CCPCs run newspapers that are less biased, and typically enter with the first commercial paper with the last Party Daily. In a sample of the 27 large provincial-capital markets where provincial and prefectural CCPCs compete, we find that in 23 markets, the first newspaper is a Party Daily owned by the higher-level CCPC, and the first commercial newspaper is owned by the lower-level CCPC. 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 during the period of 1981-2011.

Second, product competition, resulting 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 down more than 80 percent of the county-level Party Dailies for reasons that are exogenous to 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 commercial newspapers' share of articles citing the CCP official news agency by 3 percent (at a mean of 24 percentage), while it increased party papers's share of articles mentioning political leaders by 4 percent (at a mean of 12 percentage). On average, the effect on commercial newspapers dominate, and the reform reduced the average newspaper bias.

Last, economic and culture factors across regions have a significant impact on media bias. We find that newspapers are more politically biased in historical CCP strongholds and less so in Treaty Port prefectures, which were historically controlled by Western powers. Moreover, we find that the size of the advertisement market is strongly negatively correlated with newspaper bias in the cross-section, although such a correlation is not significant in the time dimension. In terms of the entry pattern, we show that commercial papers enter earlier in prefectures with larger advertising markets but later in CCP strongholds.

To the best of our knowledge, this paper is the first large-scale rigorous study on newspaper bias in autocracies. It makes several contributions to the literature of media economics. We provide a measure of bias that suits media in autocracies. Economists have created a variety

of media bias measures based on the average ideology of think tanks that a media outlet quotes (Groseclose and Milyo 2005) or "partisan" words (Gentzkow and Shapiro 2010) or sentiments of words (Tetlock 2007; Tetlock et al. 2008). However, none of these measures can be directly applied to Chinese media because words that express opposition to or negative sentiment on the official ideology are greatly suppressed. Our measure of media bias is issue-based, combining the rich content classification with the convenience of principal component analysis. This approach can be adapted to media in a wide range of empirical settings.

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 of press freedom under authoritarian regimes (Egorov et al. 2009, Lorentzen, 2014). Our study enriches this line of analysis by incorporating vertical competition between local governments and endogenizing product entry. The interaction between these two aspects – one political and one industrial – is crucial for analyzing media bias in autocracies. Outside the context of autocracies, we contribute to the empirical study of media bias by estimating the causal effects of competition on products with different degrees of substitution.

Our results are also related to a growing number of studies showing that government-controlled media in authoritarian countries affect behavior. This has been shown in the contexts of Nazi Germany (Adena. et al., 2013), Rwanda during the 1990s (Yanagizawa-Drott, 2014), and Russia (Enikolopov, Petrova, and Zhuravskaya, 2011).

Finally, the setting of Chinese newspapers provides a rare opportunity to directly measure the political-economic trade-off of government-controlled firms with dual goals. These types of firms are common. For instance, Chinese SOEs control a lion's share of critical resources in the Chinese economy and have political goals such as to protect national security, maintain fiscal revenues, and sustain social stability through employment or loan. These firms are generally believed to be inefficient (e.g., Shleifer and Vishny, 1994, 1996), and, in China, how to resolve their dual-goal conflict is viewed as important for their performance (e.g., Cao et al. 1999; Lin and Tan 1999; Bai et al. 2006). Despite the vast literature on SOEs, the politico-economic trade-off is only indirectly inferred from firms' productivity and managerial practices. Our measure of media bias directly captures the political-economic trade-off and can be used as an outcome when studying other theories of firms with dual goals. It also predicts political control in other firms; we show that our bias measure, aggregated at the province level, is highly correlated with a pro-market competency-index widely used by Chinese scholars (Fan and Wang, 2009).

2 Institutional background

2.1 Owners and Markets

All Chinese newspapers are required to have a total or dominant state ownership. They must be affiliated with a government supervisor that is responsible for licensing, the appointment of top personnel, and the monitoring of important editorial matters. Only a CCPC is eligible to obtain the license of a general-interest newspaper. Consequently, the decisions with regard to the entry of newspapers and content bias lie with top local politicians.

The Chinese newspaper ownership structure inherits the 4-layer hierarchy of the CCPC system: nation, province, prefecture, and county. Except for the national media, the control of media in China is decentralized to local governments. A local CCPC, as direct owner, monitors newspapers within 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 metropolitans with a population 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 to 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.

Another important type of market is the 300 or so non-capital prefectures. Most of them 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

Like other state-owned firms, Chinese newspaper have political as well as economic goals. Well documented and repeatedly stressed, 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 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 summon meetings to direct editorial policies. A large number of officers are employed to censor news content that is detrimental to the CCP ideology and leadership. Failure to adhere to the Party Line leads not only to withdrawal of circulated newspapers and suspension of licenses but also to imprisonment of journalists, dismissal of editors, and demotion of related government officials.

A less-known political role of Chinese media is the so-called Mass Line, along which

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 corruption and wrongdoings 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-interest government officials. A classic example of a breakdown of the Mass-line function is the failure of media to report on the failing crops in the early 1960s (the Great Leap Forward) resulting in the great famine and severe political instability.

A newspaper's pursuit of economic profit yields two types of benefits to local politicians. First, profitable newspapers 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 the central CCPC's. The local CCPCs may care more about the private rents and less about political goals such as suppressing social unrest and promoting the CCP ideology.

3 Data and Measurement

3.1 Newspaper Entry and Exit (1981-2010)

To provide an accurate description of the development of Chinese newspapers, we assemble a detailed directory of all newspapers published in mainland China during the period of 1981-2010. 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 its headquarter location, publication periods (start, suspending, 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 newspaper directory is the most comprehensive one among existing data sources.

Newspaper types. Based on ownership and managerial autonomy, we classify the general-interest newspapers into three different categories. By regulation, the general-interest newspapers in China come in variants indicated by their names (1) "Daily," (2) "Evening," and (3) "Metro" and similar names. A "Daily" is the official mouthpiece of a CCPC. Its editorial policy is strictly controlled by the CCPC Propaganda Department. All govern-

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

ment departments, government-affiliated organizations, and SOEs are required to subscribe "Dailies" run by all the CCPCs that have the power over them. By contrast, "Evenings" and "Metros" are less controlled in terms of both editorial policies and managerial autonomy. Being oriented to the general audience, they carry more entertaining news and heavily rely on street vendors for circulation. Although they differ in 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, the general-interest newspapers were allowed to own subsidiary newspapers. These subsidiary newspapers, named "Metros" or "Evenings," typically carry more consumer-orientated content. Financially, they actively absorbed non-state capital – typically from mass organizations and SOEs – 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. We use the directory to describe the historical evolution of the Chinese newspaper market; See Figure 1. In 1981, the start year of our sample period, there were 242 general-interest newspapers, among which 230 were Party Dailies of central and provincial CCPCs. The number of Party Dailies rose continuously during the 1980s and 1990s. Regulatory changes, reducing subsidies to newspapers and encouraging advertising financing 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. For example, after 1992 – a landmark year of Chinese economic reform of SOEs, there was an increased trend in the number of Subsidiaries. Another visible change is the drop in the number of Party Dailies in 2003, in which the central government withdrew the licenses of most county-level newspapers. As a result, more than 80% of county papers were shut down. We will discuss this consolidation in more detail later when we examine the effect of competition on media bias.

3.2 Content and Bias

Our content data are extracted from the digital archives in WiseNews, a Hongkong-based data provider. We restrict our sample to the period of 2001-2010 because WiseNews contains only partial content of a few newspapers before 2001. During the sample period, the WiseNews database contains 117 general-interest newspapers published in Mainland China, but the number of newspapers varies slightly over years (see Table 1). According to the above classification of newspaper types, among these 117 newspapers, 40 are Party Dailies, 12 are Evenings, and 65 are Subsidiaries. Of these newspapers, 5 are controlled by national-, 71 by provincial- and 41 by prefecture-level CCPCs; Table 2 provides a summary. Geographically, these newspapers cover major prefectural areas in 26 out of 31 provinces in mainland China. Therefore, our sample largely represents the newspaper markets in urban areas, which comprise the majority of readership.

3.2.1 Content Capturing Political and Economic Goals

We count the number of articles per newspaper and year in nine content categories. This include three categories for each of the three functions: Party Line, Mass Line and Bottom Line. We now describe the key-words used to identify articles in each category. A detailed description can be found in the on-line 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 mentions 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, which is a key instrument for the CCP to enforce propaganda objectives. Third, we identify articles covering the annual top 10 news events listed by two extreme media outlets – Xinhua News and 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.

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

The Mass Line - Investigate Reporting. As discussed in Section 2.2, Chinese newspapers should also report the public’s concerns about local policy makers and outcomes, to improve accountability to higher-level politicians. We identify three types of reports related to this aspect – reports on corruptions, disasters, and accidents. Corruption is obviously related to (upward) accountability. Significant disasters and accidents, in particular those caused by human errors or wrongdoings, are often regarded as reflecting incompetency of government officials. Media reports on the inadequate actions undertaken by local governments to rescue victims, protect public properties, and relieve loss can lead to the dismissal of bureaucrats and the demotion of officials. Examples include floods caused by poorly-managed drainage systems and public-transport crashes due to faulty systems and management failures.⁴ We extract data on the occurrence of disasters/accidents involving more than 30 fatalities in China during our sample period, from the EM-DAT database organized by the Center for Research on the Epidemiology of Disasters in Brussels. We identify 226 such events, among which

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

⁴For 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>

129 are caused by human factors. We then search articles covering these disasters/accidents within a certain time window around their occurrence.

Because this type of news may reflect badly on the CCP, one may doubt whether Mass Line journalism is actually implemented in practice. An alternative hypothesis is that the political goal makes newspapers suppress this type of material, in which case commercial papers would cover it more.

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, entertainments such as movies and music, and news on crimes. These three are the most-searched 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*, *Sport*, *Entertainment*, and *Crime*. These variables measure by the percent of articles belonging to a content category (over the total number of articles) in WiseNews, except for "Epoch Stories," which is measured by the percent of articles covering the top events listed by Epoch Times relative to the number of articles covering the top events listed by either Xinhua News or Epoch Times. We measure these variables at the newspaper-by-year level.

Table 3 presents summary statistics of these nine variables. A large share of articles concerns the Party Line. Specifically, 11.41% of all articles mention a political leader, which corresponds to 1.6 million articles. We find 3.5 million articles mentioning Xinhua News. We track down half a million articles covering the Epoch Times top stories and 1.2 million articles covering the Xinhua top stories. Regarding the Mass Line, 24.5 thousand articles cover corruption cases that are not part of the speeches of government officials and anti-corruption actions.⁵ We find 85.2 thousand stories about disasters and 18.1 thousand stories about accidents. With regard to the Bottom Line, 1.1 million articles report on sports, 2.2 million on entertainment stories, and 86.4 thousand on crimes.

3.2.2 Measuring Bias

We first compress these nine categories to one scalar measure of how strongly newspaper content reflects political goals, rather than economic. This can be done in at least three ways. One strategy is to use the similarity to newspapers with a known focus on one goal (similar to e.g. Groseclose and Milyo, 2005, and Gentzkow and Shapiro, 2010). We have a strong prior that the Party Dailies focus on the political goal. Newspapers that have a news mix characteristic of Party Dailies are likely target content to the political goal. Along these lines, a measure of the weight put on the political goal could be the predicted probability that a

⁵These 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.

newspaper is a Party Daily, based on its coverage of our nine categories. Similarly, a measure of the weight put on the economic goal could be each newspaper’s expected advertising revenues based on its coverage mix. Third, if the trade-off between political and economic goals is a main dimension of product differentiation, then this should be spotted using Principal Component Analysis (PCA) and explore whether the first dimension reflect this trade-off (similar to Nominate scores measuring the left-right dimension in US Congress).

It turns out that these three methods give essentially the same answer. First, we regress a dummy variable that indicates a newspaper to be 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 only. 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 to compute the newspaper’s expected advertising revenue, based on its content only. Finally, we employ the method of principal component analysis (PCA) to construct a single-dimensional measure that captures the most important variation in our nine content categories. Table 4 presents the PCA results. The first component explains 37 percent of the variation in news coverage. The results from these regressions are shown in Figures 2 and 3. Figure 2 shows the linear and almost perfect relationship between the predicted probability of being a Party Daily (and 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. It is not the case that some categories are important for predicting advertising revenues and others are important for predicting a newspaper being a Party Daily. Instead, the content categories all line up along one dimension, captured by the PCA first component. Consequently, it is not surprising that the PCA first component predicts, for example, advertising revenues almost as well as the unconstrained nine content categories.

The factor loadings also make sense given our previous discussion of how the political goals of Chinese media should shape content. For the Party Line, the variable *Leader Mentions* has the strongest positive factor loading, followed by *Xinhua Cites*, while *Epoch Stories* has a strong negative factor loading. All the three measures of the Bottom Line, namely, *Entertainment*, *Crime*, and *Sports*, have strong negative loading. Concerning the measures of the Mass Line, *Corruption* and *Disasters* have strong positive factor loading, while the loading of *Accidents* is modest. We will use the PCA first component as our measure of bias.

We also investigate 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 consist of 9 provincial Party Dailies in addition to People’s Daily – the mouthpiece of the CCP central committee. Except for Anhui Daily (No. 3 in the list), all the other 8 provincial Party Dailies are

from inland provinces, in which 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 a 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 Daily, Party Evening, and Subsidiary. The bias of Party Dailies is generally located to the right of the other two types of newspapers. One exception, the least-biased Party Daily, is Guangzhou Daily, which earns the largest advertising revenues in China. Interestingly, the Chairman and Chief Editor of this newspaper, Yuanjiang Li, a well-known newsman who led the newspaper to the tide of commercialization, was prosecuted as "corrupt" and jailed for a 12-year term in 2004.⁶

An open question is whether our bias measure can measure differences in the weight put on the political goal across markets and regions. We have only shown that the bias measure explains what newspapers are Party Dailies and have low advertising revenues within a given market and year. However, Figure 4 shows that some Evenings and Subsidiaries are even more biased than some Party Dailies and this could reflect regional differences. To explore this, we compare it to other measures of the political control of media and firms. To this end, we calculate the average value of the PCA first component for all newspapers within a province. Figure 5a shows 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 governments' 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). It is also strongly positively correlated with the 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.

To conclude this section, we want to highlight and discuss several findings. First, we find a strong product differentiation of newspapers along the political-economic dimension. We call a newspaper (politically) biased when it does not simply try to attract readers, but targets content for political goals. In this sense, the PCA first component is an appropriate measure of media bias. Second, the commercially oriented newspapers cover much less mouthpiece style material such as mentioning political leaders and citing Xinhua News agency. For example, while Party Dailies mention party leaders in 22 percent of their articles, the corresponding number of Subsidiaries is 5 percent. This implies that the massive entry of commercial newspapers in the 1990s (recall Figure 1) is likely to reduce reader 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. This suggests that the entry of commercial papers is unlikely to increase information relevant for political accountability. Third, we find a very strong negative correlation between advertis-

⁶According 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.

ing revenues and political content, comparing newspapers in the same market and year. In particular, increasing political bias with one standard deviation is associated with an 80% decrease in advertising revenues. This is likely to reflect a tension between the political and economic goal.

4 Theory

How does the political-economic tension in the real world shape the political bias of newspapers in China? This is an intricate question because the 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 the empirical analysis, we develop a simple theoretical model.

Our model incorporates firms (or political entities) with a dual politico-economic goal into an otherwise standard industry organization framework. Newspapers generate profits from advertising, but also deliver political value by exposing its 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, in a Hotelling line of product placement similar to Mullainathan and Shleifer's (2005) model of media bias. We also model the entry of different types of newspapers, which is empirically important because there has been a tremendous increase in the number of both highly controlled and commercial newspapers (recall Figure 1).

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 aversion to a newspaper full of reports about government officials and political slogans, while some other consumers, for instance, CCP cadres or employees in public sectors, dislike newspapers that publish "no serious stuff." A consumer with x_i derives utility from a newspaper, n , at position x_n :

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

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 retailing prices of Chinese newspapers are strictly regulated, and the revenues from circulation only account for a small fraction of a newspaper's total rev-

⁷We do not model explicitly model how these political goals are affected by biased content. There is evidence from other settings that it has effects (Enikolopov, Petrova, and Zhuravskaya, 2011, Adena et al. 2013), and that these effects are complex and may be difficult to capture in a rational information framework (Bai et al. (2015), Stockmann, 2012).

enues. Thus, the prices of newspapers are assumed constant, and, for simplicity, 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

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

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

Newspaper Owners’ Objectives A CCPC has a politico-economic dual goal. For 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 $X(x_n)R$. For 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, $b(x_n) = x_n - \frac{1}{2}$. We assume that a CCPC values the average bias of newspapers, to which readers in the market are exposed. The newspaper creates no political value if it is unbiased, but also if it is highly biased but has no readership. Consider a market with N newspapers, in which a CCPC, superscripted by J , owns a set of papers N^J . Thus, $N - N^J$ are the number of newspapers owned by other CCPCs. Then, the utility of $CCPC^J$ is:

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

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

A key feature of the above utility function is the public good nature of political value (within the CCP), captured by the second term. Specifically, if one newspaper of a CCPC exposes readers to biased content, all CCPCs in the market will benefit from it. This captures the fact that the essential parts of the 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. With 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 the externalities of national security.⁸

⁸To 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

Bias and Entry Choice Consider first a monopolist CCPC with one newspaper. When raising the bias the monopolist trades off a fall in profits and audience exposed to the bias against the increased bias exposure in the audience that remains. The optimal bias is

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

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 geographical 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 whether to launch a newspaper and 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 paper", respectively, 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 advertisement markets. The analysis proceeds sequentially: we start with a situation of no newspapers and identify which newspaper will enter first (at the smallest possible advertising revenue). Given this first incumbent 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 to enter the market. The cost of changing newspaper format is high enough so that a newspaper never relocates. Second, when deciding on market entry, newspapers only consider current profits without strategically thinking about future deterrence of 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 launched a Party paper obtains both advertising revenues and political benefits: $U_P^J = \frac{1}{2}(R + \alpha^J)$. If

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 externality on prefecture B .

instead launching a Commercial paper, 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 as long as

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

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 were not previously reading any newspaper. However, the commercial paper will incur a political cost as it steals audience from the Party paper, which reduces exposure to political bias. Thus, H will benefit from starting a Commercial paper if

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

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

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

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 the H -Party. Given $\alpha^L \leq \alpha^H$, 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

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

Here, L enters with the same newspaper type as the incumbent Party paper, and thus there is no market expansion effect. Because of the public good nature of the political value generated by H , the entry of L -Party does not create additional political value to L . A comparison between (4) and (5) shows 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 . As shown in Equation (4), 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 increase resulting from entering with a commercial paper is largest. 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., $\alpha^H \geq \alpha^L$).*

- 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.*

In the above proposition, the lower-level CCPC will always start the first commercial newspaper. Furthermore, its entry is facilitated by the competition between CCPCs. This can be seen from a comparison between 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, there is an additional business stealing effect, which induces *L* to introduce a commercial paper earlier than if it had been a monopolist. By the same token, the existence of *L-Commercial* will spur the entry of *H-Commercial*.

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

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 $\alpha^H \geq \alpha^L$. 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 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, entry of the first paper, *H-Party*, increases in both types of benefits. In contrast, a Commercial newspaper imposes a political cost and the entry of *H-Commercial* is delayed by a higher political valuation. 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.

Equation (3) provides guidance to estimate an upper bound of the political cost caused by the entry of Commercial newspapers. 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. Even though the political value of a newspaper is lower than the cost of entry, rising advertising revenues will induce the CCPC to launch the first Party paper; see Equation (2). As a result, 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 the 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

⁹More precisely, if *L-Party* enters earlier than *H-Commercial*, its entry decision is described by inequality (5). If *L-Party* enters later, its decision is described by an inequality with the same terms as (5), but with a smaller business stealing effect ($\frac{1}{8}R$). For H, if *H-Commercial* enters earlier than *L-Party*, its entry decision is described by inequality (3). If it enters after *L-Party*, its 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*.

can fine tune its content without changing basic type. Empirically, we will 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.

Suppose 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 towards P^L to mitigate the business-stealing effect created by the new competitor. Meanwhile, H will also reallocate C^H towards P^L to a more-biased variant because the stealing of its own business is mitigated in 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.

5 Empirical Analysis

Guided by the above theoretical analysis, this section investigates the entry and political bias of Chinese newspapers empirically. A main theoretical point is that newspaper competition between different administrative levels will lower people’s bias exposure because the lower-level will run less-biased papers and enter early with commercial papers (whereas the higher-level will enter early with Party papers). We will also investigate how advertising revenues and historical political preferences are related to bias and entry. Finally, we will test whether competition impacts the bias of existing papers using the 2003 reform. We can investigate this using our newspaper bias and directory data.

5.1 Bias

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

$$bias_{ijt} = \alpha_t + \beta_1 level_i + \beta_2 type_i + \beta ads_{jt} + \gamma' pol_pref_j + X_j' \delta + \epsilon_{ijt}. \quad (6)$$

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 rank 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. pol_pref_j includes two measures. The first is $CCP_Stronghold_j$, which is the share of counties in prefecture j that were passed by the CCP Long March during 1933-1935 or were a part of a CCP 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). These areas were historically exposed to Western culture and free press to a greater extent. The vector X_j include 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 rank strongly predicts bias. The provincial-level papers are significantly less biased than the central-level papers. A comparison between the coefficients of province and prefecture levels and an F-test for equal coefficients (see the bottom of Table 6) show that the prefectural newspapers are less biased than provincial newspapers. The regressions also confirm that Party Dailies are significantly more biased than Evenings, which are significantly more biased than the Subsidiaries.

Among the political and economic factors, newspapers in historical CCP strongholds are more biased, whereas newspapers in Treaty Ports 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 drops by half while the standard error increases dramatically so it becomes statistically insignificant. We cannot precisely identify the effect of advertising market in the time dimension possibly because the across-time variation 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 bias. So understanding why different newspaper formats enter in different markets goes a long way in explaining variation in the media bias that readers are exposed

to. In addition, we observe newspaper entry and exits for a longer time (1981-2011) than our content-based bias measure. Thus, we can explore the time-series variation to facilitate identification.

We study two samples separately: a sample of the provincial capitals and the other of non-capital cities. In the provincial capitals, we observe that higher and lower levels of CCPC both enter the market with party and commercial papers. Thus, we can investigate how hierarchical competition affects entry. In the non-capital cities, because of the restriction of newspaper entry, we are not able to examine the effects of hierarchical competition. However, these cities provide a much larger and relatively homogenous sample, which allows us to investigate the effects of political and economic factors on product entries.

5.2.1 Hierarchical competition

As described in Section 2.3, the provincial capital cities are the major newspaper markets. In these markets, a provincial and a prefecture CCPC compete and may run both Party and Commercial newspapers. We use Proposition 1 to analyze the sequence of newspaper entry in 27 provincial capital cities, excluding four provincial-level cities (i.e., Beijing, Chongqing, Shanghai and Tianjin).

Table 7 displays the market configurations and transitions in the above 27 provincial capital markets. A market configuration is described by a maximum of four letters (PCpc), where the letter indicate whether there is a party or commercial newspaper and the case indicate 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 means that there is 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 show the market configurations in 1981 and 2011, respectively. In 1981, the start of our sample period, all markets had a provincial party paper. Such a provincial daily faced no competition in 7 markets (configuration P), competed with a prefecture commercial in another 7 markets (configuration Pc), competed with a prefecture party paper in 11 markets (configuration Pp). Note that in two markets, Guangzhou and Kunming, the provincial CCPCs already had commercial paper in 1981, indicating the later entry of prefectural commercial newspapers. The likely reason is that these two cities had well-developed newspaper markets even before 1950. For example, in Guangzhou, Yangcheng Evening News (provincial level) was already well established in 1950s. The bottom row of the Table 7 shows that in 2011, at the end our sample, in 21 markets both levels of government had both party and commercial papers (PCpc).

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 which started with Pc in 1981. After the entry of a provincial commercial paper (Pc to PCc), these markets

all end up in configurations PCc or PCpc. Of the 11 markets that started out with party papers by both provincial and prefectural CCPCs, 8 witnessed the entry of first a prefectural and then a provincial commercial paper. These market entry patterns are all consistent with Corollary 1. The only inconsistency comes from 2 markets – Nanjing and Hangzhou, in which a provincial commercial paper entered earlier than a prefectural one (Pp to PCp).

In sum, the entry patterns in the provincial capitals are largely consistent with the theoretical predictions, confirming that provincial level CCPC values the political goal higher. In all 7 markets where we can observe the entry of the first paper, this is a provincial Party Daily. In 23 of 27 markets, the first commercial paper that enters is run by the prefecture CCPC. The latter result suggests that the prefecture-level CCPCs put a smaller weight on the political goal, consistent with our previous finding that they run less biased newspaper within a given newspaper type.

5.2.2 Economic and political factors

We now examine how economic and political factors are related to the entry of newspapers (Proposition 2). To obtain a relatively large and homogenous sample, we restrict attention to the 256 non-capital prefectures where 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 during the periods of 1987–1991 and 1994–2010. In these markets, the entry of newspapers typically follows the pattern of "no newspaper - Party Dailies - an Evening or Subsidiary" – a pattern that is consistent with Proposition 2.

We analyze market entry 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 show results from the ordered probit regressions of the number of prefecture-party, prefecture-commercial and county-party papers. Note that we only include observations before 2003 in column III, because most county papers were closed down after 2003. To control the prefecture-fixed effects for robustness check, we use OLS-regressions in the three last regressions.

We measure the size of advertising market as in (6). To measure political preferences in a region, we use the expected political preference for newspaper bias, calculated as the sum of the TreatyPort and CCPstronghold variables multiplied by their estimated coefficients in Table 6. First, we find that the size of advertising market is positively correlated with the number of newspapers in the samples of prefecture-commercial and county-daily papers, but the correlation is hardly significant for prefecture-daily papers. Second, readers' political preferences in 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 above two results are consistent with Proposition 2 Except that the size of advertising

market is barely correlated with the entry of prefecture-daily papers. One implication is that although we do not find a negative impact of the growth of advertising market on the bias of existing newspapers (recall that in table 6), the growth of advertising market can reduce readers' exposure to media bias by introducing new commercial newspapers.

The threshold value of advertising market size at which commercial newspapers enter the market 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 RMB 512 million, ten times as high as that of the first commercial paper. One likely reason is that the expansion in total demand by adding an additional commercial paper is small. We estimate that the threshold for entry is around 70% higher in CCP strongholds and around 20% lower in Treaty Port prefectures.

We use the theoretical model to learn about 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 (net of the loss of sales incurred to a Party Daily by the same owner) is sufficient to cover the political loss of reduced exposure to media bias (in addition to the entry cost). We can use this insight to make 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 more advertising revenues than a party paper. This implies that the expected advertising revenue of the commercial paper at entry is around $52 \times 5/6 = 44$ RMB million. This revenue is partly due to market expansion, and partly due to market stealing from the party paper run by the same CCPC (and from other CCPCs). So the net increase in advertising revenue is smaller. Anecdotal evidence suggests that the market stealing effect is around 1/4 of the total revenue increase (Chengju, 2010). Suppose further that the ratio of profits to advertising revenue is 1/3. This implies that for the CCPCs, the average value of the political damage caused by the entry of a commercial paper is $52 \times \frac{5}{6} \times \frac{3}{4} \times \frac{1}{3} = 11$ RMB million. Although this amount is a small fraction of total income (or local government budgets), it accounts for nearly half the average prefecture expenditure of the CCP propaganda department in 2016.

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

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

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

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

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 estimate the causal effect of competition on the bias of Chinese newspapers, using a reform to that led to drastic exits of county 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, to a large extent, overlaps with that of newspapers run by its subordinate county CCPCs. In terms of content and editorial style, many county newspapers imitate their prefectural counterparts. Because digital archives of county newspapers are not available, we are not able to measure the political bias of the county-level newspapers. However, interviews with industry experts suggest that county dailies are likely to be less biased than prefectural dailies because the former cover less the top political leaders and more county-specific events.

In 2003, the central government withdrew the licenses of most county-level newspapers. The stated purpose for this reform was to reduce the fiscal burden of local governments which financed the county Dailies.¹¹ More than 80% of 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 WiseNews prefectures for which we have content data, there were nearly 60 county Dailies in 2002, but the number had dropped to below 10 by 2004.

We estimate the effect of the reduced competition on the bias of newspapers remaining in the market, using variation in competitiveness generated by the 2003 reform. Specifically, we create a variable, *Reform 2003*, defined as the interaction of the number of county-level newspapers in a prefecture in 2002 and an indicator variable for the year being 2003 or later. This interaction term measures the decline in the number of newspapers if all county papers existing in 2002 were closed down due to the reform.

Consider an example of the Shenzhen prefecture. In 2002, there were four CCPCs competing in this newspaper market: one prefectural CCPC and three county CCPCs. The WiseNews sample includes four prefecture-level papers: one Party Daily, one Evening, and three Subsidiaries. By 2004, all the three county newspapers were closed down. Thus, the variable, *Reform 2003*, is zero before 2003 and then three in 2003 and thereafter. We estimate the effect of "Reform" on the bias of the remaining four prefectural papers. According to Claim 1 in the theory section, the exit of the 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.

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

¹² Exeptions include newspapers that were launched before 1949, or published by county-level, autonomous, ethnic minority administrations or in ethnic minority languages; papers in counties with a population of at least half a million, a GDP of 10 billion Yuan (RMB), a volume of consumer goods sales of 3 billion Yuan (RMB) and over, and where the advertising revenue of the party organ was in excess of 4 million Yuan (RMB). See Zhao (2008) for more detail.

Table 10 shows the main results. We regress the newspaper bias measure, by newspaper and year, on the Reform 2003 variable. The first two columns show the average effect of the reform across all newspapers. The second column adds the following controls: log population, log GDP, log total employment, log average wages, log real FDI, log number of university students, log industrial share of GDP, and log government expenditure. The estimated effect is negative and significant in both specifications. The last two columns show the differential effect of the reform across newspaper types. The main effect (the effect for the Party Dailies) is positive and significant whereas the reform interacted with a dummy variable indicating commercial newspapers (either Party Evenings or Subsidiaries) is negative and significant. The F-test of the zero sum of the main and interaction effects (see the bottom row of Table 10) shows that the estimated effect on 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, there is a common trend in the newspaper bias across prefectures with different numbers of county newspapers. Although this assumption is not directly testable, we test for the existence of a pre-trend in the data. Specifically, we add to the basic regression a placebo reform in 2002. 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 present the dynamic effects of the reform by lagging the reform variable by one year. That is, Reform_2004 and the interaction term between this and the commercial newspapers are added into 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 prefecture post 2003, even absent the reform. To test this 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. This has little impact on our estimated effects; see columns III and VI.

To connect the effect to outcomes that are easier to interpret, we analyze the effect of the reform on each of the nine content categories which our bias measure is constructed from. We use the specification in Column IV of Table 10. To show that the individual content-category effects 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 around 4. Five individual content categories have a significant coefficient, including all Party Line categories (*Leader Mentions*, *Xinhua Cites*, *Epoch Stories*), one Mass Line category (*Disasters*) and one Bottom Line category (*Entertainment*).

We next describe what our estimates imply in terms of effect magnitude for these five content categories and our bias measure. Table 12 shows coefficients re-scaled 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). For example,

the second column shows that the reform increased Leader Mentions in party papers by 4.2 percentage points and increased the difference in Leader Mentions between party and commercial papers by 5.3 percentage points. The reform is estimated to have caused a drop of Leader Mentions of 1.1 percentage points in the commercial papers, which is significant at the 5 percent level. The last result is shown in the two rows labelled 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 lowered the share of articles that cite Xinhua news by 3.1 percent in commercial papers.

The last three rows of Table 12 provide numbers that can be related to the magnitude of these effects. For example, political leaders are mentioned in 11.5 percent of the articles in this sample (standard deviation 12.0) while the average difference in Leader Mentions between commercial and party papers is 16.5 percentage points. Hence the estimated increased gap between party and commercial papers (5.3) is around one third of the average gap (16.5). The same relations hold for our overall measure of bias. These effects are not only statistically significant, but also significant in magnitude.

6 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 the principal component analysis. 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 political goal, relative to the economic goal. This relative weight starkly characterizes the content differentiation in Chinese newspapers – the highly-biased newspapers target the political goal by publishing much more propaganda and CCP mouthpiece articles while the less-biased newspapers target the economic goal by publishing much more entertaining content. Such a product differentiation accords to the regular classification of newspapers as party or commercial papers based on financial sources and managerial autonomy.

Chinese newspapers are owned by governments (CCPCs), which have a politico-economic dual goal. The pursuit of the political goal comes at the cost of losing economic benefits, because regular readers demand entertaining and diverse information more than propaganda content. The politico-economic trade-off, coupled with the decentralized control system, creates vertical competition between different levels of CCPCs in the same geographic area. We build a simple model with these institutional features to analyze what determine the political bias of Chinese newspapers. Three main insights, derived from the model and supported by empirical evidence, are summarized as follows.

First, vertical competition for economic benefits between multiple levels of governments erodes the CCP political goal, resulting in a decrease in the political bias of newspapers. Theoretically, because the benefits of attaining the political goal, such as regime stability,

have geographical externalities, the lower-level CCPCs internalize these benefits less and put more weight on the economic goal. This asymmetric weighing of the dual goal drives the lower-level CCPCs to run less-biased newspapers and launch commercial newspapers earlier. The entry of lower-level commercial newspapers in turn spurs the entry of higher-level commercial newspapers because the latter can steal business from the former. 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 the higher-level CCPC, while the first commercial newspaper is typically launched by the lower-level CCPCs.

Economists have contended that a regionally decentralized authoritarian system underpins the Chinese economic reform and is a driving force behind the Chinese style of economic development (e.g., Xu 2011). For example, Maskin et al. (2000) argue that a decentralized system or the M-form hierarchical structure, as adopted by the Chinese government, promotes yardstick competition between local governments against quantifiable targets, such as GDP growth rate. Although providing strong incentives for local officials to achieve the economic goal, this system undermines the central government's other goals such as political control and national coordination. Our finding that economic competition within the government hierarchy erodes the political goal echoes this line of argument. What we stress is the externality of political benefits, which leads lower-level governments to deviate from the political goal and amplifies economic competition between 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 to this policy, SOEs owned by higher-level governments invest substantially in green technology to reducing pollution. This creates externalities to firms (including lower-level SOEs and private firms) within the same region, which then decrease their incentives to reduce pollution. As a result, the implementation of the pollution-reduction goal induces excessive entry of firms with highly polluting products.

Second, product competition affects media bias through media owners' incentive to differentiate their products. In the current setting, media owners – the Chinese governments – target one newspaper to the political goal and one newspaper to the economic goal so as to better achieve the dual goal. When a competing product enters the market, this incentive of product differentiation decreases as a result of mitigating the business-stealing effect exerted by competitors. 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 and on average reduced the political bias of Chinese newspapers.

This product-competition effect does not rely on the existence of a dual goal or externalities. Rather, it is driven by media owners' incentive to differentiate products interacting with demand elasticity that is altered by product entry or exit. Thus, the insight can be applied

to other media markets outside China. It is not uncommon that a firm owns multiple media outlets in the same market. For example, in the London newspaper market, Murdoch’s News Corporation owns the Times – an elite newspaper with substantial political influence as well as the Sun – an entertaining tabloid. Our findings suggest that market competition in the one segment will affect the bias of the newspaper in the other segment as long as the owner aims to differentiate its products.

Third, even in a country with strict media control like China, economic development has a significant impact on media bias through changing the industry organization of the market. Given the politico-economic trade-off, the growth of 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 falls in 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 show that with economic development, it is more and more costly for an autocratic government to maintain the political control of media.

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

We conclude this paper with a depiction of the trend in the newspaper bias in China. In Figure 8, we depict the political bias of newspapers as well as readers’ exposure to this bias implied by newspaper entry and exit from 1981 to 2010.¹³ Since the news content data are only available during the period of 2001-2010, 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 fall in the number of articles covering 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, the bias exposure is weighted by each newspaper’s expected advertising revenue¹⁴, whereas across prefectures, the bias exposure is weighted by population. As clearly seen, the bias exposure increases initially because of the massive entry of highly-biased Party Dailies; it starts to decline from the late 1990s because of the influx of less-biased commer-

¹³Exits of general-interest newspapers in China during our sample years are extremely rare, except for the withdrawal of licenses of the county-level Party Dailies in 2003.

¹⁴We calculate the weighted average based on the estimated advertising revenue, rather than newspaper circulation, because reliable and comprehensive circulation data for Chinese newspapers are not available.

cial newspapers. One general implication from the above 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 fall in advertising revenues. This is an important caveat for examining the effect of economic development on media bias.

References

- Adena, M., Enikolopov, R., Petrova, M., Santarosa, V., & Zhuravskaya, E. (2015). Radio and the Rise of the Nazis in Prewar Germany. *Quarterly Journal of Economics*, November 2015, 130: 1885-1939.
- Bai, Chong-En, Jiangyong Lu, and Zhigang Tao. (2006) "The Multitask Theory of State Enterprise Reform: Empirical Evidence from China," *American Economic Review*, Vol. 96(2): 353-357.
- Bai, Jie, Mikhail Golosov, Nancy Qian, and Yan Kai. "Understanding the Influence of Government Controlled Media: Evidence from Air Pollution in China (Preliminary)." (2015).
- Bamman, David, Brendan O'Connor, and Noah Smith (2012), "Censorship and Deletion Practices in Chinese Social Media", *First Monday* 17.3.
- Besley, T., and Prat, A. (2006), "Handcuffs for the Grabbing Hand ? Media Capture and Government Accountability", *American Economic Review*, 96(3), 720–736.
- Brunetti, A., and Weder, B. (2003), "A Free Press Is Bad News for Corruption", *Journal of Public Economics*, 87(7-8), 1801–1824.
- Cao Yuanzheng, Yingyi Qian, and Barry Weingast. (1999). "From Federalism, Chinese Style to Privatization, Chinese Style," *Economics of Transition*, Vol. 7(1): 103-131.
- D'Alessio, Dave, and Mike Allen (2000), "Media Bias in Presidential Elections: a Meta-Analysis" , *Journal of communication*, 50(4), 133-156.
- Djankov, S., and Nenova, T. (2003), "Who Owns the Media?", *Journal of Law and Economics*, XLVI(October), 341–381.
- Durante, Ruben, and Brian Knight (2012), "Partisan Control, Media Bias, and Viewer Responses: Evidence from Berlusconi's Italy", *Journal of the European Economic Association*, 10(3) , 451-481.
- Edmond, Chris (2013), "Information Manipulation, Coordination, and Regime Change", *The Review of Economic Studies*, 80(4), 1422.
- Enikolopov, Ruben, Maria Petrova, and Ekaterina Zhuravskaya. "Media and political persuasion: Evidence from Russia." *The American Economic Review* 101.7 (2011): 3253-3285.
- Egorov, G., Guriev, S., and Sonin, K. (2009), "Why Resource-Poor Dictators Allow Freer Media: A Theory and Evidence from Panel Data", *American Political Science Review*, 103(04), 645.
- Gehlbach, S., Sonin, K., and Zhuravskaya, E. (2010), "Businessman Candidates", *American Journal of Political Science*, 54(3), 718–736.
- Gentzkow, M., and Shapiro, J. (2010), "What Drives Media Slant? Evidence from U.S. Daily Newspapers", *Econometrica*, 78(1), 35–71.
- Groseclose, T., and Milyo, J. (2005)., "A Measure of Media Bias", *Quarterly Journal of Economics*, CXX(November).

- Jia, Ruixue, (2012), "The Legacies of Forced Freedom: China's Treaty Ports", Mimeographed, IIES, Stockholm University.
- Inman, Robert P., and Daniel L. Rubinfeld. "Rethinking federalism." *The Journal of Economic Perspectives* 11.4 (1997): 43-64.
- King, G., Pan, J., and Roberts, M. (2012), "How Censorship in China Allows Government Criticism but Silences Collective Expression", Mimeographed, Harvard University.
- Larcinese, Valentino, Riccardo Puglisi, and James M. Snyder Jr. (2011), "Partisan Bias in Economic News: Evidence on the Agenda-Setting Behavior of US Newspapers", *Journal of Public Economics*, 95(9), 1178-1189.
- Liebman, Benjamin L. (2011), "The Media and the Courts: Towards Competitive Supervision?", *China Quarterly*, 208, 833-850.
- Lin, Justin Yifu and Guofu Tan. (1999) "Policy Burdens, Accountability, and the Soft Budget Constraint," *American Economic Review*, Vol. 89(2): 426-431.
- Lorentzen, P. (2013), "China's Strategic Censorship", *American Journal of Political Science*
- Oates, Wallace E. (1972). *Fiscal federalism*. New York
- Maskin, Eric, Yingyi Qian and Chenggang Xu. (2000) "Incentives, Information, and Organizational Form," *Review of Economic Studies*, 67(2): 359-378.
- Petrova, M. (2011), "Newspapers and Parties: How Advertising Revenues Created an Independent Press", *American Political Science Review*, 105(04), 790-808.
- Prat, Andrea, and David Strömberg (2013), "The Political Economy of Mass Media", *Advances in Economics and Econometrics: Tenth World Congress*. Vol. 2. Cambridge University Press.
- Shirk, Susan (2011), "Changing Media, Changing China" in Susan Shirk, ed. *Changing Media, Changing China*. New York: Oxford University Press, 1-37.
- Shleifer, A., and Mullainathan, S. (2005), "The Market for News", *American Economic Review*, 95(4), 1031-1053.
- Stockmann, Daniela (2012), "Media Commercialization and Authoritarian Rule in China", New York: Cambridge University Press.
- Tong, J., and Sparks, C. (2009), "Investigative Journalism in China Today", *Journalism Studies*, 10(3), 337-352.
- Wilson, Douglas, J. (1999), "Theories of Tax Competition", *National Tax Journal*, 52(2), 269-304.
- Yanagizawa-Drott, David. "Propaganda and conflict: Evidence from the Rwandan genocide." *The Quarterly Journal of Economics* 129.4 (2014): 1947-1994.
- Zhao, Yuezhi (1998), "Media, Market, and Democracy in China: Between the Party Line and the Bottom Line", University of Illinois Press.
- Zhao, Yuezhi (2008), "Communication in China: Political Economy, Power, and Conflict", Rowman & Littlefield Publishers.

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

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

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

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

Table 3. Summary statistics

VARIABLES	N	mean	sd	min	max
<i>Leader Mentions</i>	828	11.41	11.98	0.00	83.48
<i>Xinhua Cites</i>	828	24.15	15.19	0.00	86.07
<i>Epoch Stories</i>	828	23.92	14.49	0.00	57.36
<i>Corruption</i>	828	0.16	0.10	0.00	0.75
<i>Disasters</i>	828	0.53	0.71	0.00	9.12
<i>Sport</i>	828	6.49	2.82	0.00	21.01
<i>Entertainment</i>	828	12.82	4.92	2.62	34.16
<i>Crime</i>	828	0.51	0.35	0.00	1.99
Total number of articles	828	19,731	13,847	289	104,240

Notes: All measures are at newspaper by year level. *Leader Mentions*: percentage of all articles mentioning the top leaders. *Xinhua Cites*: percentage of all articles citing/mentioning Xinhua News Agency. *Epoch Stories*: the percentage of articles covering the annual top 10 events listed by Epoch Times out of articles covering the top 10 events listed by either Xinhua News or Epoch Times. *Corruption*: percentage of all articles covering corruption cases. *Disasters* (%) and *Accidents* are respectively the percentage of all articles covering the natural disasters and accidents with more than 30 fatalities that caused by human errors in China during 1998-2010. *Sport*, *Entertainment*, and *Crime* are, respectively, the percentage of all articles covering sports, entertainment, and crime stories.

Table 4 Principal Components Analysis

Component	Eigenvalue	Proportion	Variable	Comp1
Comp1	3.311	0.3679	Leader mentions	0.4865
Comp2	1.436	0.1596	Xinhua Cites	0.4139
Comp3	1.084	0.1204	Epoch Stories	-0.2913
Comp4	0.832	0.0924	Corruption	0.2832
Comp5	0.679	0.0755	Disasters	0.2928
Comp6	0.644	0.0716	Accident	0.0691
Comp7	0.473	0.0526	Sports	-0.2495
Comp8	0.318	0.0353	Entertainment	-0.3755
Comp9	0.223	0.0248	Crime	-0.3650

Note: 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	0.585	QINGHAIDAILY	Party Daily	province	Qinghai	Xining
2	0.549	GANSUDAILY	Party Daily	province	Gansu	Lanzhou
3	0.534	ANHUIDAILY	Party Daily	province	Anhui	Hefei
4	0.528	NINGXIADAILY	Party Daily	province	Ningxia	Yinchuan
5	0.498	PEOPLESAILY	Party Daily	central	Beijing	Beijing
6	0.496	SHANXIDAILY	Party Daily	province	Shanxi	Taiyuan
7	0.495	SICHUANDAILY	Party Daily	province	Sichuan	Chengdu
8	0.492	YUNNANDAILY	Party Daily	province	Yunnan	Kunming
9	0.487	JIANGXIDAILY	Party Daily	province	Jiangxi	Nanchang
10	0.486	HUBEIDAILY	Party Daily	province	Hubei	Wuhan
107	0.185	YANGCHENGEVENINGNEWS SHENZHEN	Subsidiary	province	Guangdong	Shenzhen
108	0.160	WUHANMORNINGPOST	Subsidiary	prefecture	Hubei	Wuhan
109	0.146	LIAOSHENEVENINGNEWS	Subsidiary	province	Liaoning	Shenyang
110	0.145	WUHANEVENINGNEWS	Subsidiary	prefecture	Hubei	Wuhan
111	0.145	MIRROR	Subsidiary	province	Beijing	Beijing
112	0.137	BEIJINGEVENINGNEWS	Subsidiary	province	Beijing	Beijing
113	0.125	THEFIRST	Subsidiary	province	Beijing	Beijing
114	0.119	YANGCHENGEVENINGNEWS FOSHAN	Subsidiary	province	Guangdong	Foshan
115	0.118	YOUTH EXPRESS	Subsidiary	central	Beijing	Beijing
116	0.095	YANGCHENGEVENINGNEWS DONGGUAN	Subsidiary	province	Guangdong	Dongguan
117	0.013	BEIJINGDAILYMESSENGER	Subsidiary	province	Beijing	Beijing

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

Table 6. Dependent variable: Newspaper bias

	I	II	III
Province	-0.111*** (0.010)	-0.126*** (0.005)	-0.126*** (0.006)
Prefecture	-0.151*** (0.012)	-0.175*** (0.010)	-0.176*** (0.013)
Party Evening	-0.133*** (0.014)	-0.140*** (0.012)	-0.145*** (0.016)
Subsidiary	-0.187*** (0.011)	-0.183*** (0.013)	-0.184*** (0.016)
Newsp Ad Mkt (log10 RMB 2011)	-0.035** (0.016)	-0.017 (0.087)	
Treaty Port	-0.023** (0.011)		
Long March	0.050*** (0.011)		
Observations	828	828	828
R-squared	0.698	0.732	0.794
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	0.013

Note: 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	8	
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		

The blue and the green color marks the two equilibrium newspaper entry sequences in Corollary 1. The orange colored observations are inconsistent with our theory of entry.

Table 8. Dependent variable: Number of Newspapers

Admin. level Newspaper type	Ordered Probit			OLS		
	Prefecture Party I	Prefecture Commercial II	County Party III	Prefecture Party IV	Prefecture Commercial V	County Party VI
<i>Advertising Mkt</i> (log10 RMB 2011)	0.426* (0.250)	1.932*** (0.232)	1.707*** (0.234)	0.007 (0.077)	0.407** (0.198)	0.893** (0.347)
<i>Expected political value</i>	10.765** (4.806)	-9.087** (3.816)	-3.112 (4.223)			
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

Note: 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 CCP stronghold 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	512
Cut 3	1,991
Cut 4	4,247
Cut 5	14,101

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

Table 10. Dependent variable: *Newspaper Bias*

	I	II	III	IV
<i>Reform 2003</i>	-0.006** (0.002)	-0.005** (0.002)	0.011** (0.005)	0.013*** (0.005)
<i>Commercial Paper * Reform 2003</i>			-0.021*** (0.004)	-0.022*** (0.004)
Observations	774	774	774	774
R-squared	0.847	0.850	0.853	0.855
Controls	No	Basic	No	Basic
Fixed Effects	Newspaper and Year	Newspaper and Year	Newspaper and Year	Newspaper and Year
Commercial			0.001	0.000

Note: The dependent variable is our measure of newspaper bias. Basic controls include GDP, population, wage, industrial share of GDP, real FDI, number university students, number employees, average wage, total government expenditure. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 11. Dynamic effects. Dependent variable: Newspaper Bias

	I	II	III	IV	V	VI
<i>Reform 2002</i>	-0.002 (0.005)	-0.001 (0.005)	0.002 (0.005)	-0.002 (0.005)	-0.001 (0.005)	0.002 (0.005)
<i>Reform 2003</i>	0.012* (0.006)	0.013** (0.005)	0.014** (0.006)	0.012*** (0.004)	0.011*** (0.004)	0.011** (0.004)
<i>Reform 2004</i>				0.000 (0.005)	0.002 (0.005)	0.003 (0.005)
<i>Commercial Paper * Reform 2002</i>	-0.003 (0.006)	-0.004 (0.006)	-0.005 (0.005)	-0.003 (0.006)	-0.003 (0.006)	-0.005 (0.005)
<i>Commercial Paper * Reform 2003</i>	-0.019*** (0.006)	-0.020*** (0.006)	-0.020*** (0.007)	-0.014*** (0.004)	-0.014*** (0.004)	-0.014*** (0.004)
<i>Commercial Paper * Reform 2004</i>				-0.006 (0.005)	-0.007 (0.005)	-0.007 (0.005)
Fixed Effects	Newspaper and Year					
Controls	No	Basic	Extended	No	Basic	Extended
Observations	774	774	738	774	774	738
R-squared	0.853	0.856	0.854	0.854	0.856	0.855

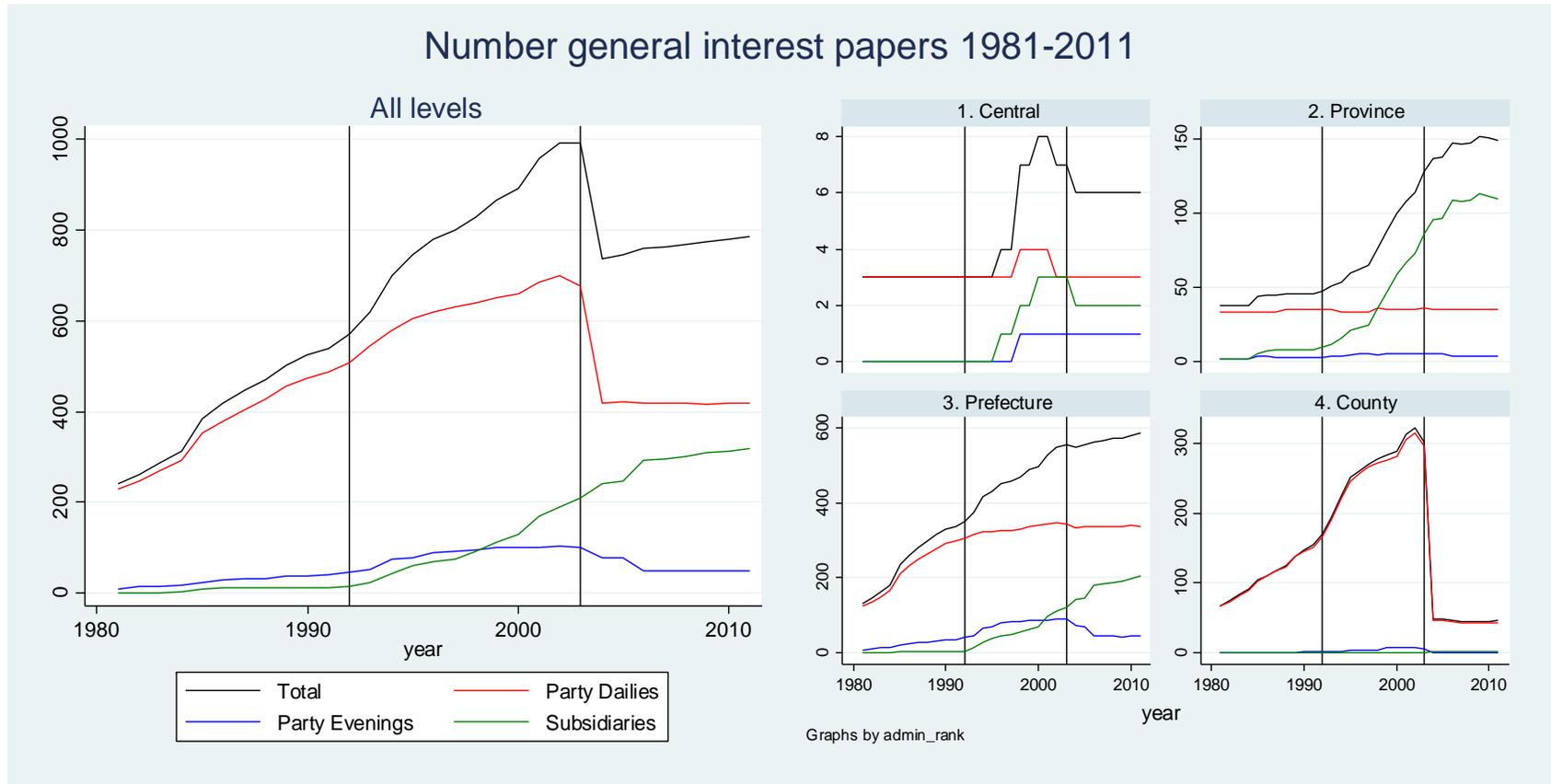
Note: Basic controls include GDP, population, wage, industrial share of GDP, real FDI, number university students, number employees, average wage, total government expenditure. Extended controls also include the interaction term between the predicted number of county dailies in 2002 based on our controls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

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

	I	II	III	IV	V	VI
Dependent Variable	Newspaper bias	Leader Mentions	Xinhua Cites	Epoch Stories	Disasters	Entertainment
<i>Reform 2003</i>	0.035*** (0.012)	4.224*** (1.062)	3.065 (3.013)	-1.346 (1.294)	0.129** (0.054)	-1.059** (0.394)
<i>Commercial Paper * Reform 2003</i>	-0.062*** (0.013)	-5.342*** (1.355)	-6.132** (2.668)	2.859** (1.130)	-0.207*** (0.073)	1.695*** (0.417)
Observations	774	774	774	774	774	774
R-squared	0.855	0.842	0.859	0.843	0.685	0.831
Commercial	-0.026	-1.118	-3.067	1.513	-0.077	0.637
Commercial p-val	0.000	0.041	0.007	0.151	0.080	0.022
Mean	0.296	11.505	24.146	23.746	0.538	12.934
Std. Dev.	0.122	12.034	15.242	14.257	0.731	4.911
Commercial-Party difference	-0.178	-16.508	-15.031	4.701	-0.215	3.334

Note: All regressions include newspaper- and year-fixed effects, as well as our set of basic controls: GDP, population, wage, industrial share of GDP, real FDI, number university students, number employees, average wage, total government expenditure. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 1. General-interest newspapers 1981-2011



Data source: Chinese newspaper directory data constructed by the authors.

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

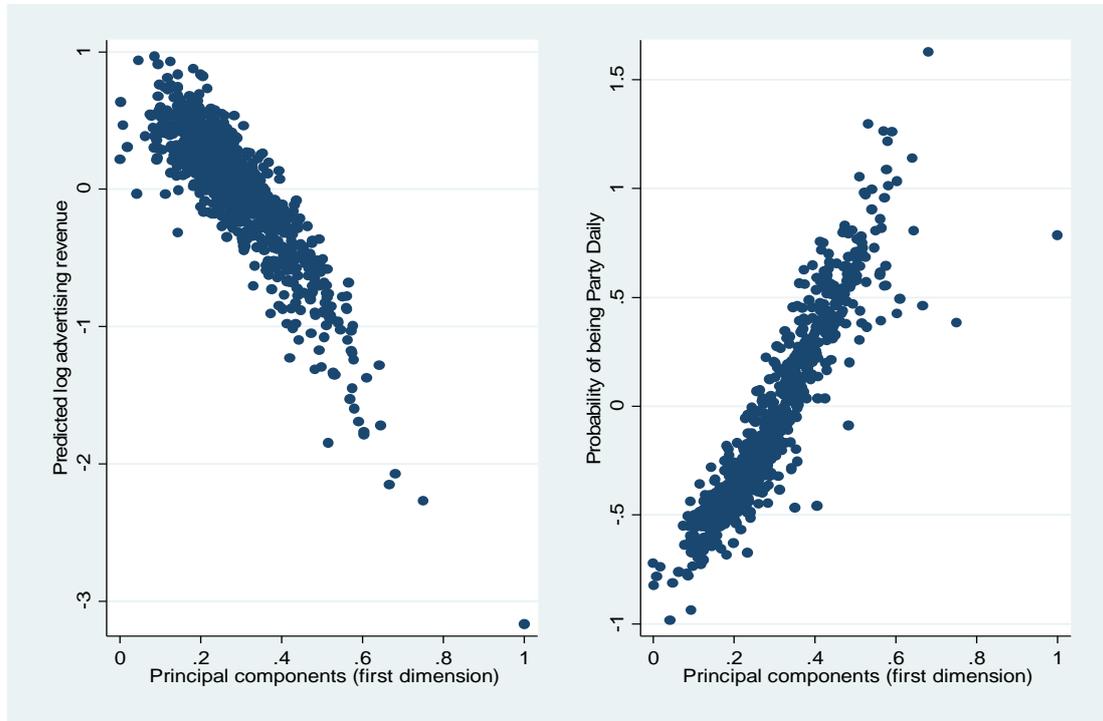
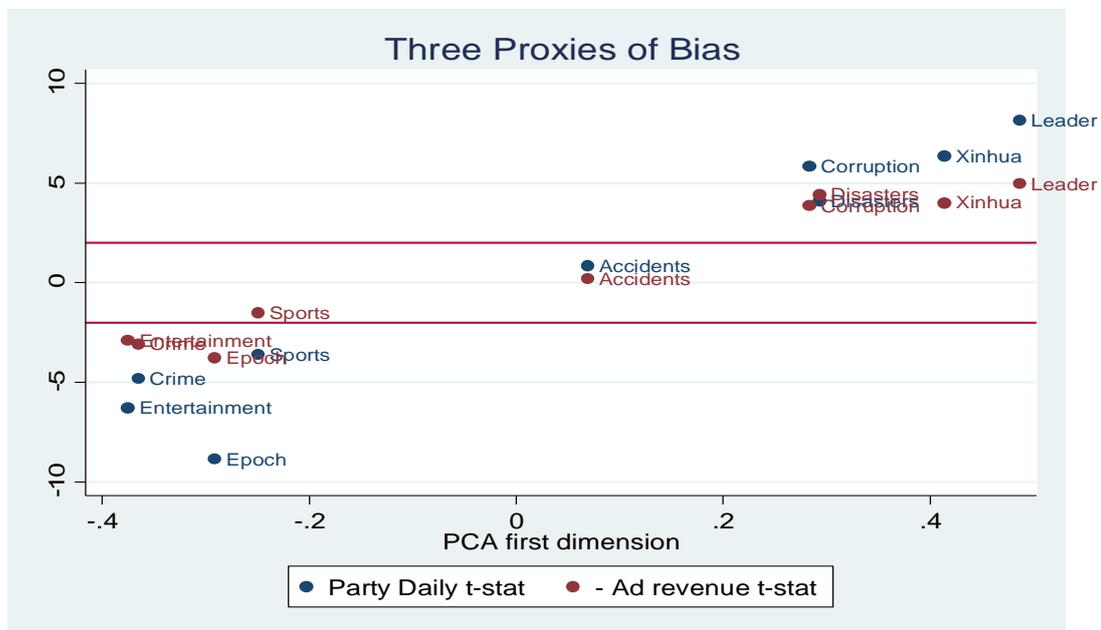


Figure 3. Content loadings in three bias measures



Note: 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

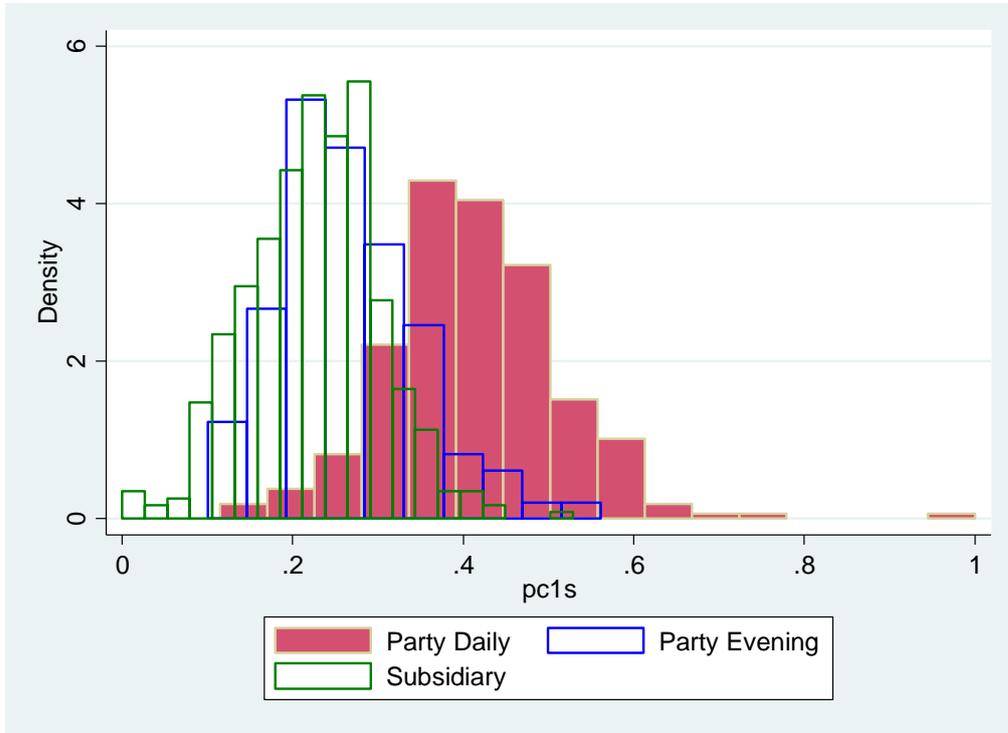


Figure 5. Newspaper bias and political control of media and firms

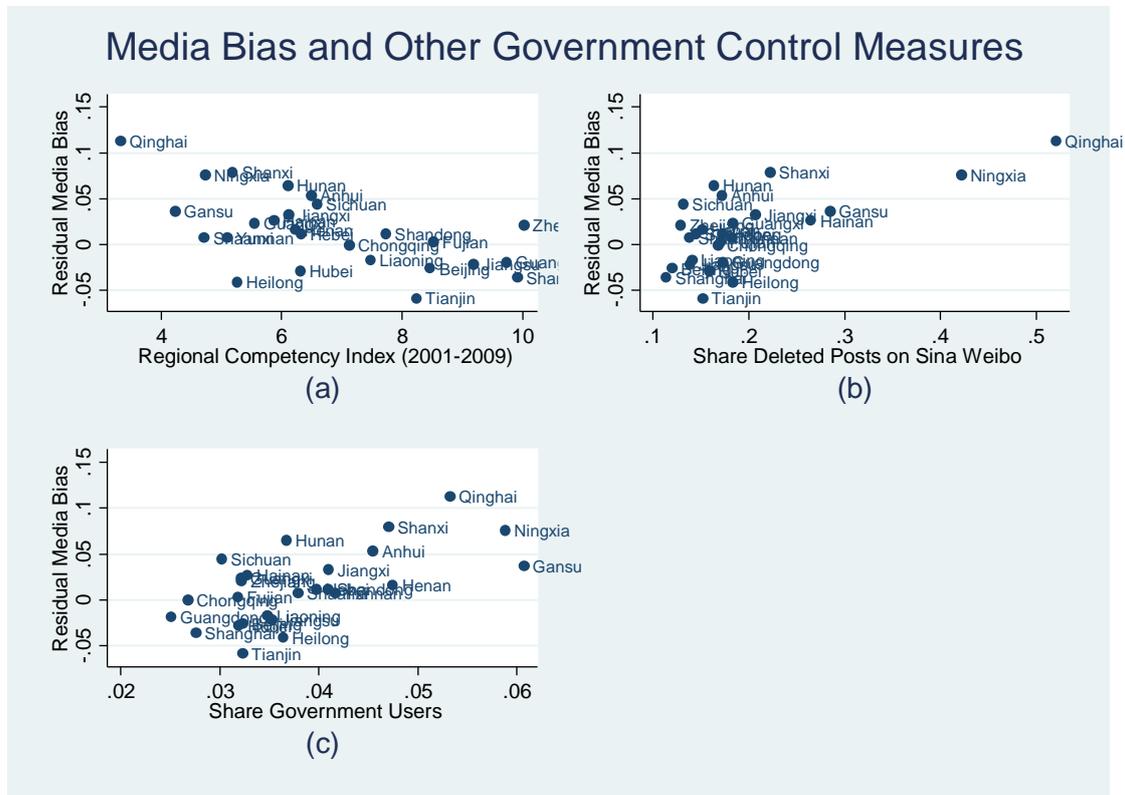


Figure 6. Effect of reform on content vs. PCA factor loadings.

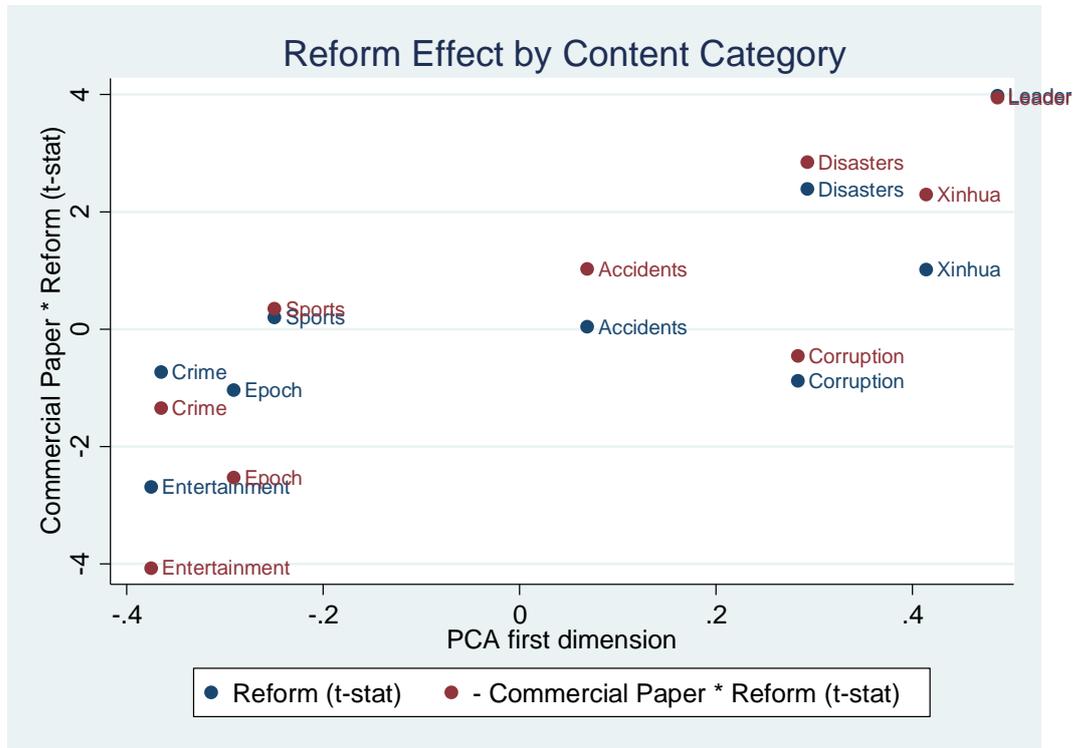
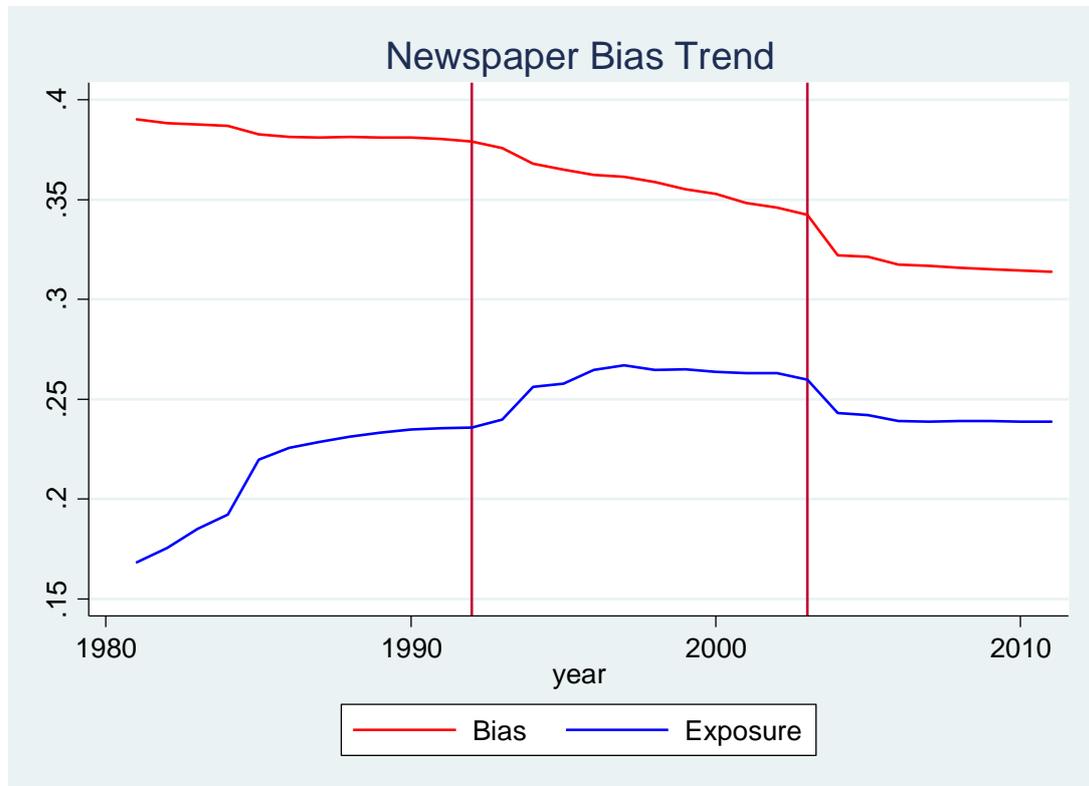


Figure 7 Trend in newspaper bias implied by entry and exits



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.