Media Bias in Autocracies: Evidence from China

Bei Qin* David Strömberg† Yanhui Wu‡

September 2014

Abstract

What is the political value of media control for government in an autocracy? To address this question, this paper studies the content of 110 mainstream newspapers in mainland China from 1998 to 2010. Using principal factor analysis, we construct a novel measure of media bias, which positively predicts the probability of a newspaper being a party mouthpiece and negatively predicts a newspaper's advertising revenue. We find that more-biased newspapers 1) more intensively cover political leaders and cite official articles to facilitate top-down communication within governments; and 2) more actively report on corruptions and disasters to implement the function of monitoring bureaucrats. Our findings show that newspapers in regions with larger advertising markets and those that were historically more exposed to Western culture are less biased, while newspapers in regions at higher administrative levels and thoses that were historically more exposed to the Communist ideology are more biased. Moreover, we find that the growth of advertising market does not affect media bias of the existing newspapers, but induces more entries of commercial newspapers, which reduces readers' exposure to media bias.

*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

Recent economics studies have demonstrated the important role of the media in democracies, ranging from the accountability of government and the provision of public goods, to citizens' political participation and electoral outcomes, and to information transparency in financial markets and corporate governance of firms.[1] By contrast, the role of media in autocracies is rarely known beyond anecdotal stories. This paper measures and studies the political bias of more than 100 mainstream newspapers in China from 1988 to 2011, from which we infer the value and cost of controlling media for governments in autocracies.

The loss of control over the media in authoritarian regimes has been associated with the downfall of the ruling party, as witnessed by the experience in Mexico, Peru, and the recent Arab Spring. Therefore, it is not surprising that an autocratic government uses the media as its "Mouthpiece" to maintain regime stability. As a result, media in autocracies are naturally biased towards the ruling party. However, the "Mouthpiece" view of media in autocracies is oversimplified. It neglects the fact that some non-democratic regimes accommodate free or partially free media. The Chinese Democracy Wall and Beijing Spring in the late 1970s[2] and the "glasnost" policy introduced by Mikhail Gorbachev in 1980s[3] are among the most famous episodes of relaxing media control under Communist regimes, during which a freer media was called for and endorsed by top political leaders. Currently, many autocratic governments embrace commercial media outlets, which cater to the increased demand for transparent information and diverse news content. Thus, what's the role of media in autocracies is a complex political and economic question. In this paper, we ask two related questions: What does an autocratic government use media for? And what factors lead the media in autocracies to deviate from its political goal?

These questions have recently spurred theoretical studies on media control by economists and political scientists (e.g., Besley and Prat 2006, Bernhardt et al. 2008, Egorov et al. 2009, Lorentzen 2013). However, empirical investigation into these questions is lacking, primarily because micro-level data on media outlets in autocracies are sparse and information on the relationship between media outlets and governments is opaque. We assemble a comprehensive directory of all Chinese newspapers during the period of 1980-2011, tracking each newspaper's relationship with government over time and in various aspects including ownership, financing, and administration. Analyzing the content of 110 general-interest newspapers and

[1] See Prat and Stromberg 2013 for a recent survey and the references therein.

[2] The Chinese Democracy Wall and Beijing Spring are part of the democratic movements in China in the late 1970s after the cultural revolution. In line with the Chinese Communist Party's policy of "seeking truth from factors," the general public were allowed to place posters with their criticim of the government on the Democracy Walls and to publish articles to debate on political issues. Despite this movement ended in 1979, the Chinese media were allowed for a substantial degree of freedom to criticize the government in the 1980s. Right before the Tiananmen Square Protests of 1989, some political leaders in China even advocated establishing a media law to improve the freedom of press.

[3] Glasnost is a policy that encourages increased openness and transparency in government and less censorship of the media. It was introduced by Mikhail Gorbachev in the former Soviet Union.

using the method of principal component analysis, we construct a novel measure of media bias that primarily captures the tension between a newspaper's political goal and commercial goal. We then correlate this bias with characteristics of newspapers that measure the financial, administrative and editorial control of newspapers and with a number of economic and political factors, most notably, the size of advertising market and the political preferences of governments. Based on the evidence, we provide a systematic description of media control in China over the last three decades.

China, the largest autocracy in the world, provides an ideal laboratory for studying the political value of media control in autocracies. The relationship between economic development and media freedom in China is striking. On the one hand, China is constantly viewed as among the countries with the most strictly controlled media. In 2013, Reporters Without Borders ranked China, in terms of the freedom of press, 173 among 179 countries, below Cuba and only slightly above North Korea.[4] On the other hand, China has one of the most dynamic media markets worldwide. The circulation of Chinese newspapers is the world's largest, with approximately 2100 newspapers selling 100 million copies every day; the advertising expenditure in China reached 41.41 billion dollars, ranked only behind U.S. (167.3 billion dollars) and Japan (43.32 billion dollars).[5] Equally striking are the variations across media outlets in China. Our directory shows that while some newspapers remain party organs run and financed by governments, an increasing number of newspapers have become entirely commercialized and are comparable, in terms of profitability, to the most lucrative state-owned enterprises in China. At both the macro and micro levels, the Chinese media industry exhibits a tension between the political and economic goals.

To capture the political-economic tension for Chinese newspapers, we measure the content differentiation across newspapers in the following nine content categories in three dimensions. First, we capture the content characteristics of a newspaper that adheres to the propaganda policy of the Chinese Communist Party (CCP hereinafter) by three types of news reports: 1) coverage of national and local political leaders, which is the foremost task in the implementation of the CCP's propaganda policy; 2) reports provided by or citing sources from Xinhua, the CCP's authoritative news agency that produces articles with an official tone; and 3) suppression on reports that are potentially detrimental to the CCP ideology, measured by articles about controversial issues that are intensively covered by oppositional overseas Chinese media. Second, we capture the commercial orientation by another three content categories, namely, crimes, sports, and entertainment. These three important categories of entertaining journalism are an important source of readership and advertising revenues for Chinese newspapers. Finally, we capture the "watchdog" role of media by a newspaper's coverage of corruptions, disasters, and accidents. In practice, we calculate the fraction of

[4]Data source: the website of Reporters Without Borders http://en.rsf.org/press-freedom-index-2013,1054.html

[5]Data source: http://www.statista.com/statistics/273736/advertising-expenditure-in-the-worlds-largest-ad-markets/

each category of articles over the total number of articles at the newspaper-by-year level, after searching relevant key words that identify these nine content categories over the digital newspaper archives.

To facilitate the analysis, we use the principal component analysis to collapse the nine dimensions of content differentiation into a single dimension – the first component, which accounts for about 40% of the variation in content. The first component is positively correlated with the measures of adherence to propaganda and the "watchdog" goal but negatively with the measures of entertaining journalism. Importantly, the first component exhibits a very strong negative correlation with a newspaper's advertising revenues and an equally strong positive correlation with the probability of a newspaper being a Party Daily - the newspaper that is most-strictlly controlled by the CCP. Moreover, at the regional level, we find that the first component strongly correlates with other measures of media freedom, such as the share of censored posts on social media. These several pieces of evidence strongly suggest that the first component of our principal component analysis captures the trade-off between political control and commercial benefits. Therefore, we use a normalized value of the first component to indexing a newspaper's product position in the political versus commercial spectrum. To be consistent with the terminology in the media economics literature, we label this index "media bias," although it does not measure deviation from a neutral position. A newspaper is more biased when its media bias index is closer to the political end.

We address the question of what the CCP uses media for by analyzing what content is characteristic of more-controlled newspapers. Based on the direct ownership and editorial autonomy, we classify all general-interest newspapers into three categories: 1) *Party Daily*, which is a CCP committee's official mouthpiece, directly owned by a CCP committee and under strictly supervised by CCP officials; 2) *Evening*, which is owned by a CCP committee but is allowed for substantial editorial autonomy except for important political issues;[6] and 3) *Subsidiary*, which is owned by other newspapers and has the greatest editorial autonomy among all Chinese newspapers. We find that compared to the Evening and Subsidiary newspapers, the Party Dailies carry far more content characteristic of propaganda (i.e., more reports on political leaders, more citations of Xinhua, and less coverage of controversial issues), but substantial less content characteristic of commercial media (i.e., more reports on sports, crime, and entertainment). This result suggests that the CCP committees differentiate media products to achieve their political-economic dual goal, in particular, using the more-strictly controlled newspapers - Party Dailies - to implement the CCP's political goal of ideological control and policy implementation, while using the less-controlled newspapers to achieve the economic goal. Moreover, we find that the Party Dailies report significantly more on corruptions and disasters, though not on accidents. This result suggests the CCP committees actively use their mouthpieces to improve local accountability, consistent with

[6]The somewhat unusal classification of "Party Daily" and "Evening" follows the names of newspapers. Traditonally, "Party Dailies" are newspapers published during the day time and read in offices and workplace, while "Evenings" are newspapers published in the evening and read at home.

the view that autocratic governments allow for investigative reporting to mitigate information distortion within the government and monitor local government officials (e.g., Egorov et al. 2009; Shirk 2011).

The substantial differences in news content and the media bias index appear not only across different types of newspapers, but also within each type of newspapers. Even within Party Dailies, the media bias index is dispersed distribution, with some Party Dailies adhering to the Party line and others being among the most commercial newspapers. This heterogeneity indicates that the value and cost of controlling media are likely to differ for CCP committees in different regions. This difference can arise from politicians' incentive to control media or from readers' preferences. Considering propaganda as a public good, a lower-level CCP committee can free ride the provision of propaganda by newspapers run by a higher-level CCP committee; this free-riding problem may cause the underprovision of media bias by lower-ranked newspapers. Historically, people in different areas of China were exposed to the CCP or anti-CCP ideology to a different degree; this heterogeneity in readers' preferences can be a source of the different valuation of media bias. We find three pieces of evidence in support of the view that media are less biased in regions where the political value of media is lower. First, newspapers with a lower administrative rank are less biased, controlling for newspaper types, regional economic and demographic conditions, and year and location fixed effects. That is, a prefectural Party Daily is less biased than a provincial Party Daily, which in turn is less biased than a national Party Daily. Second, newspapers in the prefectures that were CCP strongholds, measured by whether a prefecture was part of the CCP Soviet before 1949 or was passed in the CCP Long March in 1933-1935, are more biased. Third, newspapers in the prefectures that were part of a Treaty Port controlled by Western powers during the period of 1840-1910 are less biased.

Economic development can affect the cost of media control through the advertising market. A larger advertising market tends to increase the value of moving a newspaper towards the commercial end, which implies that the cost of politically controlling the media increases. Thus, one would expect that the growth of advertising revenues in a market tends to reduce the media bias of the newspapers in that market. In the cross-section, we indeed find that the bias index of newspapers is strongly negatively correlated with the size of the advertising market. However, this negative correlation disappears when controlling for the prefecture fixed effect in regressions. Within each newspaper, either at the prefectural or national level, we do not discover any significant relationship between the bias index and the size of advertising market during the sample period of 1998-2011. However, we find that a larger advertising market induces more entries and the earlier entry of Evenings and Subsidiaries. This result implies that economic growth reduces people's exposure to politically-biased media because of their increasing access to less-biased media.

1.1 Literature Review

This paper primarily contributes to the literature of media economics. In recent years, the economic development and political transition in China and other non-democratic countries have spurred economists and political scientists to study the role of media in autocracies. However, because of the lack of reliable data and the opaque institutional information, rigorous empirical studies of the media in autocracies are scarce. To the best of our knowledge, the current research is the first large-scale quantitative study on the media in autocracies at the level of media outlet. Apart from providing systematic evidence on the political-economic tension in autocratic governments' control of media, our study sheds new light on two important inquires in the existing literature. First, our empirical findings clearly demonstrate that the Chinese governments use newspapers to achieve a political goal of mediating in the top-down communication for ideology propagation and policy implementation. These findings, though not surprising, challenge the existing theoretical studies on media capture and control (e.g., Besley and Prat 2006, Bernhardt et al. 2008), which focus on the suppression of negative reports to avoid coordinative revolt. Second, our findings also address the debate of whether the media controlled by autocratic governments can help improve accountability. Based on country-level data, Egorov et al. (2009) argue that governments in non-democratic regimes may encourage investigative reporting to monitor bureaucrats. Some other scholars, on the other hand, argue that investigative reporting is driven by the more independent commercial newspapers (Liebman 2011). Our content analysis shows that the newspapers that are more politically controlled are more intensively used to monitor government officials, but limited to the low-level officials. This evidence is consistent with the recent studies on the Internet censorship in China (King et al 2012, 2013), in which they find that criticism of the state, its leaders, and their policies is routinely published in social media, whereas posts about collective action events that potentially threaten regime stability are censored.

Methodologically, our study makes a contribution to the measure of media bias, which is an important building block in the empirical study of media. Economists and political scientists have recently proposed a variety of bias measures for media in democracies. However, none of these measures can be directly applied to media in autocracies. For example, the measure created by Gentzkow and Shapiro (2010) that relies on "partisan" words to identify the ideological position of a U.S. newspaper is not applicable to the media in autocracies, which by definition have only one ruling party. The measure produced by Groseclose and Milyo (2005) that uses the average ideology of the think tanks a media outlet quotes as a proxy for its political position is not suitable for media in autocracies, because think tanks or public intellectuals who oppose the official ideology are rarely quoted by media outlets. Another measure of media bias popular in the financial economics literature (e.g., Tetlock 2007; Tetlock et al. 2008) exploits the sentiments of words in news reports to identify media outlets' attitude towards or against certain issues. This potentially useful approach is, however, difficult to apply, because words with an obvious negative sentiment are unusual

in Chinese newspapers' reporting on political and important policy issues. Based on institutional knowledge, we measure newspapers' content differentiation in various dimensions and then use the principal component analysis to extract the most important element as a measure of media bias. We believe that this novel measure of media bias for Chinese newspapers can be adapted to media in other autocracies and other empirical settings.

This paper also contributes to the expanding literature on the political economics of China from a unique angle. Media outlets in China are, to a large extent, analogous to state-owned enterprises that have a political and economic dual goal. A number of studies on state-owned enterprises in China (references to be added) have shown that the provision of economic incentives may undermine the political goal and thus induce resources reallocated towards the more-efficient private sector, but this efficiency improvement is limited without fundamental changes in ownership and personnel control. Our empirical evidence is consistent with this view: the rapid commercialization substantially increases newspapers' profitability, but does not induce newspapers to allocate resources to implement investigative journalism, which has high economic returns and social value. There are also interesting parallels between our study and the studies of the provision of public goods in China. Because information asymmetries between upper-level and lower-level governments, the central government in China has to use a decentralized system to provide public goods, such as environment protection, which leaves local governments substantial autonomy to select a local policy. When a local government has different preferences than the central government or can free ride the provision of a public good by upper-level governments, it tends to under supply this public good. In the current context of Chinese newspapers, we find strong evidence that newspapers at lower administrative levels provide less political bias than those at higher levels.

2 Institutional Background and Data

In this section, we present the institutional background of the Chinese newspaper industry based on the newspaper directory that we compiled. Despite the large number of publications on the Chinese media industry (mostly in Chinese), they are mostly qualitative with a few exceptions of quantitative studies based on small-scaled surveys. To provide an accurate description of the development of Chinese newspapers, we assemble a detailed directory of all mainland Chinese newspapers during the period of 1981-2010. Data about media outlets in china are scatter, and we gather information from a large number of publications, primarily the following four 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 publica-

tion. 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). When the relevant information from different sources is inconsistent or ambiguous, we verify the information with newspapers' internal documentation and consulting industry experts. To the best of our knowledge, our newspaper directory is the most comprehensive and accurate one among any other existing data on Chinese media. We also gather as much advertising information as possible. In particular, we obtain accurate annual advertising data, aggregated from daily information by a private data company, for about 80 major newspapers during certain periods after 2003.

2.1 Ownership and Control

The CCP controls the newspapers as well as other media in China in the aspects of ownership, personnel, and editorial direction. All Chinese newspapers are required to have a total or dominant state ownership. They must also be affiliated with a government supervisor that is responsible for licensing, the appointment of top personnel, and the monitoring of important editorial matters. Eligible supervisors include the CCP committees at different administrative levels, CCP divisions and government departments, and, on special occasions, government-affiliated mass organizations. Newspaper licenses are issued by SPPA, a government department under the supervision of the Propaganda Department of the CCP committees. In this study, we focus on the general-interest newspapers, which account for a dominant share of the newspaper readership in China. By regulation, only a Chinese Communist Party Committees (CCPC hereafter) is eligible to obtain the license of a general-interest newspaper.

The control of media in China is largely decentralized. The Chinese newspaper industry inherits the hierarchical structure of the CCPC system, the highest and most powerful decision-making bodies, ranked at four levels: national, provincial, prefecture, and county. Although the central CCPC maintains the ultimate control over all newspapers, the local CCPCs directly own and supervise the newspapers under their leadership. In practice, many newspapers are effectively controlled by local city authorities and government divisions in terms of both financing and management (Zhao 1998; Li, 2003; Tong, 2007a). This decentralized control system gives local CCPCs substantial leeway in their use and control of newspapers.

2.2 The Political Use of Newspapers

The foremost political goal of Chinese newspapers is to implement the CCP's Party Line - a propaganda policy that aims to maintain regime stability and facilitate policy implementation. Along this Party Line, the CCP transmits information from upper-level to lower-level governments to propagate the CCP ideology, maintain the cohesion of CCP leadership, and

informs readers of party decisions and government policies. To achieve such a political goal, the CCP Propaganda Departments frequently issue propaganda directives, summon meetings with chief editors, and require newspapers to publish articles from the official news agency – Xinhua. One most notable consequence is the routine coverage of CCP leaders' policy directives, visits and works with a highly positive tone. Failure to adhere to the Party Line usually leads to the demotion and dismissal of newspapers' editors and their government supervisors. Another important aspect of political control is the suppression of news content that is detrimental to the CCP ideology and leadership, the image and reputation of governments, and the implementation of policies. Newspapers self censor improper content according to the CCP propaganda guidance. The CCP propaganda departments also issue ad hoc directives and notices to censor the coverage and report of certain events and topics. A number of CCP cadres are employed to monitor newspapers' content after their publication. Failure to obey censorship may not only cause the dismissal and demotion of top personnel, but also the withdrawal of circulated newspapers, license suspension, and even the imprisonment of journalists.

A less well-known political role of Chinese media is the so-called Mass Line, along which media have the task of covering the performance of lower-level bureaucrats, particularly in emergencies, to provide intelligence to top leaders (see Zhao 1998 for a detailed description). In contrast to the top-down Party Line, the Mass Line involves bottom-up information transmission. 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 this function is the failure of media to report about the failing crops during the Great Leap Forward, resulting in the great famine and severe political instability. In recent years, the Mass Line is manifested in the so-called "supervision by public opinion," which permits the media to report on corruption and wrongdoings of party officials and government agencies.

2.3 Commercialization and Newspaper Types

Stringent control of news content causes two problems. First, general readers who demand diverse information and soft news have no incentive to subscribe strictly-controlled newspapers. A readership confined within government bureaucrats, employees in the public sector and state-owned enterprises, and CCP members hinders the propagation of the CCP ideology and leadership. Second, strictly-controlled newspapers are unattractive to advertisers because of their limited readership. The heavy subsidies to these newspapers are a burden on local governments. These two problems lead the CCP to relax its political control of newspapers.

The relaxation of media control in China takes the form of commercialization, during which newspapers are permitted to finance themselves by advertising revenues and non-government investors and allowed for the freedom to retain and distribute their profits. Com-

mercialization, however, may undermine the political goal of newspapers. First, commercial newspapers are less willing to implement the Party Line, which does not produce advertising revenues. For example, a common practice to carry out propaganda tasks among commercial newspapers is to shorten the length of propaganda articles and locate them to less important position and pages. Second, commercial newspapers may steal readership from the more politically-controlled newspapers. Third, most importantly, to compete for readership and advertising revenues, commercial newspapers may publish articles that deviate from the Party Line and the censorship rule. For these reasons, the CCP's control of newspapers needs to strike a balance between the political and economic goals.

Based on their direct ownership and managerial autonomy, we classify the general-interest newspapers into different categories. By regulation, the general-interest newspapers in China come in variants indicated by their names that can be easily identified as 1) "Daily," 2) "Evening," and 3) "Metro" and similar names. A "Daily" is the official mouthpiece of a CCPC, and its editorial policy is strictly controlled by the CCPC Propaganda Department. All CCPC and government departments, government-affiliated organizations, and state-owned enterprises are required to subscribe "Dailies" run by all the CCPCs that have the power over them.[7] "Dailies" are mostly subscribed to with public money and for consumption in offices, classrooms, and factory workshops. In contrast, "Evenings" and "Metros" are less-strictly 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. Apart from differing in publication time ("Evenings" in the afternoon and "Metros" in the morning), these two types of newspapers are similar in content, circulation, and managerial practices. In the 1990s, the general-interest newspapers were allowed to own subsidiary newspapers. With several exceptions, these subsidiary newspapers are "Metros" or "Evenings". We call these newspapers "Subsidiaries" to distinguish them from the "Evenings" and "Metros" that are directly owned by CCPCs.

To sum up, we classify all the general-interest newspapers in this study into three types: 1) Party Dailies, CCPC's mouthpieces under the name "Daily"; 2) Party Evenings, owned by CCPCs under the name "Evening" or "Metro"; and 3) Subsidiaries, owned by other newspapers under the name "Evening" or "Metro." Among these three types of newspapers, the top personnel of Party Dailies and Party Evening are appointed by CCPCs, while the top personnel of Subsidiaries are appointed by their parent newspapers. In terms of editorial policies, Party Dailies are directly controlled by CCPCs, while Party Evenings and Subsidiaries enjoy substantial autonomy.

[7] For example, suppose C-County belongs to B-Prefecture, which in turn belongs to A-Province. Then, a government department in the C county must subscribe the "Dailies" run by the C-County CCPC, the B-Prefecture CCPC, the A-Province CCPC, and the People's Daily which is run by the central CCPC.

2.4 Historical Development

Figures 1 and 2, constructed from our newspaper directory, illustrate the evolution of the general-interest newspapers in China from 1981 to 2011. Figure 1 shows the total number of all newspapers; Figure 2 demonstrates the broken-down by the newspapers' hierarchical levels.

After the foundation of the People's Republic of China in 1949, all mass media came under the strict control of the CCP.[8] During a long period, "Party journalism" dominated the news consumption of Chinese people.[9] In 1981, the start year of our sample period, there were 242 general interest newspapers, among which 230 were Party Dailies. These Party Dailies were operated by CCPCs at the central and provincial levels with a few exceptions being operated by lower-level CCPCs. Following the economic and social reforms in 1978, both the consumer demand for informative media and the advertiser demand for advertising outlets grew in tandem with incomes and literacy rates. Meanwhile, governments at all level gradually reduced subsidies to newspapers and encouraged commercial financing of media. These policy changes spurred the Party Evenings to produce more consumer-orientated content. Although small in numbers, they soon attracted a large readership and became the top advertising earners.

In 1992, after Deng Xiaoping's Southern Tour, the open endorsement of the market economy by political leadership stimulated a boom in advertising and media industries.[10] During the 1990s, the most fundamental reform regarding media commercialization is the permission of establishing Subsidiary newspapers. Without any funding from governments, many Subsidiaries absorbed non-state capital – typically funding from mass organizations and state-owned-enterprises – in addition to funding from their parent newspapers. As seen in Figure 2, the increased trend in the number of subsidiaries after this first vertical line – the year 1992 of Deng's Tour – is clearly visible. This trend is particularly pronounced at the provincial level. The 2000s witnessed continuing growth of Subsidiaries at the prefectural level but the consolidation of newspapers at the county level. Notably, the number of county-level newspapers dropped from 325 in 2002 to 75 in 2004 In 2003 (see Figure 2), because most county level newspapers were shut down by the central government in 2003 to reduce the fiscal burden of county-level governments. In recent years, the most significant reform in the Chinese newspapers industry is to gradually convert Party Evenings and "Subsidiaries" into state-owned

[8] A small number of commercial newspapers and radio stations were allowed to continue into the early 1950. There numbers dropped from 58 in March 1950 to 25 in August 1951 to zero in 1952.

[9] In the late 1950s and early 1960s, recognizing the need for newspapers as a form of popular culture and entertainment for the urban population, the CCP permitted some regional committees in central cities to launch 13 evening dailies. Also responsible for propagating Party policies and directives, these "Party Evening Papers" were more readership-oriented, with contents more diversified and closer to everyday urban life. During the Cultural Revolution, all 13 evening papers were forced to close because their orientation were viewed as incompatible with the ideology of the time. In the early 1980s, these 13 Evening papers all resumed publication.

[10] In 1993, advertising revenues in the whole country reached 13.4 billion Yuan, a 98% percent increase over 1992.

enterprises, but the requirement of a dominant state-ownership of general-interest newspapers and the policies of personnel and editorial control have not changed.

3 News Content and Measures of Media Bias

In this section, we discuss how we measure media bias based on the content of newspapers in the current empirical setting. Our news content data are extracted from a digital newspaper achives base provided by WiseNews, a Hongkong-based data provider. Other providers of digital Chinese newspaper archives either contain only a limited selection of articles or span only the most recent few years. The data base starts from 1998, but we restrict our sample to the period of 2001-2010, during which the data set contains a significant number of newspapers and complete digital archives.

In total, there are 110 general-interest Chinese newspapers published in Mainland China in the WiseNews data during our sample period, but the number of newspapers slightly varies over years, as shown in Table 2.[11] According to our classification of newspaper types, among these 110 newspapers, 39 are Party Dailies, 28 are Party Evenings, and 43 are Subsidiaries; Table 1 provides a summary. Geographically, these newspapers cover 26 out of 31 provinces in Mainland China. However, the WiseNews sample only contains newspapers located in major prefectural areas. Therefore, our newspaper sample largely represents the newspaper markets in urban areas, which comprise the majority of readership.

3.1 Challenges of Measuring Bias of Media in Autocracies

We aim to measure a newspaper's political bias. This is particularly challenging for Chinese newspapers. One highly useful method to measure media bias is to identify content that is characteristic of agents with known ideologies. For example, Gentzkow and Shapiro (2010) regress the ideological position of U.S. House congressmen on word frequencies in their speeches. They then use the estimated word coefficients to compute the expected bias of a newspaper based on the frequencies of words appearing in articles of the newspaper. However, in an autocracy like China, there are no competing parties that advocate opposing ideologies. Even implicit words expressing deviation from the CCP ideology rarely appear in Chinese newspapers. One may attempt to apply the Groseclose and Milyo's (2005) measure of media bias based on the share news articles citing Democratic or Republican think tanks. In China, with several exceptions, think tanks are all affiliated with government departments under the leadership of CCP. In recent years, a number of public intellectuals, including a few dissenters, are active in social media, but the citations of their opinions are extremely rare in newspapers. Another potential approach is to measure the tones of news reports on selected

[11] WiseNews purchases the digital archive of newspapers on an individual base and sell them to institutional subscribers. The number of newspapers purchased by WiseNews depends on the purchasing prices and the number of subscribers. The fairly drastic drop in the number of newspapers in 2010 is caused by the competition from other newspaper providers (e.g., APABI).

issues, following the measures of sentiments using positive or negative words in the financial economics literature (e.g., Tetlock 2007; Tetlock et al. 2008). However, Chinese newspapers are regulated to maintain a unified tone in their reporting on political issues, government policies, and important events. There may exist variations in the tone of reporting on certain economic and social issues, but exploiting these fine variations is less likely to capture the major part of political bias and may run the risk of producing misleading results because of the subtlety of sentiment words.

To overcome these difficulties in the measure of media bias for Chinese newspapers, we create a series of measures that, respectively, capture a newspaper's political goal and economic goal. We then employ the method of principal component analysis to compress the multi-dimensional measures of content differentiation into a single-dimensional measure of media bias. Our approach is comparable to several existing measures of media bias in the literature, as will be discussed below.

3.2 Classification of News Content

We measure differentiation in news content across newspapers in three dimensions: 1) the Party Line, which reflects a newspaper's adherence to the CCP's top-down propaganda policy; 2) the Bottom Line, which reflects audience-oriented news content; 3) the Mass line, which reflects the "watchdog" role of mass media. In each dimension, we search key words over every newspaper's digital archives to identify several content categories that are related to the dimension of interest. Potentially, there is a large degree of freedom to choose the search key words. Practically, apart from the relevance to the content dimension, the choice of key words must satisfy two additional restrictions. First, they must be commonly used across newspapers and over time. Second, they must be well identified and easily applied by other researchers and in other samples. These restrictions rule out many key words that are related to narrowly-defined issues and events and are widely used in journalism study, such as ideology slogans by newly-elected national leaders, National Congress, and Olympic Games. Covering more general issues, our approach allows us to exploit meaningful variations across a large number of media outlets and has the advantage of being duplicable. A detailed description of the key words for each measure can be found in an on-line appendix.

The Party Line. We construct three measures 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. Among these leaders, 108 individuals are at the central level, 816 at the provincial level, and 1187 at the prefectural level. Second, we calculate the number of articles that are either provided by or cite Xinhua News, which is a key instrument for the CCP to enforce propaganda objectives. Third, we identity 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 that is sponsored by anti-CCP organizations and whose circulation is banned in Mainland China. We use the

ratio of the numbers of these two kinds of articles to capture the omission of negative news relative to the inclusion of positive news.

The above three content categories provide natural proxies for pro-incumbent politician bias. They are also closely related to the existing measures of media bias. For instance, news stories covering politicians from a party are a common measure of media bias favoring that party, as used by D'Alessio and Allen (2000) and 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 newspaper articles citing Democratic or Republican think tanks. Coverage of positive news is another common measure of bias favoring incumbent politicians. For example, Larcinese et al. (2007) find that newspapers that endorse Democratic politicians systematically give more coverage to high unemployment when the incumbent president is Republican.

Within our sample newspapers, we identify 1.58 million articles covering the political leaders, among which 0.6 million articles cover central leaders, 0.6 million cover provincial leaders, and 0.38 million cover prefectural leaders. We find 3.4 million articles mentioning Xinhua News. We track down 473,000 articles covering the Epoch Times top stories and 1.1 million articles covering the Xinhua top stories.

The Mass Line. We aim to measure the role of media in monitoring bureaucrats and improving the accountability of government. We call this watchdog role of media "Mass Line" as it is a core part of the CCP Mass Line. On the other hand, the watchdog journalism is also an important characteristic of the free media in democracies. We identify three types of reports that is related to the watchdog journalism – reports on corruptions, disasters, and accidents. Corruptions obviously reveal the incompetency of government. In China, significant disasters and accidents, in particular those caused by human errors or wrongdoings, are often regarded as reflecting the incompetency of the responsible 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. One typical kind of disaster is floods caused by poorly-managed drainage systems, and typical accidents include public transport crashes due to malfunctioned vehicles or maloperation.[12] 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 129 are caused by human factors. We then search articles covering these disasters/accidents within a certain time window around their occurrence.

[12] For example, in July 2011, two high-speed trains collided in Wenzhou, Zhejiang province, killing 40 people. The first government response was to quickly conclude rescue operations and order the burial of the derailed cars. Facing strong criticism in Chinese media, the government issued directives to restrict media coverage, which was met with limited compliance. The Ministry of Railways announced that three high ranking railway officials were fired immediately after the crash under charges of corruption. For more detail, see Branigan, Tania (2011-07-25). "Chinese anger over alleged cover-up of high-speed rail crash". London: Guardian Media Group. http://www.guardian.co.uk/world/2011/jul/25/chinese-rail-crash-cover-up-claims

We track down 24,000 articles that cover corruption cases that are not part of the speeches of government officials and anti-corruption actions. These articles are mostly related to low-level officials.[13] We only identify 13 cases concerning prominent political leaders, an extremely small fraction in our sample of 2111 political leaders that are intensively covered. We find 82,509 stories about the disasters and 17,965 stories about the accidents.

The Bottom Line. Soft journalism featured by entertaining reports is an important part of commercial newspapers worldwide. In China, hard journalism featured by reports on political and economic news fails to attract a large audience because of the suppression of independent reporting on important issues; commercial newspapers rely heavily on soft journalism to compete for readership and advertising revenues. Thus, we measure three most significant types of soft journalism – sports, entertainments such as movies and music, and news on crimes – to capture a newspaper's inclination towards commercialization, which we call "the Bottom Line". These three types of journalism are the most-searched subjects in Baidu, the foremost searching engine in China. However, they are often regarded by CCP officials as "spiritual pollution," because they distract newspapers from pursuing the Party Line.[14] Thus, they also indicate a newspaper's deviation from its political goal. We find 1.1 million articles covering sports, 2.1 million related to entertainment stories, and 88,700 reports on crimes.

Summary Statistics. Based on the nine content categories, we define nine variables: *Leader Mentions, Xinhua Cites, Epoch Stories, Corruption, Disasters, Accidents, Sport, Entertainment*, and *Crime*. The variable Epoch Stories is measured by the ratio of the number of articles covering the top events listed by Epoch Times over the number of articles covering the top events listed by Xinhua News; all the other variables are measured by the share of articles belonging to the corresponding content category over the overall number of articles in Wisenews. All the nine variables are scaled up by a factor of 100 and defined at the newspaper_by_year level. Table 3 presents The summary statistics of these variables. A large share of articles concerns the Party Line and a significant share concerns the Bottom Line, while the Mass Line articles only account for a small share.

3.3 Principal Component Analysis

The above nine content categories provide raw measures of content differentiation in different dimensions. Although these measures can be clearly interpreted, they are analytically inconvenient. Thus, we employ the method of principal component analysis (PCA) to construct a single-dimensional measure of media bias. PCA is a statistical method used to reduce dimensionality of data to capture the most important variation. Despite the wide application of PCA in both natural and social sciences, its application in media content analysis has

[13] Typical examples of this type of reports are "An officer from a poor county in Shanxi province has collected bribes worth over 20 million Yuan" or "The vice deputy director of Shunyi Municipal Bureau of Land and Resources was sentenced to prison because of taking bribes."

[14] See e.g. Zhao (1998), p. 131.

not received much attention. One application close to our purpose is to measure the ideology position of U.S. House congressmen by using PCA of all their roll-call votes and then interpreting the first dimension as left-right ideology (Nominate Scores).

In our empirical setting, we perform PCA to reduce the nine content categories to a single dimension. Because news availability may vary by prefecture and year, we analyze the residuals from a regression of content categories on prefecture_by_year fixed effects. The result is shown in Table 4. The first component explains 38 percent of the variation in news coverage. 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* all have strong negative loading. For the measures of the Mass Line, *Corruption* and *Disasters* have strong positive factor loading, while the loading of *Accidents* is modest. The PCA first component seems to well capture the tension between a newspaper's political and economic goals in the way that we measure them.

One major challenge in the application of PCA is the difficulty of giving a clear and credible interpretation of the first component. To address this problem, we correlate the PCA first component to a newspaper's advertising revenues and the probability of that newspaper being a CCP mouthpiece – a Party Daily. Specifically, we regress the logarithm of a newspaper's advertising revenues on the nine content variables defined as above, controlling for prefecture-by-year fixed effects. By the same token, we regress a dummy variable that indicates a newspaper to be a Party Daily on the nine content variables with the same controls. We then use the estimated coefficients of the content categories in each of the two specifications to compute, respectively, the expected log advertising revenues and the probability of being a Party Daily. These predicted values are plotted against the PCA first component in Figure 3. Clearly, the first component is negatively related with the predicted advertising revenue and positively related with the predicted probability of being a Party daily.

Table 5 shows similar results in regression analysis. Column II, in comparison to Column I, shows that the PCA first component is a prominent factor in explaining a newspaper's low advertising revenues. The result is even stronger when prefecture-by-year fixed effects are added (Column III). In Column IV, a replacement of the first component with the nine individual content categories only slightly increases the R-squared from .78 to .80, indicating that the PCA first component fits the data almost as well as the an unconstrained linear combination of content categories. Similarly, Columns V and VI show that the PCA first component has strong explaining power for a newspaper to be a Party Daily.

The above results strongly support that the PCA first component we obtain from our classification of content differentiation provides a good measure for a newspaper's position in a spectrum with the political goal on one end and the economic goal on the other end. We define the PCA first component of a newspaper, normalized in a $[0, 1]$ range as the political bias of that newspaper. A newspaper with a larger PCA first component is called

more politically biased. Our definition of newspaper bias is comparable to the method of Gentzkow and Shapiro (2010) in which they construct a measure of media bias based on known ideology positions, because in our setting, we have a strong prior belief that a Party Daily is highly biased and newspapers with high advertising revenues are less biased.

Two additional pieces of evidence lend further support to the credibility of our measure of media bias. First, we construct a provincial-level media bias by calculating the average value of the PCA first components for all newspapers within a province and then correlate this bias with the intensity of censorship in the Chinese social media at the provincial level. Figure 4 plots the provincial-level media bias against the share of deleted posts on Sina Weibo, which is by far the largest microblog in China, with over 300 million registered users.[15] Since our sample does not contain the same mix of Party Dailies, Evenings, and Subsidiaries across provinces, we control for the year fixed effects, the types of newspaper, and the administrative levels of newspapers in the plot. Obviously, Figure 4 demonstrates a strong positive relationship between the provincial-level media bias we construct and the intensity of censorship in Sina Weibo. For instance, the newspapers in the two provinces Qinghai and Ningxia, where more than 40% of the posts on Sina Weibo were deleted, are most biased in terms of our measure.

The second piece of evidence comes from individual newspaper. We assign the bias measure to each newspaper in our sample. Figure 5 shows the distribution of the bias measure for each of three types of newspapers: Party Daily, Party Evening, and Subsidiary. With several exceptions, the bias of Party Dailies is located to the right of the other two types of newspapers. One such exception, the least-biased Party Daily, is Guangzhou Daily, which has earned the reputation as the newspaper with the largest advertising revenues in China. Interestingly, the Chairman and Chief Editor of this newspaper, Yuanjiang Li, a famous newsman who led the newspaper to the tide of commercialization, was prosecuted as "corrupt" and jailed for a 12-year term in 2004.[16] Table 6 lists the top 10 and the 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 and Evenings from large metropolitan areas, consistent with the belief that metropolitan areas bread the most commercial and free media.

[15] We obtain the data on the shares of deleted posts on Sina Weibo at the provincial level from Bamman, O'Connor and Smith (2012).

[16] According to Zhao (2008, P116), Yuanjiang Li fell from favor because of critical reporting on local affairs and defying the orders of Guangzhou municipal party officials, "he had violated the basic rule of the game: no matter how successful he had become as a press baron of national status, he remained a functionary of the local party committee he belonged to."

4 What Does the Chinese Government Use Media for?

The results presented in the last section show a substantial difference in the political bias between the mouthpieces of CCPC at all levels (i.e., Party Dailies) and the commercialized newspapers (i.e., Party Evenings and Subsidiaries). Presumably, the CCPCs use their mouthpieces to fulfill the political goal, while the commercialized newspapers are allowed for leeway in their pursuit of the political goal. In this section, we study what news content is characteristic of Party Dailies, relative to the other two types of newspapers, to provide some descriptive evidence on the political value of media bias, from which we learn what the Chinese government uses the media for.

4.1 Descriptive Statistics

Table 7 shows the nine raw measures of content by three newspaper types – Party Dailies, Evenings, and Subsidiaries – and in three dimensions – Party Line, Mass Line, and Bottom Line. As previously, all the variables are defined as shares of articles, except for Epoch Stories. Using the share, rather than the number, of a particular type of articles to measure media bias is consistent with what is used in the literature. The average number of articles for each type of newspaper is reported in the last column. Party Evenings and Subsidiaries on average contain more articles than Party Dailies, because a Party Daily chooses to produce fewer pages due to the insufficiency of advertisement.

The top panel of Table 7 concerns the Party Line. Party Dailies mention political leaders in 23 percent of their articles, a portion that is vastly greater than those of Party Evenings (7 percent) and Subsidiaries (5 percent). Party Dailies cite Xinhua News in 35 percent of their articles, again substantially more than Party Evenings (24 percent) or Subsidiaries (17 percent). Party Dailies also cover less of the top stories listed by Epoch Times, as opposed to those listed by Xinhua News. In terms of the number of articles, Party Dailies still cover substantial more political leaders and Xinhua News than the other two types of newspapers; the difference in the coverage of Epoch Stories is even greater.

The middle panel concerns the Mass Line. The share of articles on corruption in Party Dailies is significantly larger than those in Party Evenings and Subsidiaries, while the difference is less obvious in terms of the number of articles. In terms of both the share and number of articles, Party Dailies report substantially more on disasters than Party Evenings and Subsidiaries. The coverage of Accidents, however, is not obviously different between Party Dailies and the other two types of newspapers. more on corruption and disasters than Evenings and Subsidiaries.

Finally, the bottom panel concerns the Bottom Line. Party Evenings and Subsidiaries cover 20 percent more stories about sports and entertainment than Party Dailies. The coverage of crimes in Party Evenings and Subsidiaries double that in Party Dailies. These differences are amplified when they are calculated in terms of the number of articles.

4.2 Regression Analysis

The above descriptive differences in the content measures across the three types of newspapers could potentially be contaminated by a problem of sample selection: the composition of Party Dailies, Party Evenings, and Subsidiaries in our sample may differ in different regions. For example, Party Dailies could come predominantly from regions with more corruption cases, resulting in more coverage of corruptions in Party Dailies. To account for this potential selection problem, we regress the content variables on a dummy of being a Party Daily, controlling for prefecture-by-year fixed effects. Panel A of Table 8 presents the results. Essentially, the nine regressions confirm the descriptive evidence presented in Section ??.

We also regress the nine content variables on newspapers' advertising revenues, controlling for prefecture_by_year fixed effects (reported in Panel B of Table 8). Except for the variable "Accidents," the coefficients in all the regressions are statistically significant and their sign is opposite to that of the corresponding coefficients in the regressions on the Party Daily dummy (see Panel A). In other words, a newspaper's adherence to the Party Line by reporting more on political leaders, citing more Xinhua News, and suppressing more Epoch Stories is correlated with a lower level of advertising revenue, while catering to the Bottom Line by covering more Sports, Entertainment, and Crime stories is correlated with a higher level of advertising revenue. Interestingly, the content measures of the Mass Line – Corruption and Disasters – are negatively correlated with a newspaper's advertising revenue.

We extract the t-statistics of the independent variable "Party Daily" in the above regressions of content categories (Panel A of Table 8) and then plot them against the PCA factor loadings in Figure 6. In the same figure, we also plot the negative values of the t-statistics of "Advertising Revenue" in the regressions of content categories (Panel B). The fit between the t-statistics and the factor loadings once again confirms the previous results using the raw measures of news content.

4.3 Discussion

A common view is that governments in authoritarian regimes control media primarily to propagate the ideology of the ruling party and suppress reports on the incompetency of government, coordinated actions, and riots that may threat regime stability. In light of this view, several theoretical models (e.g., Besley and Prat 2006; Banhardt et al. ??) have been developed to analyze strategic media control in terms of censorship in authoritarian regimes. The results presented in this section show some consistency with these studies: compared to commercialized newspapers, the CCP mouthpieces, namely Party Dailies, substantially report more on political leaders and cite more Xinhua News while suppressing more Epoch Stories from the opposing media.

Our findings also show that the implementation of the CCP Party Line is associated with a loss of advertising revenue, indicating the Party Line journalism is not attractive to general readers. Even if the subscription of a Party Daily is mandatory, a rational reader

can choose to ignore the newspaper's political content. Thus, the circulation of Party Dailies is mostly confined within government bureaucrats. A subtle question arises: what is the political value of the Party Line journalism with such a limited readership? Our empirical results provide suggestive answers to this question. First, in China, the reports on political leaders are strictly controlled, not only in terms of content but also in terms of position (e.g., whether in the front page) and size (e.g., the font of titles and length of articles). Moreover, the names of political leaders in the same article must appear in an official sequence approved by the CCP propaganda departments. Despite that a large number of reports on political leaders cover their routine activities that have little journalistic value, the coverage of political leaders provides useful information for government bureaucrats who are able to read between lines to infer the real leadership and potential changes of power in the government. This leadership-signalling function is particularly important in the period of politician turnover and intense political competition. Second, a significant fraction of articles that cite Xinhua News is related to the implementation of policies and government actions. These articles can provide a function to clarify policy ambiguity, silence debates, and coordinate actions across government departments. In general, the Party Line journalism is likely to play an important role in facilitating the top-down information communication within the CCP and government system. To the best of our knowledge, we are not aware of any theoretical models that analyze this aspect of media control.

There is little doubt on the limited function of the media in monitoring top political leaders in autocracies. However, whether the media in autocracies plays a watchdog role to hold lower-level officials accountable is debatable. A number of studies in political science (Egorov et al. 2009; Liebman 2011; Shirk 2011; Lorentz 2013) have argued that autocratic governments can benefit from actively using media to keep government bureaucrats in check and thus improve the quality of government. This argument is consistent with the Mass Line function of media in the CCP propaganda policy (see the discussion in Section ??). On the other hand, numerous case studies on the journalism in China show that investigative reports conducted by commercial Chinese newspapers implicated government officials, confronted powerful vested interests, and exposed major social abuses, while the CCP mouthpieces failed to fulfill such a watchdog function (e.g., Zhao 2008; Tong and Sparks 2009; Bandurski and Hala 2010; Tong 2012). These case studies are consistent with the view that autocratic governments tend to suppress investigative reports on government officials as they may reflect the incompetency of the ruling party (e.g., Levisky and Way 2010).

Our empirical findings show that compared to the commercialized newspapers, Party Dailies "excessively" report more on corruption cases and disasters, the type of events that are related to the competency and accountability of local officials. This result is consistent with the Mass Line function of media, rejecting the view that commercial media in autocracies are the primary source of investigative journalism. One likely reason that commercial media under provide investigative journalism, which is highly valuable for readership, is the high cost

of implementing investigative reports in the autocratic political system – local governments may take actions to interfere in the management of the newspapers that report corruption and wrongdoing of officials and bureaucrats. (Cite a famous case. Sun Zhigang) This cost is higher for newspapers with a higher advertising revenue. On the contrary, the advertising revenues of Party Dailies are much lower than commercial newspapers; thus, their concern of losing financial benefits due to local governments' intervention is mitigated. Moreover, their coverage of the misbehavior of a lower-level government is often endorsed by an upper-level government, which has an incentive to monitor its subordinate governments. A caveat should be noted that the Mass Line journalism in the Chinese newspapers has a limited role in holding government accountable, because most reports are "swatting flies and dead tigers," – meaning reporting on either about low–level bureaucrats or about officials who are already politically dead and under attack from within the CCP.

Although our evidence does not support the view that commercialization of media leads to watchdog journalism, commercialization does, to some extent, undermine the influence of strictly-controlled CCP mouthpieces. First, the commercialized newspapers (Evenings and Subsidiaries) substantially deviate from the Party Line journalism to the Bottom Line journalism (e.g., reports on sports, entertainment, and crimes) that is oriented to general audience. This reduces readers' exposure to the CCP's ideological influence. Second, the existence of commercial newspapers decreases the readership of Party Dailies, in terms of both the number of subscribers and reading time. Third, competition from commercial newspapers tends to induce Party Dailies to produce more market-oriented content. This is supported by the observation that a large number of Party Dailies carry a significant fraction of reports on sports, entertainment, and crimes.

5 What affect Media Bias?

The empirical results presented in the previous sections clearly demonstrate that the political bias of newspapers primarily reflects the tension between a newspaper's political and economic goals. The remarkable heterogeneity in our bias index across provinces (recall Figure 4) and within newspaper types (recall Figure 5) indicates that the political-economic tension for newspapers is likely to vary across regions where the political and economic conditions are different. In this section, we investigate how political and economic factors at the regional level affect the extent of media bias, guided by a simple theoretical model.

5.1 A Theoretical Framework

In what below, we sketch a simple Hotelling location model, in which owners of newspapers – CCPCs in our setting – choose the bias of a newspaper to maximize the utility derived from the achievement of a political and economic dual goal.

Consumers and Market Demand. There exists a continuum of consumers with ideol-

ogy blisspoints, x_i, which is uniformly distributed on $[0, 1]$. To be consistent with our empirical measure of media bias, a position closer to one means a stronger political preference for CCP ideology, while a position closer to zero means a stronger commercial preference. A consumer with x_i derives his or her 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 newspaper's position and the consumer's own preferred position, as in Mullainathan and Shleifer (2005). While some consumers prefer newspapers with more commercial positioning, some other consumers, for instance CCP cadres or employees in public sectors and state-owned enterprises, prefer newspapers with more political positioning. Since the subscription and retailing prices of Chinese newspapers are strictly regulated and the revenue from circulation only accounts for a small fraction of the total revenues for a newspaper, we assume that the prices of newspapers are all zero. We further assume that consumers read only one newspaper, the one that delivers them the highest level and positive utility. For expositional simplicity, we assume that $x_n \in [\frac{1}{2}, 1]$. Then, the market demand of a newspaper at x_n is

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

Objective Function. The decision maker is a CCPC that has both economic and political goals. A newspaper located at position x_n will earn a profit $X(x_n)\overline{R}$, where $\overline{R}$ is a parameter indicating the total value of the local advertising market faced by the newspaper.[17] The newspaper also has the political goal to promote the Party Line and to monitor lower-level officials. The implementation of this political goal involves publishing some material that is not highly demanded by consumers and hiding material that is. We define a newspaper's political bias as $b(x_n) = x_n - \frac{1}{2}$, where $\frac{1}{2}$ is the profit-maximizing position of a monopolistic newspaper. This bias captures the tension between the CCPC's intension to politically control the newspaper and the intension to earn profits. Given that the CCPC's ideological blisspoint is $x_n = 1$, a CCPC can obtain a maximum value of $\frac{1}{2}$ from the political bias, but this value is destroyed as more commercial content appears in the newspaper. Denote the set of papers run by a CCPC N^{PC}, with PC indicating *Party Committee*. Taking into account all the above elements, the objective function of a CCPC is as follows:

$$U^{PC}(x_n) = \underbrace{\sum_{n \in N^{PC}} X_n(x_n)\overline{R}}_{\text{revenue}} + \alpha^{PC} \underbrace{\sum_{n \in N^{PC}} X_n(x_n) b(x_n)}_{\text{bias exposure}}. \quad (1)$$

The first part of this function is simply the sum of profits from all newspapers owned by

[17] Advertising is the major revenue source for Chinese newspapers. Except for a few national Party Dailies (e.g., People's Daily), all the general-interest newspapers operate in a local market.

the same CCPC. The second part is the CCPC's valuation of the political bias exposed to readership. This setup implies that the CCPC is not simply trying to conceal information as modelled in most existing studies; rather, it uses the media as a communication tool and obtains a higher level of utility with a biased newspaper exposed to a larger readership. The parameter α^{PC} measures the valuation of the political goal across CCPCs.

Decision Making. We model the decisions of a CCPC as a local monopolist, which fits most local newspaper markets in China. We first consider the CCPC's choice of the level of media bias for a single product, i.e., $N^{PC} = 1$ in (1). In this case, the CCPC trades off its political goal against the economic goal by locating $x_n \in [\frac{1}{2}, 1]$. The following result can be easily obtained.

Proposition 1 ***(Bias Decision)*** *When a monopolistic PC produces only one newspaper, the political bias of the newspaper decreases in $\overline{R}$, the size of advertising market, and increases in α, the CCPC's valuation of bias.*

Proof. See Appendix A. ■

This proposition is intuitive. Exposing readers to more bias delivers political benefits, but reduces market demand and hence advertising revenues, which also decreases the propaganda reach of the newspaper. This tradeoff determines the optimal level of political bias of the newspaper. An increase in the CCPC's valuation, captured by the parameter α, will tilt the bias towards the political end, while a larger advertising revenue $\overline{R}$ increases the cost of politically controlling the newspaper, leading to an adjustment in bias toward the commercial end.

We now consider another empirically relevant situation: in addition to the existing newspaper, a CCPC can launch a new paper after paying an entry cost. In the presence of this opportunity, the CCPC can use differentiate its two products to achieve the dual goal. Specifically, it can use a more-biased paper (i.e., Party Daily) for its political goal while using a less-biased paper (i.e., Evening or Subsidiary) for its economic goal. The following results can be obtained.

Proposition 2 *When a CCPC can introduce another newspaper in addition to the existing one,*
1) it will differentiate the two newspapers such that one is more biased and the other is less biased than the existing newspaper.
2) the political bias of the less-biased newspaper (i.e., commercial newspaper) decreases in the size of advertising market, $\overline{R}$, and increases in the CCPC's valuation of bias, α.
3) the incentive for a CCPC to introduce a new paper increases in $\overline{R}$; it decreases in α when $\frac{\overline{R}}{\alpha} \leq \frac{1}{\sqrt{2}}$, but increases in α when $\frac{\overline{R}}{\alpha} > \frac{1}{\sqrt{2}}$.

Proof. See Appendix A. ■

Despite their simplicity, the results in Proposition 2, together with those in Proposition 1, have several important implications for the evolution of media bias. First, in general, a larger advertising market and lower political valuation of media tends to reduce the political bias of newspapers, especially the commercial ones. This result leads to the following two testable hypotheses.

Claim 1 ***(H1)*** *Newspapers in regions with greater advertising markets are less biased.*

Claim 2 ***(H2)*** *Newspapers in regions where CCPCs have higher political valuation of media are more biased.*

A caveat regarding the effects of advertising revenues should be noted. Although the growth of advertising market tends to reduce the political bias of a newspaper, it may induce a CCPC to introduce another newspaper, which in turn increases the bias of the existing newspaper. If we measure the overall exposure to newspaper bias as $\sum_{n \in N^{PC}} X_n(x_n)\, b(x_n)$, it can be shown that the bias exposure decreases after the introduction of a new paper when $\frac{\overline{R}}{\alpha} < \frac{1}{\sqrt{2}}$, but increases when $\frac{\overline{R}}{\alpha} > \frac{1}{\sqrt{2}}$. Therefore, the effect of the growth of advertising market on the average bias of newspapers can be nuanced.

Another implication is that while a larger advertising market provides an incentive for newspaper entry, lower political valuation of media may not. As shown in the third result of Proposition 2, a decrease in the political valuation of media would spur a CCPC to introduce a new paper only under the condition that the advertising market is small relative to the political valuation. This condition implies that the existing paper is highly biased, and thus a CCPC with lower political valuation is more sensitive to the commercial end but less sensitive to the political end and has a greater incentive to introduce a commercial newspaper. Conversely, when the advertising market is high relative to the political valuation, the CCPC is more sensitive to the political end but less sensitive to the economic end; thus, a CCPC with higher political valuation has a greater incentive to introduce a new paper to further bias the existing paper. These results lead to the following two hypotheses.

Claim 3 ***(H3)*** *The number of commercial newspapers is larger in regions with greater advertising markets.*

Claim 4 ***(H4)*** *The number of commercial newspapers is negatively correlated with a CCPC's political valuation of media, while the number of party papers is positively correlated with a CCPC's political valuation of media.*

5.2 The Impact of Political and Economic Factors

In this subsection, we test the four hypotheses $H1 - H4$ that are derived from the simple model. We first test hypotheses *H1* and *H2*, which concern the effects on media bias, using the

newspaper content data during the sample period of 2000-2010. Then, we will test hypotheses *H3-H4*, which concern the effects on the entry of newspapers, using the newspaper directory data.

5.2.1 Impact on Newspaper Bias

To test the effects on newspaper bias, we estimate the following baseline econometric specification:

$$\text{Bias}_{ijt} = \lambda + \beta \text{Ad\_Market}_{jt} + \gamma \text{Political\_Value}_{jt} + X'_{ijt}\delta + \eta_t + \epsilon_{ijt}. \quad (2)$$

In this specification, the dependent variable is the newspaper bias measure that we construct in Section 3; the subscripts should read as newspaper i in prefecture j at year t. The vector X_{ijt} are a number of controls, including newspaper types (dummies for being Party Daily, Evening, and Subsidiary, respectively), economic and social conditions at the prefectural level (e.g., population, literacy, and Internet penetration), and geographical information (e.g., a prefecture's distance to Beijing and its latitude and longitude). η_t is year fixed effects. ϵ_{ijt} captures the error term, which we cluster at the prefecture level. In some specifications, we will also include prefecture fixed effects, in which case the effects of time-invariant characteristics of prefectures cannot be identified.

The main interests of our estimation are the coefficients of the variables Ad_Market and Political_Value. Ad_Market measures the size of the advertising market – the theoretical variable $\overline{R}$. It is constructed by multiplying prefecture level GDP by the ratio of national newspaper advertising revenues to the national GDP. We construct a number of proxies for Political_Value – the theoretical variable α^{PC} that measures the political value of newspaper bias. Our first proxy is the administrative rank of a newspaper, because the political valuation of bias is likely higher for an upper_level CCPC. A part of the political gain from the newspaper bias, such as regime stability, has the nature of a public good within the CCP; the provision of this kind of bias has positive externalities across CCPCs. Consequently, a lower_level CCPC tends to under provide the political bias as it can free ride the provision of bias by an upper_level CCPC, which has a greater incentive to internalize the externalities. Second, traditionally, the CCP had stronger influence in some areas of China than in others. We thus define a variable called *CCP_Stronghold*, which is measured by the share counties passed by the Long March 1933-1935 or that were a part of a CCP Soviet before 1949. Third, for historical reasons, some areas in China were exposed to Western culture and free press to a greater extent. We define a dummy variable TreatyPorts equal to one if a prefecture was ever conceded by the Qing dynasty to Western powers from 1840 to 1910. In these TreatyPorts prefectures, Western powers established municipal authorities, factories, schools, police, and judiciaries. Moreover, we use a variable that measures the number of newspapers in a prefecture in 1895 to capture a prefecture's historical exposure to non_state media, as

the newspapers during that period were mostly founded by missionaries and businessmen.

Table 9 reports the results from estimating the specification (). The first column includes only year fixed effects and thus focuses on the cross-sectional correlations. As expected, newspapers in areas with larger advertising revenues are less biased; newspapers owned by a lower_level CCPC are less biased (the F-test at the bottom of the table does not reject that prefectural newspapers are more biased than provincial newspapers); newspapers in historical CCP strongholds are more biased; and newspapers in areas that were Treaty Ports are less biased. But we do not find a significant effect of the number of newspapers in 1895 on the bias of newspapers. Although they are merely cross-sectional correlation and should not be interpreted as causal, these results provide suggestive evidence in alignment with Hypotheses H1 and H2.

Interestingly, in Column 2 of Table 9, when the prefecture fixed effects are included in the regression, the negative effect of advertising revenues on newspaper bias becomes considerably smaller and statistically insignificant. This result implies that there is little time-series correlation between newspaper bias and the size of advertising markets. In other words, prefectures with greater economic growth over the last decade do not experience a fall in newspaper bias. Note that the muted effect of economic growth on newspaper bias is not inconsistent with our theoretical model, which admits the possibility that economic growth may induce a CCPC to further bias some of its newspapers as a result of product differentiation. But some other explanations may also be plausible, as will be discussed later. The last column includes prefecture_by_year fixed effects in the regression, and thus the estimated coefficients effectively compare the bias of different newspapers in the same market and year. The results confirm the previous finding that Party Dailies are significantly more biased than Evenings and Subsidiaries and the finding that newspapers run by a lower-level CCPC are less biased.

5.2.2 Impact on Market Entry

We now test Hypotheses H3 and H4 to examine the impact of the economic and political factors on the entry of newspapers. Compared to the sample used in the last subsection, we extend our sample to cover the general-interest newspapers during the periods of 1987–1991 and 1994-2010, because prefecture_level GDP data are not available for other years before 1994. We restrict our attention to the prefectures that are not the capital cities of provinces, because in the capital prefectures, the entry decisions of newspapers can be rather complicated for historical reasons or because of the competition between newspapers owned by different CCPCs. In most of the non-capital prefectures, newspapers are operated by a monopolist local CCPC, and the entry of newspapers typically follows the pattern of "no newspaper - a Party Daily - an Evening or Subsidiary." Therefore, an examination of the number of newspapers in the market allows us to infer the entry pattern of newspapers. In

particular, we estimate the following ordered probit specification:

$$\#\text{Newspapers}_{jt} = \lambda + \beta \text{Ad\_Market}_{jt} + \gamma \widehat{\text{Political\_Value}}_j + X'_{jt}\delta + \eta_t + \epsilon_{jt}. \quad (3)$$

The dependent variable is the number of Party Dailies or Evenings and Subsidiaries operating in prefecture j at year t. The variable Ad_Market_{jt} is defined as the same as in (2). The variable $\widehat{\text{Political\_Value}}_j$ is the expected political value of newspaper bias, calculated as the sum of the TreatyPort and CCPstronghold variables multiplied by their estimated coefficients in (2) (recall Column I of Table 9). X_{jt} includes a set of control variables. η_t is year fixed effects, and ϵ_{ijt} captures the error term.

Table 10 reports the regression results of (3). The first two columns focus on the sample of Evening and Subsidiary newspapers, with the second column including prefecture fixed effects in addition to year fixed effects. The last two columns use the same specifications in the sample of Party Dailies. The regressions in Columns I and II show that the advertising market size is positively related to the number of prefecture_level Evenings and Subsidiaries, both in the cross section and in the time series. In particular, the magnitude of the coefficient of log Advertising_Revenues implies that a one_percent increase in the size of the advertising market is associated with a .23 percent increase in the probability of having at least one Evening or Subsidiary paper.[18] This result lends strong support to Hypotheses H3, which states that advertise revenues drive the entry of commercial newspapers. The coefficients of the variable "Expected_Political_Value" in Columns I and III show that the political valuation of newspaper bias is positively correlated with the entry of Party Dailies but negatively correlated with the entry of Evenings and Subsidiaries, a result in alignment with Hypotheses H4.

We do not find any significant effects of the size of advertising market on the entry of Party Dailies (see Column2 III and IV in Table 10). This result is not surprising, as Party Dailies primarily serve the political goal of CCPCs. We find that the number of newspapers in 1895 has a positive effect on the entry of Party Dailies but no effect on the entry of Evenings and Subsidiaries. This suggests that the CCPC in a region with a historically more-developed newspaper market has a greater incentive to start a newspaper, as the value of readership is higher in that region; but this effect of the initial condition on commercial newspapers is absorbed by the region's current market condition.

5.3 Trend of Media Bias

In the above subsection, we show evidence consistent with predictions from the theoretical model, which are driven by a CCPC's balance between the political and economic goals. One important implication is that the adjustment on the extensive margin – the entry decision of newspapers – has a significant impact on the level of newspaper bias within a area. In

[18] We use a log10-scale, so our coefficients should be divided by ln(10)=2.3 to be comparable.

this section, we depict the trend in newspaper bias implied by newspaper entry and exit.[19] Since our news content data only cover the period of 2000-2010, we extrapolate the estimated newspaper bias from our sample to the earlier period. Specifically, we assume that the bias is constant within the newspaper type and the level of CCPCs, considering the previous result that the growth of advertising revenues has little effect on newspaper bias over the time series (recall Column II in Table 9).

Figure 7 demonstrates the evolution of newspaper bias from 1980 to 2011, based on our estimation. The green line at the top of the figure is the unweighted average bias across newspapers. It displays an obvious downward trend, in particular, after 1990. The implied change in our newspaper bias index from 1980 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 (see the orange line in the figure). The red line (the one starting at the scale 0.35) shows the average bias across newspapers weighted by each newspaper's expected advertising revenue, calculated from a linear projection of the prefecture-level population and GDP, newspaper type, and administrative rank.[20] This weighed average bias displays a similar trend to the unweighted average bias, although it lies below the unweighted average, because there are more less-biased newspapers (i.e., Evenings and Subsidiaries) in areas with greater advertising revenues. Finally, the bold blue line depicts the average exposure to newspaper bias across readers, with is constructed by averaging the bias index at the regional level weighted by the population in each region. This bias exposure line displays an inverted U-shape as expected. It increases initially because of the entry of many highly biased Party Dailies; it starts to decline from the late 1990s because of the influx of less-biased Evenings and Subsidiaries.

The trend of the media bias of Chinese newspapers provides an explanation to reconcile the conflict between the persistent perception of China as a country with an extremely low level of press freedom and the rapid growth of the Chinese newspaper market in terms of both advertising revenues and circulation. On the intensive margin, the political bias within a newspaper changes little in the last decade. Some party mouthpieces may even become more biased as a result of Chinese governments' intention to differentiate products. Thus, the freedom of press, if measured by the political bias of the newspapers that have existed for a long period, remains persistently low. On the extensive margin, however, the entry of commercial newspapers dominates the entry of party mouthpieces after 1990s. These new players have spurred the dynamics in the Chinese newspaper market.

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

[20] We 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.

6 Conclusions

In autocracies, governments often strictly control media and slant news content in favor of the ruling parties. What do autocratic governments use biased media for? In this paper, we present evidence on this inquiry in the setting of China. Our empirical findings clearly demonstrate that Chinese governments use newspapers to archives a dual goal: 1) a political goal to propagate the CCP ideology, facilitate top-down communication with the government, and monitor bureaucrats; and 2) an economic goal to realize the commercial benefits primarily from the advertising market. To achieve the political goal, the party mouthpieces adhere to the Party Line journalism by excessively covering political leaders, citing articles from official news agency, and suppressing unfavorable reports. In addition, the party mouthpieces actively report on issues related to the accountability of local governments and bureaucrats, such as corruptions and significant diesters and accidents. To achieve the economic goal, Chinese governments differentiate their media products by introducing commercial newspapers, which deviate from the political goal by substituting the Party Line journalism with entertaining journalism such as reports on sports, entertainment, and crimes.

We find that despite the dramatic expansion of advertising markets in China, the political bias within the same newspapers remained stable in the last decade. Nevertheless, the growth of advertising markets provides greater incentives for Chinese governments to launching commercial newspapers. This effect on the extensive margin results in the surge of commercial newspapers, which reduces readers' exposure to highly biased newspapers but does not improve the watchdog role of media. Another factor that we find is crucial for the development of less-biased media is the discrepancy in the valuation of media control between local and national governments. Because of the externalities in the provision of media bias or the differences in historical exposure to Western culture and the Communist ideology, local governments may under supply the political bias of media. We believe that these findings about the effects of economic and political factors on media bias provide insights that are not only pertinent to the media in China, but also relevant to the media in other autocratic political systems.

This paper aims to provide a systematic description of the bias of newspapers in China, in the hope of spurring further interest in both theoretical and empirical studies of the media in non-democratic regimes. Modeling media bias as an endogenous outcomes within a political system provides a useful framework to analyze the role of media in autocracies. In a related paper, we study how political competition among local governments in China affects the provision of newspaper bias. Moreover, the suggestive evidence that autocratic governments use media to enhance both top-down communication, such as signalling leadership and facilitating policy implementation, and bottom-up communication, such as monitoring bureaucrats raises a number of questions that deserve further theoretical rationalization. Empirically, future work will be devoted to the refinement of measuring media bias and the identification of causal effects.

7 References

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.

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.

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.

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.

Lorentzen, P. (2013), "China's Strategic Censorship", American Journal of Political Science

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.

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.

8 Appendix A

Proof of Proposition 1.

Proof. With a single product, the CCPC maximizes the following objective function

$$\begin{aligned} U(x_n) &= \underbrace{X(x_n)\overline{R}}_{\text{revenue}} + \alpha \underbrace{X(x_n)b(x_n)}_{\text{political exposure}} \\ &= (\frac{3}{2} - x_n)\overline{R} + \alpha(\frac{3}{2} - x_n)(x_n - \frac{1}{2}). \end{aligned}$$

Here, we omit the superscript PC for expositional simplicity. The first derivative with respect to x_n is

$$-\overline{R} + \alpha[(\frac{3}{2} - x_n) - (x_n - \frac{1}{2})] = 2\alpha(1 - x_n) - \overline{R},$$

from which we obtain the following solution:

$$x_n^* = \begin{cases} 1 - \frac{\overline{R}}{2\alpha} & \text{if } \frac{\overline{R}}{\alpha} \leq 1 \\ \frac{1}{2} & \text{if } \frac{\overline{R}}{\alpha} > 1. \end{cases}$$

In the domain $\frac{\overline{R}}{\alpha} \leq 1$, x_n^* decreases in $\overline{R}$ and increases in α. In the domain $\frac{\overline{R}}{\alpha} > 1$, x_n^* reaches a corner solution given the restriction $x_n \in [\frac{1}{2}, 1]$. ■

Proof of Proposition 2.

Proof. We analyze the location and entry decisions of the CCPC in two steps. First, under the assumption that the CCPC has produced two newspapers, we consider the CCPC's

location choice of the two newspapers. Then, we analyze the CCPC's incentive to introduce a new paper. As a monopolist, the CCPC tends to differentiate its two newspapers. For notational convenience, we label the one closer to the political end "Party Newspaper," denoted by p, and the one closer to the commercial end "Commercial Newspaper," denoted by c. The CCPC's objective function (1) becomes

$$\begin{aligned} U(x_p, x_c) &= \overline{R}\left(\frac{1}{2} + \frac{x_p - x_c}{2} + 1 - x_p + \frac{x_p - x_c}{2}\right) \\ &\quad +\alpha[(\frac{1}{2} + \frac{x_p - x_c}{2})(x_c - \frac{1}{2}) + (1 - x_p + \frac{x_p - x_c}{2})(x_p - \frac{1}{2})]. \end{aligned}$$

The first derivatives of the objective function with regard to x_c and x_p, respectively, are

$$\begin{aligned} \frac{\partial U}{\partial x_p} &= \alpha(1 - x_p) \geq 0; \\ \frac{\partial U}{\partial x_c} &= -\overline{R} + \alpha(1 - x_c). \end{aligned}$$

Therefore, it is optimal for the CCPC to always set $x_p^* = 1$ and set

$$\begin{aligned} x_c^* &= 1 - \frac{\overline{R}}{\alpha} \quad \text{when } \frac{\overline{R}}{\alpha} < \frac{1}{2}; \\ x_c^* &= \frac{1}{2} \quad \text{when } \frac{\overline{R}}{\alpha} \geq \frac{1}{2}. \end{aligned}$$

The first part of Proposition 2 is proved. To prove the remaining parts, we discuss the following three cases.

Case 1. $\frac{\overline{R}}{\alpha} < \frac{1}{2}$. In this case, $x_n^* = 1 - \frac{\overline{R}}{2\alpha}$, $x_p^* = 1$, and $x_c^* = 1 - \frac{\overline{R}}{\alpha}$. Obviously, $x_c^* < x_n^* < x_p^*$. Consider the net value of introducing a new paper:

$$\begin{aligned} \Delta U &= U\left(x_p^*, x_c^*\right) - U\left(x_n^*\right) \\ &= \frac{\overline{R}^2}{2\alpha} + \frac{\overline{R}}{2} + \frac{1}{4}\alpha - \frac{1}{4\alpha}\left(\overline{R} + \alpha\right)^2 = \frac{1}{4}\frac{R^2}{\alpha}. \end{aligned}$$

Obviously, $\frac{\partial \Delta U}{\partial \overline{R}} > 0$ and $\frac{\partial \Delta U}{\partial \alpha} < 0$.

Case 2. $\frac{1}{2} \leq \frac{\overline{R}}{\alpha} < 1$.In this case, $x_n^* = 1 - \frac{\overline{R}}{2\alpha}$, $x_p^* = 1$, and $x_c^* = \frac{1}{2}$. Again, $x_c^* < x_n^* < x_p^*$. Consider the net value of introducing a new paper:

$$\begin{aligned} \Delta U &= U\left(x_p^*, x_c^*\right) - U\left(x_n^*\right) \\ &= \overline{R} + \frac{1}{8}\alpha - \frac{1}{4\alpha}\left(\overline{R} + \alpha\right)^2 = \frac{\overline{R}}{2} - \frac{\overline{R}^2}{4\alpha} - \frac{\alpha}{8}. \end{aligned}$$

Given $\frac{1}{2} \leq \frac{\overline{R}}{\alpha} < 1$, $\frac{\partial \Delta U}{\partial \overline{R}} = \frac{(\alpha - \overline{R})}{2\alpha} > 0$. However, $\frac{\partial \Delta U}{\partial \alpha} = \frac{1}{4}(\frac{\overline{R}^2}{\alpha^2} - \frac{1}{2})$ is ambiguous in sign.
If $\frac{1}{2} \leq \frac{\overline{R}}{\alpha} < \frac{1}{\sqrt{2}}$, $\frac{\partial \Delta U}{\partial \alpha} < 0$; if $\frac{1}{\sqrt{2}} \leq \frac{\overline{R}}{\alpha} < 1$, $\frac{\partial \Delta U}{\partial \alpha} \geq 0$.

Case 3. $\frac{\overline{R}}{\alpha} \geq 1$.In this case, $x_n^* = \frac{1}{2}$, $x_p^* = 1$, and $x_c^* = \frac{1}{2}$. Hence, $x_c^* \leq x_n^* < x_p^*$. Consider the net value of introducing a new paper,

$$\begin{aligned} \Delta U &= U\left(x_p^*, x_c^*\right) - U\left(x_n^*\right) \\ &= \overline{R} + \frac{1}{8}\alpha - \overline{R} = \frac{\alpha}{8}. \end{aligned}$$

Obviously, $\frac{\partial \Delta U}{\partial \overline{R}} = 0$ while $\frac{\partial \Delta U}{\partial \alpha} = \frac{1}{8} > 0$.
Summing up the results in the above three cases, we obtain

$$\begin{aligned} x_c^* &< x_n^* < x_p^* \text{ when } \frac{\overline{R}}{\alpha} < 1; \\ x_c^* &\leq x_n^* < x_p^* \text{ when } \frac{\overline{R}}{\alpha} \geq 1. \end{aligned}$$

The second part of Proposition 2 is proved. We also obtain

$$\begin{aligned} \frac{\partial \Delta U}{\partial \overline{R}} &> 0 \text{ and } \frac{\partial \Delta U}{\partial \alpha} < 0 \text{ when } \frac{\overline{R}}{\alpha} < \frac{1}{\sqrt{2}}; \\ \frac{\partial \Delta U}{\partial \overline{R}} &\geq 0 \text{ and } \frac{\partial \Delta U}{\partial \alpha} > 0 \text{ when } \frac{\overline{R}}{\alpha} \geq \frac{1}{\sqrt{2}}. \end{aligned}$$

The third part of Proposition 2 is proved. ■

Table 1. Number general interest newspapers in WiseNews

	daily	evening	metro	Total
parent newspaper	**2**	**16**	**40**	58
party	**37**	**12**	**3**	52
Total	39	28	43	110

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

Table 2. Number general interest papers by year

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Freq	81	76	79	82	73	71	74	104	81	53	774

Data source'; Wisenews.

Note: WiseNews slightly changes the subscription every year, so some newspapers are added while some are dropped each year. It thus gives us an unbalance panel.

Table 3. Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Leader Mentions	774	11.36	12.10	0	83.48
Xinhua Cites	774	23.95	15.35	0.102	86.07
Epoch Stories	774	23.55	14.49	0	51.62
Corruption	774	0.158	0.0930	0	0.621
Disasters	774	0.526	0.717	0	9.202
Accidents	774	0.112	0.104	0	0.876
Sport	774	6.445	2.856	0	21.01
Entertainment	774	12.64	4.900	2.618	34.16
Crime	774	0.523	0.349	0	1.985
Total number of articles	774	19,844	13,948	311	104,240

Notes: All measures are all in terms of percentage 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 Crimes are, respectively, the percentage of all articles covering sports, entertainment, and crime stories.

Table 4. Principal components analysis

Component	Eigenvalue	Proportion	Variable	Comp1
Comp1	3.38	0.38	Leader Mentions	0.48
Comp2	1.49	0.17	Xinhua cites	0.40
Comp3	1.07	0.12	Epoch Stories	-0.29
Comp4	0.80	0.09	Corruption	0.32
Comp5	0.67	0.07	Disasters	0.29
Comp6	0.61	0.07	Accident	0.03
Comp7	0.43	0.05	Sports	-0.27
Comp8	0.32	0.04	Entertainment	-0.37
Comp9	0.23	0.03	Crime	-0.36

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

Table 5. Advertising Revenue and Party Daily, WiseNews Sample

	Log Advertising Revenue				Party Daily	
	I	II	III	IV	V	VI
GDP per capita (log)	0.307***	0.208**				
	(0.085)	(0.080)				
Population (log)	0.438***	0.240***				
	(0.106)	(0.079)				
PCA first dimension		-2.831***	-3.639***		3.439***	
		(0.418)	(0.456)		(0.206)	
Observations	402	402	402	402	773	773
R-squared	0.366	0.547	0.784	0.804	0.697	0.754
Sample	WiseNews	WiseNews	WiseNews	WiseNews	WiseNews	WiseNews
Fixed Effects	Year and Level	Year and Level	Prefecture-by-Year and Level	Prefecture-by-Year and Level	Prefecture-by-Year	Prefecture-by-Year
Content categories				All		All

Notes: The dependent variable is newspaper by year, and there are some newspapers missing the advertising revenue data in some years. All regressions in table 5 use OLS with fixed effects. *Content categories* refer to the nine news content discussed in section 2.
Robust standard errors clustered by newspaper in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Media Bias by Newspaper

Rank	Measure of Bias	Newspaper name	Newspaper type	Level	Province	Prefecture
1	0.60	QINGHAIDAILY	Party Daily	province	Qinghai	Xining
2	0.56	GANSUDAILY	Party Daily	province	Gansu	Lanzhou
3	0.54	ANHUIDAILY	Party Daily	province	Anhui	Hefei
4	0.54	NINGXIADAILY	Party Daily	province	Ningxia	Yinchuan
5	0.51	PEOPLE'SDAILY	Party Daily	central	Beijing	Beijing
6	0.51	SHANXIDAILY	Party Daily	province	Shanxi	Taiyuan
7	0.50	SICHUANDAILY	Party Daily	province	Sichuan	Chengdu
8	0.50	YUNNANDAILY	Party Daily	province	Yunnan	Kunming
9	0.49	JIANGXIDAILY	Party Daily	province	Jiangxi	Nanchang
10	0.49	HUBEIDAILY	Party Daily	province	Hubei	Wuhan
100	0.19	DUSHISHIBAO	Party Evening	prefecture	Yunnan	Kunming
101	0.19	JINWANBAO	Party Evening	province	Tianjin	Tianjin
102	0.19	JINLINGEVENINGNEWS	Subsidiary	prefecture	Jiangsu	Nanjing
103	0.19	INFORMATIONTIMES	Subsidiary	prefecture	Guangdong	Guangzhou
104	0.16	WUHANMORNINGPOST	Subsidiary	prefecture	Hubei	Wuhan
105	0.15	WUHANEVENINGNEWS	Subsidiary	prefecture	Hubei	Wuhan
106	0.14	LIAOSHENEVENINGNEWS	Subsidiary	province	Liaoning	Shenyang
107	0.13	BEIJINGEVENINGNEWS	Subsidiary	province	Beijing	Beijing
108	0.12	THEFIRST	Subsidiary	province	Beijing	Beijing
109	0.12	YOUTHEXPRESS	Subsidiary	central	Beijing	Beijing
110	0.01	BEIJINGDAILYMESSENGER	Subsidiary	province	Beijing	Beijing

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

Table 7. Content by Newspaper Type

	I	II	III	IV
	Party Line			
	Leader Mentions	Xinhua Cites	Epoch Stories	Number Articles
Party Daily	23.04	34.75	20.67	16,460
Party Evening	7.08	24.00	22.93	20,328
Subsidiary	5.01	17.24	25.44	21,841
	Mass Line			
	Corruption	Disasters	Accidents	
Party Daily	0.20	0.67	0.12	
Party Evening	0.15	0.44	0.13	
Subsidiary	0.13	0.46	0.10	
	Bottom Line			
	Sports	Entertainment	Crime	
Party Daily	5.76	10.68	0.31	
Party Evening	6.91	12.97	0.70	
Subsidiary	6.77	13.78	0.62	

Note: All numbers in the table except for *Number Articles* are in the unit of %.

Table 8

Panel A: Content and Newspaper Type

VARIABLES	Leader Mentions	Xinhua Cites	Epoch Stories	Corruption	Disasters	Accidents	Sport	Entertainment	Crime
Party Daily	18.708***	14.954***	-5.011***	0.066***	0.238***	0.005	-1.144***	-2.934***	-0.340***
	(2.702)	(2.340)	(0.689)	(0.013)	(0.075)	(0.009)	(0.385)	(0.486)	(0.073)
Observations	774	774	774	774	774	774	774	774	774
R-squared	0.706	0.800	0.893	0.620	0.779	0.699	0.698	0.793	0.649

Panel B: Content and Advertising revenue

VARIABLES	Leader Mentions	Xinhua Cites	Epoch Stories	Corruption	Disasters	Accidents	Sport	Entertainment	Crime
Adv. Rev.	-14.883***	-8.604***	4.294***	-0.053***	-0.259***	0.001	1.048**	1.952***	0.248***
	(2.527)	(2.302)	(1.099)	(0.018)	(0.082)	(0.010)	(0.492)	(0.573)	(0.073)
Observations	403	403	403	403	403	403	403	403	403
R-squared	0.690	0.783	0.855	0.674	0.875	0.798	0.761	0.790	0.768

Note: All dependent variables are at newspaper by year level and in the unit of %. "Adv. Rev" refers to the advertising revenue in log form. All specifications control for prefecture-by-year fixed effects.
Standard errors clustered by prefecture in parenthesis: *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Dependent variable: Newspaper bias

	I	II	III
Province	-0.052***	-0.077***	-0.075***
	(0.015)	(0.011)	(0.014)
Prefecture	-0.095***	-0.131***	-0.129***
	(0.017)	(0.017)	(0.022)
Party Evening	-0.146***	-0.159***	-0.164***
	(0.017)	(0.015)	(0.018)
Subsidiary	-0.187***	-0.186***	-0.186***
	(0.015)	(0.016)	(0.020)
Newsp Ad Mkt (log10 RMB)	-0.042**	-0.019	
	(0.017)	(0.130)	
Treaty Port	-0.027**		
	(0.013)		
CCP stronghold	0.054***		
	(0.013)		
Number of papers 1895	-0.000		
	(0.001)		
Distance to Beijing	-0.000		
	(0.000)		
Latitude	-0.002**		
	(0.001)		
Longitude	-0.001		
	(0.001)		
Observations	774	774	774
R-squared	0.667	0.708	0.782
Fixed Effects	Year	Year and Prefecture	Year by Prefecture
Province = Prefecture	0.000	0.000	0.001
Evening = Subsidiary	0.021	0.096	0.233

Note: The dependent variable is the 1st principle component from our principal component analysis at newspaper by year level. The last two rows report the p-value of F tests.

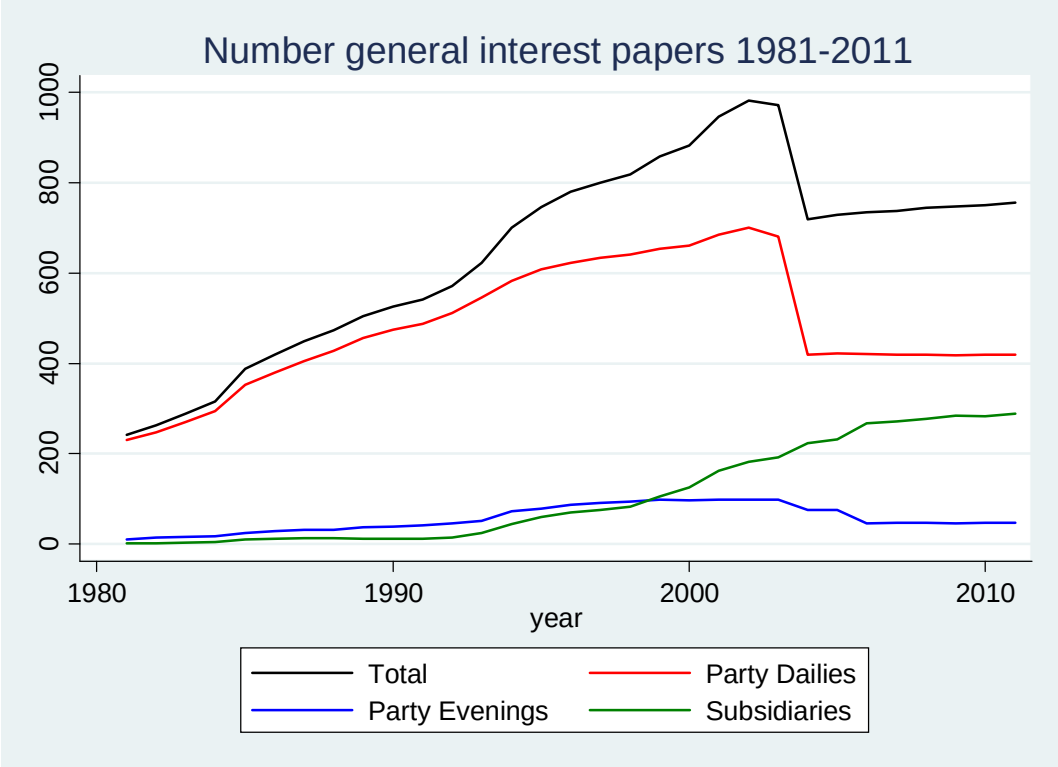
Standard errors clustered by prefecture in parenthesis: *** p<0.01, ** p<0.05, * p<0.1.

Table 10. Dependent variable: Number of Newspapers

	I	II	III	IV
Advertising Mkt (log)	1.980***	0.660**	0.327	0.030
	(0.238)	(0.271)	(0.231)	(0.076)
Number papers in 1895	0.087		0.234**	
	(0.089)		(0.106)	
Expected political value	-7.250**		10.253**	
	(3.537)		(4.048)	
Observations	4,677	4,677	4,677	4,677
R-squared		0.767		0.718
Sample	Non-capital prefectures	Non-capital prefectures	Non-capital prefectures	Non-capital prefectures
Fixed Effects	Year	Year and Prefecture	Year	Year and Prefecture
Dependent Variables	Evenings & Subsidiaries	Evenings & Subsidiaries	Party Dailies	Party Dailies

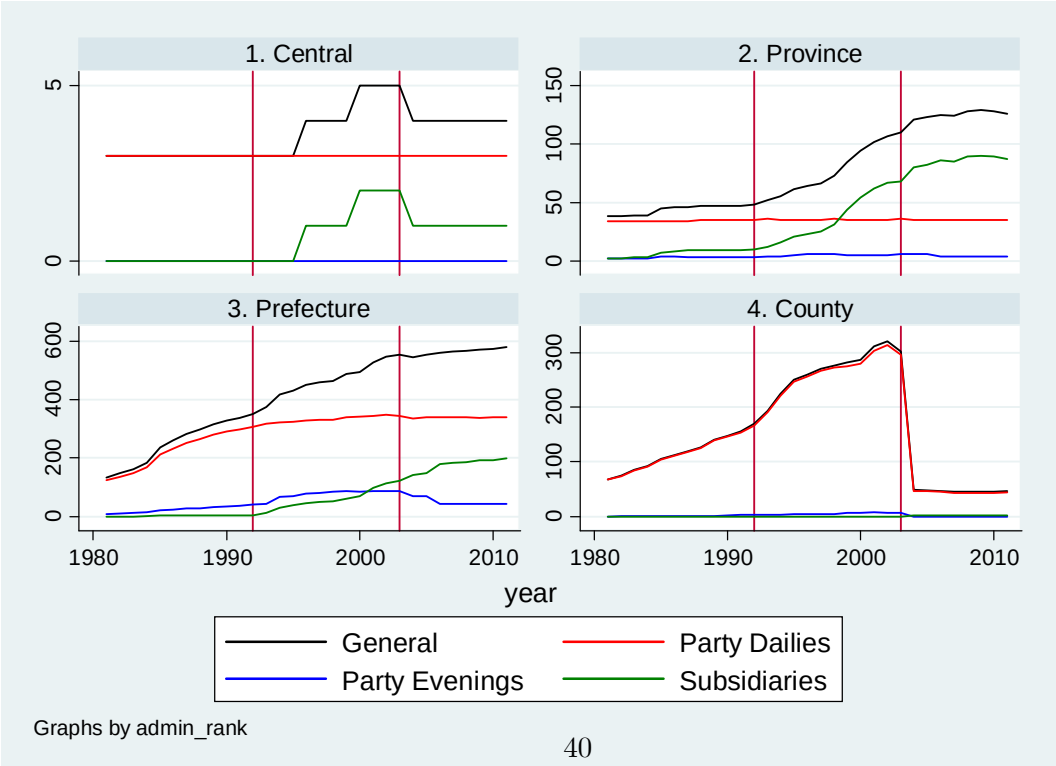
Note: All results in this table are from ordered probit regressions. The dependent variable is the number of Party Evenings or Subsidiary newspapers at the prefectures level in the prefecture and year for column I and II. The dependent variable is the number of Party Dailies at the prefecture level in the prefecture and year for column III and IV. *Advertising Mkt* is the predicted advertising revenue for the prefecture in the year based on GDP and population. *Expected political value* is the predicted media bias based on the Treaty Port and CCPstronghold variables from the bias regressions in table 9 and aggregated at prefecture level.
Standard errors clustered by prefecture in parenthesis: *** 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. General interest newspapers, by administrative level, 1981-2011



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

Figure 3. Interpretation of the PCA first component

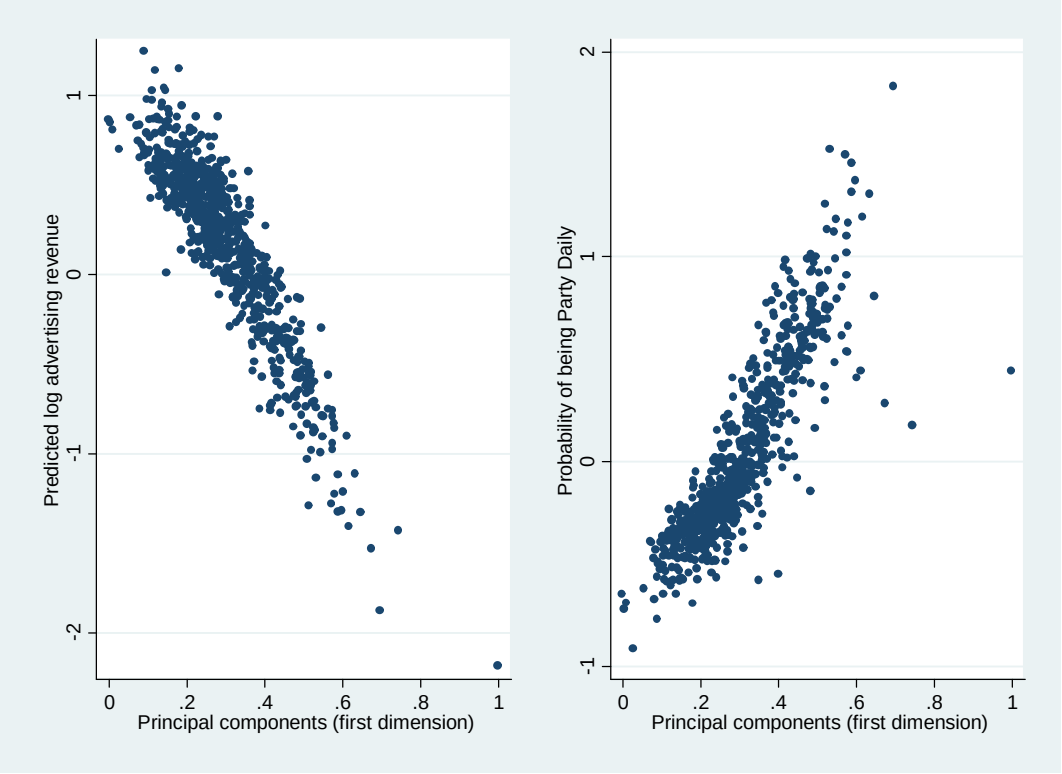
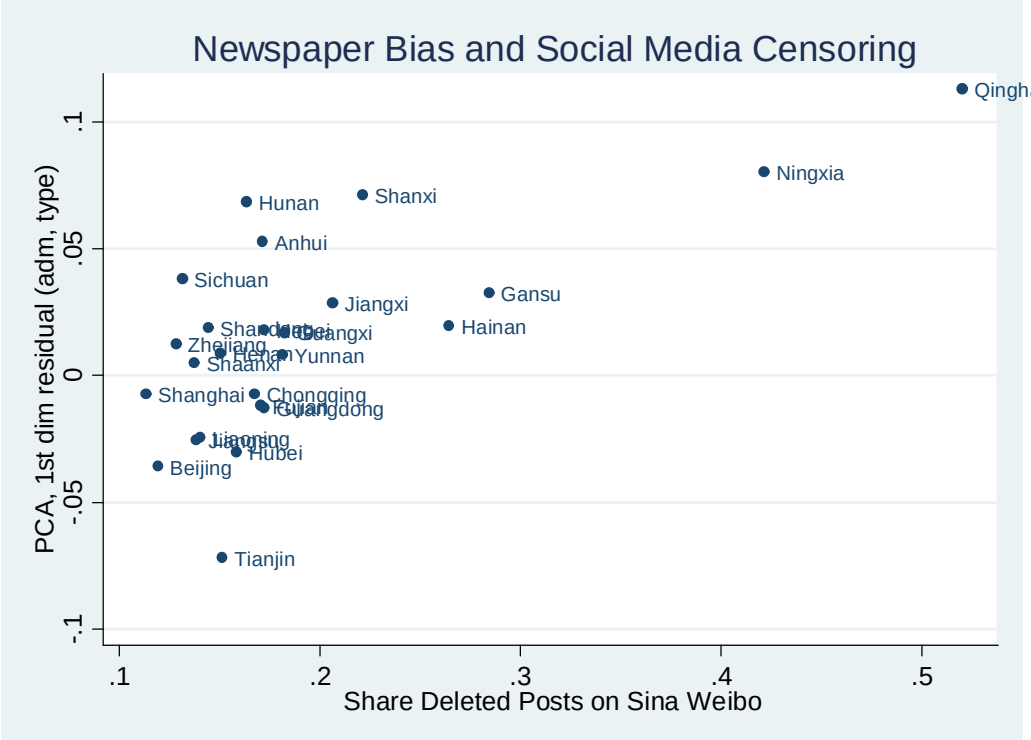


Figure 4. Newspaper Bias and Social Media Censoring



Note: Each dot represents one province in China.
Data Source: PCA score constructed by the authors and the share censored posts estimated by Bamman, O'Connor and Smith (2012).

Figure 5. Newspaper Bias by Newspaper Type

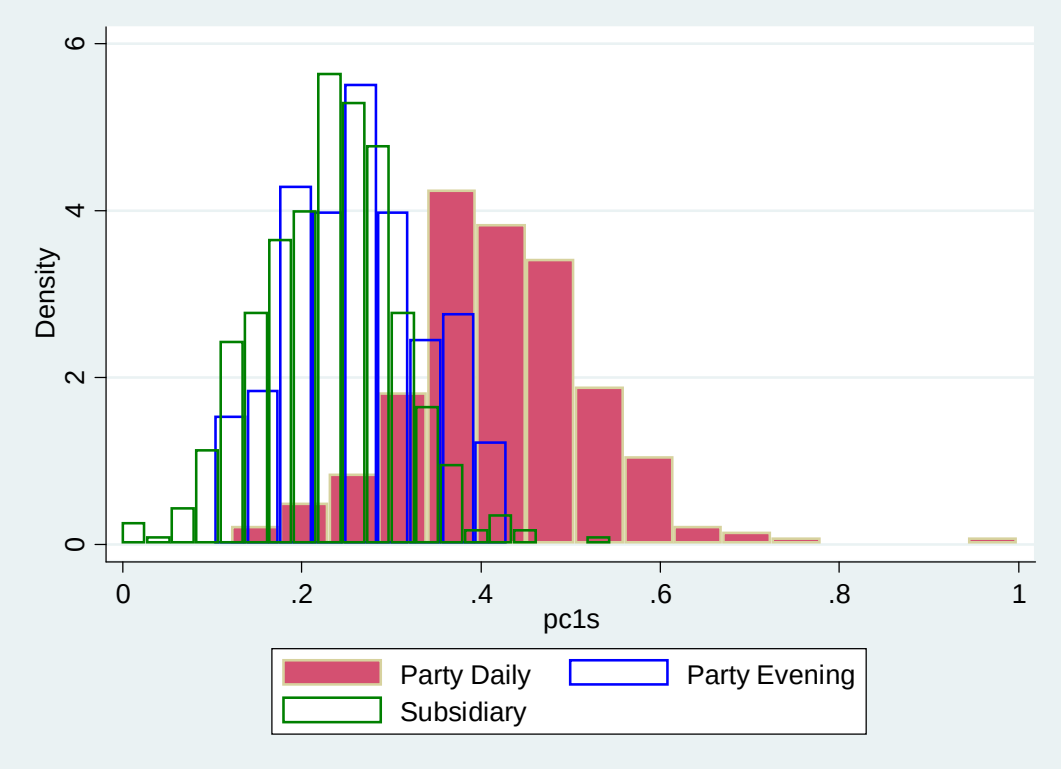
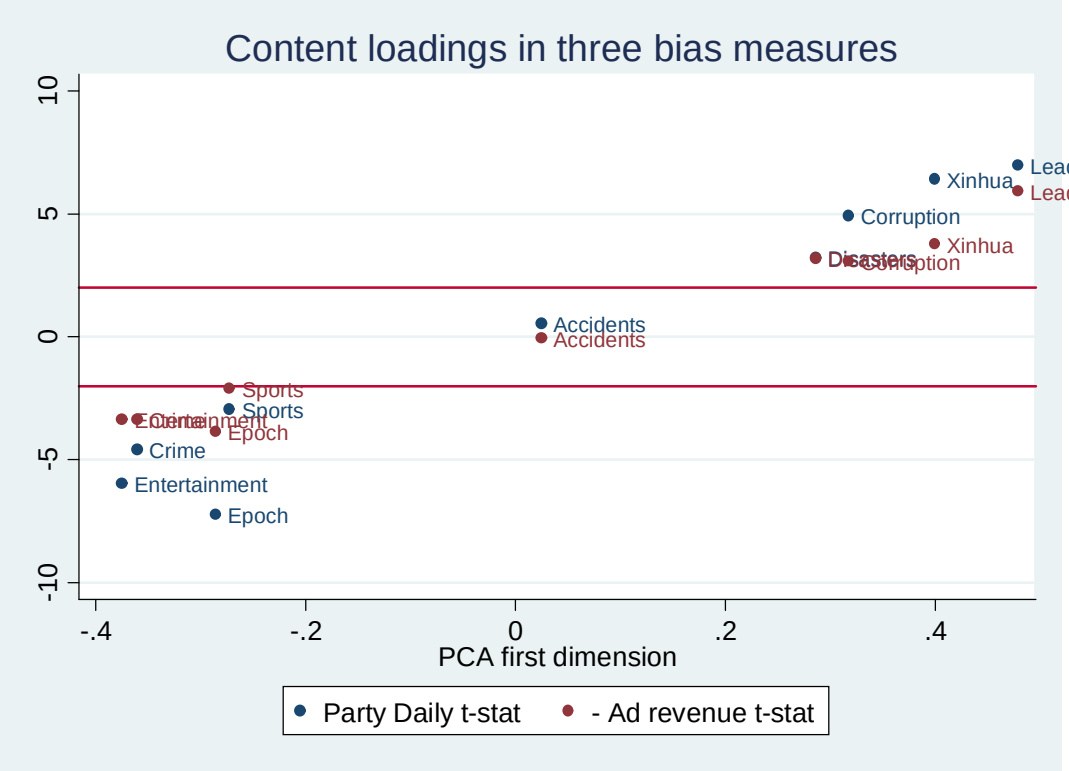
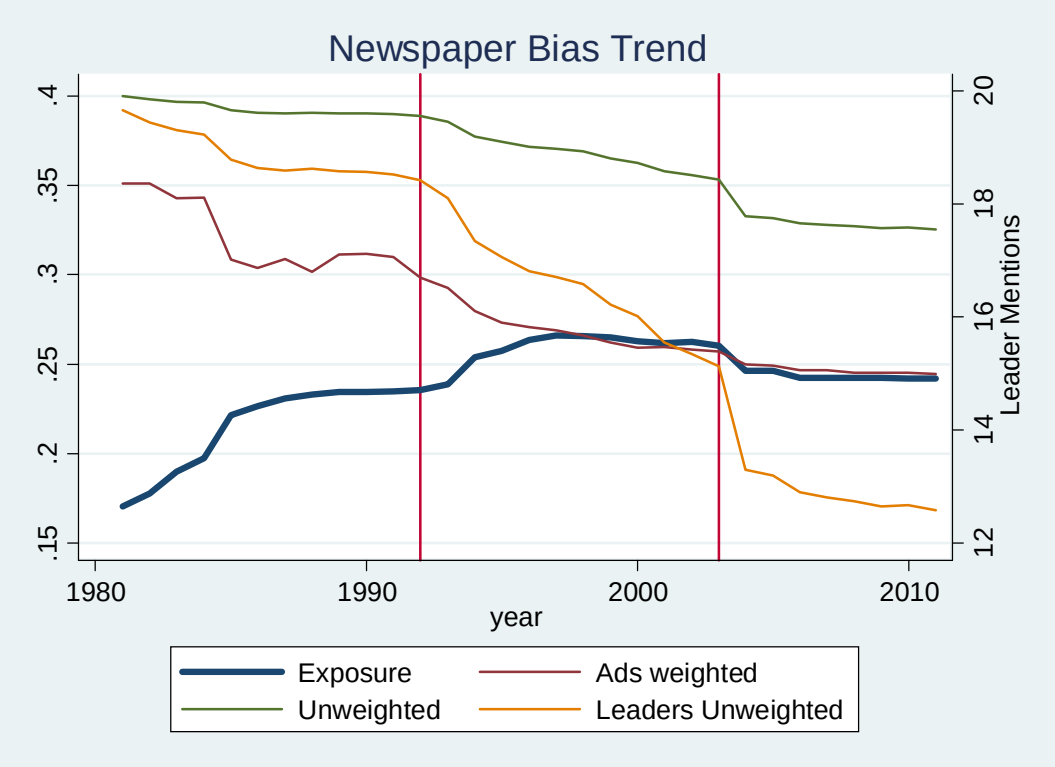


Figure 6. Content loadings in three bias measures



Note: The scatters are t-statistics for the coefficients of the associated variable (Party Daily or Adv revenue the regression of each content variable on it controlling for prefecture-by-year fixed effects (Table 8) against factor loading for each content variable (Table 4).

Figure 7. Trend in newspaper bias implied by entry and exits



Notes: The "Unweighted" 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 "Ads Weighted" trend is the average bias across newspapers weighted by each newspaper's expected advertising revenue, calculated from a linear projection of the prefecture-level population and GDP, newspaper type, and administrative rank. The "Exposure" trend is the average exposure to newspaper bias across readers, with is constructed by averaging the bias index at the regional level weighted by the population in each region.