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Anticorruption and Growth: Evidence from China

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Abstract: This study investigates the relationship between anticorruption and economic growth by focusing on the anticorruption campaigns run by the Communist Party of China in recent years. To measure the intensity of the Party's anticorruption efforts, we count the number of articles from official newspapers that discuss corruption or anticorruption policies. We first show how our proxy compares with alternative measures. Using data from Chinese provinces over time, we then estimate the effect of anticorruption upon economic growth. We find a negative effect from anticorruption upon economic growth. Our findings do not imply that governments should not try to lower corruption, but do suggest a cost of doing so.

Key Words: Anticorruption; Official Newspapers; China; Corruption; Economic Growth;

JEL Classification: K42, O11, H11

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1. Introduction

Many studies find that corruption is detrimental to economic growth or investment. Mauro (1995) provides an early example but numerous others have followed. Surveys of this literature can be found in Svenson (2005) and Asiedu and Freeman (2009).¹ Researchers have also considered various channels as to how corruption could lower growth. Murphy, Shleifer, and Vishny (1991, 1993) argue that corruption reallocates resources from productive to rent-seeking activities. Mo (2001) finds that corruption could lead to more political instability.²

Empirical studies regress some economic outcome such as growth upon a corruption measure and various control variables. A negative coefficient upon the corruption variable implies that corruption lowers growth.³ A policy implication follows that lowering corruption increases growth. We do not necessarily dispute this inference, but we do argue that such an implication should be formally investigated. Lowering corruption does not occur in a vacuum

¹ However, this negative view is not uniform. Others argue corruption can sometimes act as “speed up” money that can facilitate productive activities and “grease the wheels” (Leff, 1964; Huntington, 1968; Aidt, 2003).

² Those that argue that corruption enhances economic growth also provide specific channels for how such a positive effect could occur. For example, Egger and Winner (2005) and Barassi and Zhou (2012) find that corruption can help a host economy attract more foreign direct investment (FDI) thereby contributing to higher growth.

³ Obviously, identifying causal effects from such associations is not trivial; but for the purposes of our discussion we assume that such causal inferences are valid.

and the anticorruption efforts taken by a government could themselves lower economic growth, at least in the short run. For example, such efforts presumably require resources that have positive opportunity costs. Becker and Stigler (1974) and Di Tella and Schargrodsky (2003) consider raising government salaries to deter corruption. However, raising salaries for government officials reallocates government funds that could be used elsewhere. Likewise, greater monitoring of government officials necessitates greater oversight and so more personnel. To the extent that lowering corruption changes regulatory agencies and governing institutions, then such changes could cause uncertainties that dissuade investment until these uncertainties are resolved. Of course, if such costs are small then the dominant effect of anticorruption reforms would be to increase economic growth. In this paper, we explicitly examine the effects of anticorruption efforts upon economic growth.

More specifically, we examine anticorruption efforts in China from 2000 to 2014. We focus upon China for four reasons. One, it is a large country exhibiting regional variation that can be exploited for use in statistical comparisons. Second, corruption within China has received much attention, not only in academia but also in more public forums. Some even see substantial long run growth effects if it is not addressed.⁴ The ongoing anticorruption campaign under President Xi shows how serious the Chinese government views corruption. Third, anecdotal accounts suggest substantive effects from anticorruption campaigns. Two excerpts from the *Washington Post* provide examples:

“As a result, many [government officials] are sitting on their hands, delaying decisions and failing to grant approvals for investment projects, either out of fear that they could be caught up in a future corruption probe or because, without a bribe, they simply lack any incentive to act.”

“Graft has certainly not gone away, but the anti-corruption campaign has taken a toll on the sales of luxury goods and on business at high-end restaurants and hotels. Some karaoke bars, where officials were softened up with alcohol and women, have closed their doors; the former Portuguese enclave of Macao has been hit hard by a sharp decline in gambling revenue, the mainstay of its economy.”⁵

Finally, proxies for the intensity of anticorruption campaigns can be found at both the national and provincial levels. We exploit the use of the official newspapers, such as the *People's Daily* and its provincial counterparts, by the Communist Party of China (the Party,

⁴ Dong and Torgler (2010) find that corruption can have both positive and negative effects on economic development. They also find that corruption raises income inequality, lowers FDI, and reduces government spending on education and R&D.

⁵ Denyer, S. (2015, February 11). Without corruption, some ask, can the Chinese economic system function? *The Washington Post*. Retrieved from: https://www.washingtonpost.com/world/asia_pacific/without-corruption-some-ask-can-the-chinese-communist-party-function/2015/02/10/c69693e8-b12f-11e4-bf39-5560f3918d4b_story.html.

hereafter) to communicate official government views and policies. The *People's Daily* (the PD, hereafter) is a national newspaper in China that many view as the official mouthpiece of the Party, similar to *Pravda* in the former Soviet Union. Its provincial counterparts, such as the *Beijing Daily*, play similar roles at the regional level. Using the Party's official newspapers at the provincial level, we search for the key phrase “腐败” (“corruption”, in Chinese) in the China National Knowledge Infrastructure (CNKI), the most comprehensive newspaper database within China. From these papers, we count the number of corruption-related articles. We argue that the newspaper count can be considered as a measure of the Party's anticorruption efforts and resolve as the newspapers are the official voice, or organ, of the Party and are responsible for announcing official policies and policy changes, including those during anticorruption campaigns. Our sample period starts from the year 2000 as that is when electronic versions of the majority of the province-level, official newspapers first become available in the CNKI database. We discuss these newspapers and our methodology in much greater detail below.

We then estimate the effect of anticorruption efforts upon economic growth using newspaper accounts as our proxy of these efforts. We employ a panel dataset, using Chinese provinces as the cross-sectional units over the period between 2000 and 2014. We employ both dynamic GMM estimation methodologies as well as an instrumental variables methodology since anticorruption effort could be endogenous.⁶ We find that anticorruption efforts lower economic growth. Such a detrimental impact is further confirmed when we consider the impact of major anticorruption events in a control-treatment approach. Specifically, we identify cases where high ranking government officials within a province were sentenced for undertaking corrupt activities. We then examine to what extent provincial economic growth after sentencing differed from the norm and find that economic growth was lower for about two years.

We, however, do not infer from our findings that governments should not fight corruption. Given the short sample period, we are most likely picking up short-run effects from the Party's anticorruption efforts. Due to transitional costs or uncertainties associated with anticorruption campaigns, short-run effects could be negative even if net long-run benefits are positive. Instead, we take from our results that diminishing corruption is not costless and our results help measure this cost, possibly providing governments more insight as to short-run costs of such campaigns. Moreover, our results could explain why governments might not do more to reduce corruption. If political considerations focus more on short-run outcomes then such costs could preclude beneficial reforms, especially in those cases where corruption is most prevalent.

The remainder of this paper is organized as follows. Section 2 discusses in detail our anticorruption proxy, including the validity of using sources such as the PD and its provincial counterparts to gauge the Party's efforts. Section 2 also compares our proxy with the

⁶ However, it is not clear how economic growth could affect such efforts. Low growth could trigger more aggressive crackdowns since low growth could signal a more extensive problem. On the other hand, low economic growth could lead to the Party to direct resources into other areas that it might feel could more quickly raise growth rates.

corruption indicator in the Worldwide Governance Indicators, that from Ramirez (2014) who uses U.S. newspapers to measure the level of corruption in China, and those that have used the conviction rate. Section 3 presents baseline results on how anticorruption influences growth using a fixed-effects estimation. Section 4 addresses endogeneity concerns because anticorruption campaigns could be driven by growth outcomes. Section 5 undertakes an event study analysis that focuses upon the sentencing of provincial officials for corruption and whether such events affected growth. Section 6 concludes the paper.

2. Measurement of Anticorruption

Below we first discuss why we use the prevalence of corruption-related articles in official Chinese newspapers to gauge the Party's anticorruption efforts. We then show how to construct our specific proxies. The third part of this section is devoted to comparing our proxies with related ones in the literature.

2.1. The Official Newspapers and Their Functions in the Party's Anticorruption Campaign

The Party established official newspapers, both at the national and provincial levels. Like all newspapers, one purpose is to disseminate information. However, others argue that these official papers go further in that they disseminate the official views and policies of the government. Some have even claimed that such newspapers manipulate or indoctrinate the public (Edelstein and Liu, 1963; Liu, 1974; Lee, 1981). Probably the most well-known official newspaper is the PD, which has been affiliated with the Central Committee of the Party since established and directly controlled by the Propaganda Department of the committee (Wu, 1994). Similar to *Pravda* of the former Soviet Union, articles and especially editorials and commentaries appearing in the PD must be cleared by the Propaganda Department prior to publication (Wu, 1994; Shambaugh, 2007). In order to keep the nation's media "on message", the department sometimes "drafts the editorial in the first place" or "sets and enforces the exact wording to be used by journalists, scholars, and broadcasters in reporting on a given event" (Shambaugh, 2007). Of its three million subscribers, the vast majority are government agencies, state-owned enterprises, armed services, and other government-related organizations. Moreover, subscription is compulsory for these agencies (Huang, 2001). The Party uses the PD to then communicate with these government agencies at various levels. Consequently, the PD is widely accepted as the organ, or mouthpiece, of the Party and its articles are generally regarded as authoritative statements of policies and viewpoints of the Party (Wu, 1994; Luther and Zhou, 2005; Mao 2014).

As it relates to the anticorruption campaigns run by the Party, the PD can relay at least three types of information. First, the PD directly publishes important decisions and announcements of the Party so that officials at various levels can access them. For example, an article on February 10, 2015 covers the five aspects advanced by Premier Li Keqiang that the central

government will focus on in the anticorruption campaign of the year. These aspects include removal of administrative approval for certain actions and investment restrictions, transparency of the government budget, etc. Another example comes from June 9, 2007 when the PD published an announcement of the Central Commission for Discipline Inspection (CCDI), the institution in charge of enforcing internal rules and regulations and combating corruption. Among other things, the announcement urged corrupt cadres to contact the CCDI voluntarily and confess within 30 days in order to receive lenient punishments.

The second function of the PD is to report the achievements of the anticorruption campaigns. Some PD articles release statistics of the campaigns, such as the number of cases filed and investigated by the CCDI and the number of cadres accused of corruption. On January 30, 2015, for instance, the PD published the work report of Wang Qishan, Secretary of the CCDI, which states that there were 53,000 cases investigated by the CCDI and 71,000 cadres caught in 2014.

The third function of the PD is to sway public opinion by setting the tone for the rest of news media, building a favorable consensus for government efforts, and addressing concerns about the campaigns. For instance, to demonstrate that the vast majority of cadres and the public support the campaign, a commentary published on January 15, 2015 cites a survey (but did not identify the source). The survey indicates that 91.5% of leading cadres and 75.8% of average citizens have confidence in the ongoing campaign. To address the concern that the campaign may hinder economic development, an article published on March 24, 2015 mentions that a place in Inner Mongolia called Hinggann created 18,000 jobs and increased physical investment by 21.5% right after 42 corruption cases were investigated.

For all of these functions, we take a greater prevalence of corruption-related articles or editorials to signal greater anticorruption efforts made by the Party. Most concretely, this would occur when the PD is reporting upon the arrest and punishment of those engaged in corruption. But even articles that merely highlight the existence of corruption do so in order to raise awareness and so can be a sign of greater government concern about it. Presumably, increasing concerns about this problem then leads the Party to take additional steps to combat it, even if it is behind the scenes.

Although to the best of our knowledge, no previous studies use the PD to measure anticorruption efforts, researchers have used the PD as a tool when studying government commitment to other issues. Dong et al. (2008) examine AIDS coverage in the PD between 1986 and 2002. They claim that the political nature of the coverage was largely related to government campaigns and focused on the government's effort to control the disease. Similarly, Liang and Lu (2013) use the PD to gauge the government's anti-drug campaigns, including its drug education campaign in the 1990s. Others examine the PD to ascertain official government positions on various matters. Parsons and Xu (2001) compare the news framing choices of the PD with those of the *New York Times* in reporting the bombing of the Chinese Embassy in Serbia

in 1999. By conducting a day-by-day textual analysis of key words, they conclude that the PD reverted to more harsh, Cold War language just one day after the bombing. The PD selected and emphasized the facts that were consistent with government sentiments. They also find multiple reports in the *New York Times*, accusing the Chinese government of using its vast propaganda machines, including the PD, to “whip up anti-American hysteria” after the bombing. Therefore, we are not the first to treat the PD as a gauge for the Party’s policies or positions on various issues.

The PD is a national paper. Each province in China has an analogous newspaper directly controlled by the Party’s provincial committee, the *de facto* highest political authority of its jurisdiction. For instance, *Beijing Daily* and *Southern Daily* are the official newspapers of the Party’s Beijing Municipal Committee and Guangdong Provincial Committee, respectively. Following the tone set by the PD, these province-level organs are responsible for pushing propaganda further down to lower levels of government. They focus on specific policies set by the provincial committees to meet the expectation of the Party’s central committee and cover the influences of the policies within the context of their respective jurisdictions. As Shambaugh (2007) points out, the Party’s Propaganda Department closely oversees these provincial (and municipal) dailies, ensuring that official positions are followed.

In this paper, we investigate the frequency of corruption-related articles in these provincial organs and develop a provincial-level panel data set across 31 provinces, autonomous regions, and directly-controlled municipalities in China between 2000 and 2014. As will be elaborated in section 2.2 substantial cross-regional variation arises in the frequency of corruption-related articles in the provincial papers. One reason for this variation could stem from different degrees of anticorruption efforts across the provinces. For example, the Central Leading Group for Inspection Work, a collaborative body led by the CCDI to conduct its disciplinary inspections nationwide, dispatched its first inspection teams to only five provinces immediately following the Party’s demonstration of its anticorruption resolution at the 18th National Congress.⁷

2.2. Construction of Anticorruption Proxy

We count the number of articles that contain the key phrase “腐败 (corruption, in Chinese)” in the official newspapers of the Party’s provincial committees. The strategy can find the articles that are relevant to both corruption and anticorruption as the phrase “腐败” is a subset of the phrase “反腐败 (anticorruption, in Chinese)”. Note that as discussed above, the appearance of such articles, including those containing the phrase “腐败” but not “反腐败”, is not merely to inform the public of the presence of corruption. The party is choosing to make

⁷ The five provinces were Inner Mongolia, Jiangxi, Hubei, Chongqing, and Guizhou. Source: the *People’s Daily*, January 9, 2014.

some event public knowledge for a wider purpose. We normalize the number of corruption-related articles in two ways. The first is to divide the number of corruption related articles by the total number of articles. As an alternative, we also normalize by the number of articles that contain the phrase “政府 (government, in Chinese)”. Not only can the second measure be used as a robustness check but it provides a more similar comparison since corruption involves government officials. Both ways, however, help to normalize the corruption article count by accounting for changes in the size of newspapers and/or any shift of the Party’s general publicizing strategy over the years.⁸ We use the historical newspaper search engine of China Core Newspapers Full-text Database, which is part of the China National Knowledge Infrastructure (CNKI), the most comprehensive databases of academic journals, newspapers, dissertations, and proceedings published in Chinese. According to the self-description on its website, the CNKI collects 13 million articles from 604 newspapers in China which start from the year 2000 to the present.

[Insert Figure 1 Here]

Figure 1 shows the medians (across provinces) of the two proxies between 2000 and 2014. Both suggest at least two major anticorruption campaigns run by the Party in the past 15 years.⁹ The occurrence of the campaigns also coincides with transitions in Party leadership. The first took place in 2001 under the leadership of President Jiang Zemin and Premier Zhu Rongji. Corruption-related articles measured 3.7% of all articles and 11.2% of the articles containing the word “government” in the official newspapers. That campaign started with the investigation of Cheng Kejie’s corruption scandal in 2000. Cheng had been Vice Chairman of the Standing Committee of the National People’s Congress and considered as one of the national leaders of the Party before he was sentenced to death for a bribe of RMB 40 million.¹⁰ The campaign went deeper and broader with the exposure of the Yuan-Hua Group smuggling scandal totaling RMB 53 billion of foreign products, ranging from cars to crude oil to cigarettes. Nearly 300 people were convicted and many of them were high-ranking government officials, such as the Deputy Minister of Public Security of China and the Vice Secretary of the Provincial Committee of the

⁸ As an example of the change in size, the PD expanded from 12 pages to 16 in 2003 and again to 20 pages in 2009. As to the shift of the Party’s publicizing strategy, Huang (2001) finds that many official newspapers redefined themselves as half propaganda-oriented and half market-oriented in the late 1990s to be able to compete with commercialized local newspapers in the market.

⁹ We also depict evolution of the anticorruption campaigns with the provincial means of the two proxies. In addition, we apply the same counting strategy to the articles in the PD, which allows us to identify changes at the national level in an alternative way. No matter which proxy we use, we find the highest frequencies of corruption-related articles occurring in the early 2000s and in the last two years of the sample, respectively.

¹⁰ *The People’s Daily*. 31 July 2000.

Party. In the midst of the campaign, in order to show his resolution to combat corruption, Premier Zhu once said to the press that he had 100 coffins prepared, 99 for the corrupt and 1 for himself. The campaign came to an end in 2003 when both President Jiang and Premier Zhu stepped down.

Both proxies then declined and remained low from 2003 to 2011. The lowest levels of both proxies occur in 2010 with only 1.6% of all articles and 4.3% of government-related articles. This suggests that the Party did not run any massive anticorruption campaign during the administration of President Hu Jintao and Premier Wen Jiabao though the routine investigation of corruption still occurred. Both proxies start to increase again in 2012, partially because Bo Xilai's corruption scandal was exposed. Bo had served as a member of the Party's Central Politburo before he was sentenced to life imprisonment due to corruption and other criminal charges. Most provincial organs of the Party published at least two editorials in April 2012 when Bo was suspended from the politburo. These editorials directly commented on Bo's case and showed the provincial committees' loyalty and support for the Central Committee's decision.¹¹

On the far right of the figure, both proxies effectively capture the ongoing anticorruption campaign. In December 2012, the Party held its 18th National Congress in Beijing and the incumbent leadership was elected, centered on President Xi Jinping and Premier Li Keqiang. The leadership put forward its administrative goals and programs at the 3rd Plenary Session of the 18th Central Committee of the Party in November 2013, which included a massive scale of political and economic reforms. Among them, what has proved to be a crucial element since then is to make special effort to crack down on corruption. According to the statistics released on the web site of the CCDI, it undertook 53,085 corruption investigations and disciplined 71,748 government officials since then.¹² Among them, three are national leaders of the Party, including Zhou Yongkang, a former member of the Politburo Standing Committee. Zhou is the most senior figure to face corruption charges in the history of the Party.¹³ That is why the median shares of corruption-related articles climb up to 4.9% (relative to all articles) and 11.1% (to government-related articles), respectively, in 2014. Looking at the entire sample period, we think our proxies mimic variations in the Party's anticorruption efforts with reasonable accuracy.

Our proxies also contain large variation across provinces. There are several remarkable phenomena displayed in Figure 2. First, these proxies are largest in magnitude in the central

¹¹ In fact, Bo's scandal was exposed accidentally when one of his disciples sought asylum at an American consulate in China and revealed details of Bo and his family's crimes. However, the Party had made special efforts to remove him from the politburo as his political allies tried to avoid all this from happening.

¹² Source: http://www.ccdi.gov.cn/yw/201501/t20150107_49817.html.

¹³ Zhou was charged with bribery, abuse of power, and the intentional disclosure of state secrets in April, 2015.

provinces, including Shanxi, Henan, Hunan, Hubei, and Jiangxi.¹⁴ The proxies are relatively lower in all border regions except for Jilin and Tibet. One possible explanation is that more emphasis is placed upon border security in these regions when prioritizing policies. Attempts to combat corruption in border areas could cause shakeups that destabilize these regions.

Second, our proxies are also lower in provinces with relatively larger shares of ethnic minorities. These provinces include four of the five autonomous regions, Guangxi, Lingxia, Xinjiang, and Inner Mongolia, and even those with a substantial amount of ethnic-minority inhabitants, such as Qinghai, Yunnan and Sichuan. As with border security, the Party probably places ethnic concerns before anticorruption efforts since ethnic tensions remain a large concern of the government. Anticorruption campaigns could stir up anti-government sentiment in these areas.

[Insert Figure 2 Here]

Third, our proxies do not seem strongly correlated with the level of economic development. One might argue that the Party should fight corruption harder in the coastal areas whose market is more prosperous than that of inland areas and so government officials are more likely to be exposed to bribery. This, however, is inconsistent with what Figure 2 shows. Many coastal areas such as Jiangsu, Zhejiang, Fujian, and Shanghai see lower frequencies of corruption-related articles in the official newspapers. On the contrary, one could argue that the Party should focus its anticorruption efforts in inland areas whose cadres are likely to be more corrupt because the market is less open and more influenced by the government. However, this is not consistent with what Figure 2 indicates, either.

Lastly, the frequencies of corruption-related articles in the official newspapers seem to depend partially upon provincial leaders of the Party. There is more coverage of corruption in the official newspapers when provincial leaders of the Party get caught due to corruption or they are ardent supporters of the anticorruption campaign run by the Central Committee of the Party. Take Guangdong as an example as it has the highest mean frequency of corruption-related articles to all articles, stemming from the 2009-12 window. During this time, Wang Yang served as the provincial committee secretary of the Party who was known as an anticorruption advocate.¹⁵ Shanxi, as another example, is the province where our second proxy indicates that anticorruption campaigns are most intense. The mean share of corruption-related articles to government-related ones is 8.8%. In the meanwhile, it also has the highest standard deviation,

¹⁴ In addition, four other central provinces, Hebei, Shaanxi, Anhui, and Chongqing, also hold a place in the group with the second-highest frequency of corruption-related articles.

¹⁵ Wang is currently one of the four Vice Premiers of China and a member of the politburo of the Party.

4.3%, implying large variation over time. Its high mean stems from its large share of corruption articles (relative to government-related ones) in 2014, 22.5%. Behind the number is the corruption scandal of a national leader of the Party, Ling Jihua, whose family and supporters were deeply rooted in Shanxi.¹⁶ Hence, the Party's anticorruption efforts are more or less associated with the characteristics of high-rank government officials in a province.

In summary, our proxies show great variation over time and across provinces, allowing for econometric methodologies of panel data. Moreover, our proxies are not largest or smallest in the highest income provinces, suggesting that they are not driven by income but could be exogenous to the stage of economic development.

2.3. Comparing Our Proxies to Others

If one believes that the Party's anticorruption efforts are purely the responses to how corrupt a province is, it is possible that our newspaper proxies are not much different from the measures of corruption in the literature. To further address such a concern (although we have discussed above a variety of political considerations in the Party's decision-making process during its anticorruption campaigns) we compare our proxies to three popular ones of corruption in the literature. Given the similarities of our two proxies displayed in the previous part, we focus discussion on the ratio of corruption-related articles to all articles. Using the other proxy where we normalize with respect to government articles gives similar comparisons.

Figure 3 compares our main proxy (at the national level) to the commonly used measure of corruption from the World Governance Indicators (WGI) called Control of Corruption. The coefficient of variation (CV) is 32% for our proxy but only 6% for the WGI measure. The WGI measure remains steady throughout the sample period with little evidence of either a nonzero trend or large fluctuations, suggesting that – at least at the national level – corruption has changed little across the sample period. Our anticorruption proxy, in contrast, shows much greater variation, which is not surprising given that anticorruption policies are presumably more malleable than is the level of corruption. Use of the Corruption Perceptions Index from Transparency International gives a similar picture.

[Insert Figure 3 Here]

¹⁶ Between 2012 and 2014, Ling served as Vice Chairman of the National Chinese People's Political Consultative Conference (CPPCC) and the head of the United Front Work Department of the Party's Central Committee. He was removed from both positions in late 2014 and early 2015, respectively, though his case is still under investigation of the CCDI. His brother, Ling Zhengce, who was one of the Party's provincial leaders and used to be the Vice-Chairman of Shanxi People's Political Consultative Conference is now under investigation of the CCDI as well.

A second measure comes from newspapers although to the best of our knowledge only two studies use newspaper count data as a proxy for corruption. Glaeser and Goldin (2006) count the articles in the *New York Times* and other newspapers from 1810 to 1975 that contain the words “corruption” or “fraud”. They claim that given the absence of other measures of corruption during the period, the count effectively gauges media coverage of corruption and offers a proxy for the amount of reported corruption. They find that the trend of the count is consistent with political cycles and well-known corruption scandals in U.S. history.

Following this direction, Ramirez (2014) compares the corruption situation in China between 1990 and 2011 with that in the U.S. between 1870 and 1930 (as their income levels were similar) by tracking corruption-related articles in prominent U.S. newspapers. Despite the similarity of the newspaper-counting strategy between Ramirez and ourselves, important differences remain. Ramirez (2014) examines U.S. newspapers whereas we use official newspapers of the Party. Although some of the articles in the U.S. papers discuss government efforts to battle corruption, others could focus more on a descriptive analysis of corruption in China without necessarily indicating any government action towards it. On the other hand, we take any description of corruption within the PD or its provincial counterparts as an indication of government efforts to reduce it since the very inclusion of a corruption article within the official newspapers provides a signal of the Party’s displeasure of it.

Moreover, Ramirez’s proxies could also capture greater general interest of China among U.S. readers thereby increasing all types of articles on China, both positive and negative ones. However, a higher frequency of corruption-related articles in the official newspapers should only be interpreted as a sign that the Party is combatting corruption more intensely. Another crucial difference is that we can construct analogous measures at the provincial level allowing for statistical analysis across Chinese provinces whereas Ramirez’s measure only tracks variations over time at the national level.

Obviously, our measures provide some overlap, but correlations are not that high. Comparing two measures that are most comparable – our proxy normalized by government-related articles and his proxy normalized by politically-related articles – gives a correlation of only 0.30. Therefore, these two indices certainly capture distinct aspects of corruption within China.

[Insert Figure 4 Here]

Figure 4 compares two of these measures: the Ramirez proxy, the ratio of the number of corruption-related articles to that of political ones in the U.S. newspapers, and our second

proxy.¹⁷ Note that the Ramirez proxy fluctuates below 2%, as shown by the left axis, whereas our proxy spikes above 11% in some years, as shown by the right axis. Such difference is reasonable as U.S. newspapers cover news from all over the world, especially U.S. domestic stories, thereby limiting coverage of corruption within China. Nevertheless, one can still compare differences. Both measures are increasing after 2010 and show a high degree of co-movement and so both could capture the anticorruption campaigns from 2012 to the present.¹⁸ Other periods, however, see different patterns. The Ramirez measure becomes flat in the middle of the graph whereas ours shows a steady decrease. His steadily declines at the beginning of the sample period but ours spikes in 2001. This spike corresponds to the anticorruption campaign discussed in section 2.1, a campaign that does not seem to influence the Ramirez measure.

Finally, we compare our proxy to another measure that has been widely employed as a corruption measure. Goel and Nelson (1998), Fisman and Gatti (2002), and Glaeser and Saks (2006) use the rate of convictions to measure corruption across U.S. states. Dong and Torgler (2012, 2013) apply similar techniques to Chinese provinces using the number of corruption cases filed by the People's Procuratorate in a province.¹⁹ Figure 5 displays the correlation between the conviction rate of Chinese provinces and our main proxy.²⁰ The rate is positively correlated with our proxy, suggesting that the conviction rate tends to be higher in the provinces where the Party combats corruption more intensely. It is then arguable that convictions capture not only the prevalence of corruption but also the effort of a government to prosecute such malfeasance.²¹ However, the correlation coefficient between the two is merely 0.22.

¹⁷ Ramirez (2014)'s sample period is 1990 to 2011. We follow his searching strategy and extend the period to the year of 2014 so as to cover the ongoing anticorruption campaign run by the current leadership. The search engine is Factiva and we restrict the search to the same US newspapers: *Atlanta Journal Constitution*, *Chicago Tribune*, *Los Angeles Times*, *New York Times*, and *Washington Post*.

¹⁸ It is hard to argue that China has become 2.44 times more corrupt from 2010 (0.69%) to 2014 (1.69%), as suggested by the Ramirez proxy. There could be two driving forces behind such a change. First, more China-related articles appear in the U.S. newspapers due to greater interest of China among U.S. readers. Second, the U.S. newspapers cover more frequently anticorruption actions taken by Chinese government because relevant stories tend to be more interesting and controversial. The evidence, therefore, indicates that the Ramirez proxy does capture both anticorruption and corruption.

¹⁹ Since the vast majority of cases filed by the People's Procuratorate result in convictions in China, the number of cases filed provides a good measure of the number of convictions.

²⁰ The correlation analysis between the conviction rate and our other proxy, the ratio of corruption-related articles to government-related articles, is 0.33.

²¹ In fact, Cole et al. (2008) use this same measure to gauge the extent of a government's anti-corruption effort when examining the determinants of FDI within China. They justify this interpretation by presuming that corruption levels are similar across provinces. Obviously, one might question this claim. Other examples include Wedeman (2005, 2008) which use the number of economic crime cases filed to measure the Party's effort to strengthen enforcement of relevant laws and disciplines. Here economic crime includes graft, bribery, misappropriation of public funds, etc.

No matter what the conviction rate exactly measures, we argue that use of newspaper counts provides for a more general proxy for anticorruption since convictions of government officials for corruption are likely to be reported in official newspapers. An advantage of our proxy is that it is broader than convictions since anticorruption campaigns can also involve increasing public awareness as well as mobilizing public opinion. The conviction rate does not directly include these facets. Moreover, conviction of a high ranking official could signal a more intense anticorruption campaign than would a conviction of a low ranking official. The conviction rate treats the two the same although our newspaper proxy can capture this distinction as long as convictions of high ranking officials receive more news coverage.

[Insert Figure 5 Here]

2.4. Is Our Anticorruption Proxy Just Another Corruption Proxy?

If the Party fights corruption hardest in the most corrupt provinces then perhaps we are mainly re-inventing the wheel and merely constructing another measure of corruption. If so, then any negative association between our proxies and growth as shown below could be just another finding that corruption hurts growth. However, we believe that such a potential is small. For one, as we showed above anticorruption efforts as measured by our proxies do not seem to be targeted to those provinces with the most corruption. Second, commonly used national measures of corruption such as the WGI's Control of Corruption indicator evolve differently than do our newspaper count proxies. Corruption in China seems to be more stable than the Party's anticorruption efforts at the national level. Finally, to the extent that the level of corruption also holds steady during our sample period at the provincial level, then the extent of corruption can be implicitly captured by including provincial fixed effects in the model which we will do.

3. Anticorruption and Growth: Empirics

This section examines to what extent the anticorruption efforts made by the Party have lowered economic growth. Figure 6 provides initial evidence of a negative association where anticorruption is measured with our newspaper proxies discussed earlier in section 2. Each dot denotes a province-year pairing. This section will now undertake a more formal examination of the relationship. Below we first describe the empirical methodology and then presents results.

[Insert Figure 6 Here]

We consider the specification that consists of a fixed-effects panel model:

$$Growth_{i,t} = \alpha_0 + \alpha_1 \ln anticorruption_{i,t} + \alpha_2 \ln income_{i,t-1} + CX_{i,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where i indexes 31 provinces and t indexes 14 years from 2000 to 2014. The dependent variable, $growth_{i,t}$, is the annual growth rate of real GDP per capita of province i in year t . $Anticorruption_{i,t}$ is approximated by the natural logs of the share of corruption-related articles in all articles, $\ln(corrup/all)_{i,t}$, and in government-related articles, $\ln(corrup/gov)_{i,t}$, respectively. If the Party's anticorruption efforts do hinder economic growth as suggested in Figure 6, α_1 is expected to be negative and statistically significant. We also include the logarithm of the previous year's GDP per capita, $\ln income_{i,t-1}$, to control for convergence across provinces. In addition, following the framework in Mankiw et al. (1992), $X_{i,t}$ is a set of controls commonly used in the growth literature: province-level physical investment, population growth, technological progress, depreciation, average years of education (as a measure of human capital), and the share of private sector employment in total employment (as a measure of privatization). Lastly, η_i and λ_t are unobserved province- and year-specific fixed effects, respectively. The data of GDP per capita and other controls are gathered from *China Compendium of Statistics 1949-2008*, *China Statistical Yearbook*, and its counterpart at the provincial level for various years.

Three potential concerns arise with the model in (1). The first is that estimates made with annual data might be driven by short-run economic fluctuations. To check the robustness of the results with longer time windows, we also estimate (1) by using three-year time intervals.²² Having only 15 years makes it difficult to consider longer windows. Of course, using annual data remains appropriate if anticorruption campaigns have more immediate effects that contribute to short-run fluctuations.

A second concern involves the validity of our anticorruption proxies. Are they really measures of the intensity of anticorruption campaigns? As an indirect test, we interact these proxies in (1) with the number of subscriptions to the Party's official newspapers. Presumably, any cost due to the disruptions or uncertainties of an anticorruption campaign should be more heavily felt where the government's reach is most extensive. The number of subscriptions can be used to measure this reach. For one, the number of subscribers suggests how effectively and efficiently the Party's policies, including but not limited to its anticorruption campaigns, can be implemented in a top-down manner in a province for a given year. The literature has well documented that as an integral part of the Party's propaganda system, the subscriptions of the Party's organs, are overwhelmingly mandatory for all government agencies, state-owned

²² Considering the period 2000-2014, we have four data points for each province: 2013, 2010, 2007 and 2004. When $t=2004$, for example, $t-1$ is 2001, and income growth and anticorruption variables are averages in three-year spans. We do not use five-year averages due to the fact that the entire sample period is relatively short, especially when we deal with system and difference GMM estimates which will be discussed in section 4. For example, the difference GMM models cannot be estimated due to a lack of sufficient sample periods if we use five-year averages.

enterprises (SOEs), and even some private businesses and organizations (Huang, 2001; Shambaugh, 2007; Zhang, 2011). Second, the greater number of subscriptions suggests a greater number of agencies that can be affected by anticorruption campaigns. Unlike subscriptions of regular or commercial newspapers which depend upon income level, the subscriptions of the organs depend primarily upon the number of government agencies and SOEs. That is why such mandatory subscriptions have not experienced any substantial changes in most provinces over the sample period, except for the three direct-controlled municipalities, Beijing, Tianjin, and Shanghai where they all declined. The model becomes:

$$\begin{aligned} Growth_{i,t} = & \alpha_0 + \alpha_1 \ln anticorruption_{i,t} + \alpha_2 subscriptions_{i,t} \times \ln anticorruption_{i,t} \\ & + \alpha_3 \ln income_{i,t-1} + CX_{i,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where $subscriptions_{i,t}$ denotes the number of subscriptions per thousand people of the Party's official newspaper in province i in year t . The data of subscriptions comes from *China Press and Publishing Statistics* for the years from 2000 to 2013. Supposing that the Party's anticorruption efforts measured by $\ln anticorruption_{i,t}$ have the greatest impact where the Party's reach is most extensive, then α_2 is expected to have the same sign as α_1 .

The third concern regards endogeneity and will be discussed in the next section.

Table 1 presents results of these two specifications. The first four columns of Table 1 display the estimates when using our first anticorruption measure, the logarithm of the ratio of corruption-related articles to all articles, and the last four columns display those when using our second anticorruption measure, the logarithm of the ratio of corruption-related articles to government-related ones. We report the results of the pooled models in 3-1 and 3-5 for comparison. All other models in the table include fixed-effects.

All columns in Table 1 consistently suggest that anticorruption hurts growth. The annual data in panel A show that when excluding the interaction term, the coefficient of our anticorruption measure is always negative and statistically significant no matter which anticorruption measure is used nor whether other controls are introduced. In terms of magnitude, the models using the main anticorruption measure (corruption articles normalized by all articles) in columns 3-2 and 3-3 indicate that a one-standard-deviation increase in this index is associated with a decrease in growth of 0.38 percentage points, or 0.13 standard deviations. The models using the second measure, 3-6 and 3-7 (normalized by government articles), indicate a relatively smaller effect, a decrease in the growth rate by around 0.21~0.23 percentage points.

[Insert Table 1 Here]

The conclusions are confirmed by the three-year average data reported in panel B of the table. In fact, the negative effect of anticorruption becomes about three times larger in magnitude and more statistically significant, either with or without the interaction term in the model. For instance, the estimate from model 3-3 using three-year averages indicates that a one-standard-deviation increase in the ratio of corruption-related articles to all articles is associated with a decrease in growth of 1.12 percentage points, three-times larger than the 0.38-percentage-point decline estimated with annual data. To further put this magnitude into context, consider the anticorruption indices from 2014. If Heilongjiang with the smallest index value, 3.24%, had Shanxi's value of 8.85%, then Heilongjiang's growth would decrease by approximately 4 percentage points, or about 1.4 standard deviations, decreasing Heilongjiang's growth from 5.6% to 1.6%. Given that use of the three-year average data does not overturn the conclusions drawn on the basis of the annual data, we will concentrate on the annual data hereafter.

Moreover, the coefficients on the interaction terms in 3-4 and 3-8 are negative and statistically significant, which implies again that anticorruption hurts growth no matter which anticorruption measure we use. As expected, such a negative effect becomes larger in a province with more subscriptions of the Party's organs. As stated, one explanation is that anticorruption policies could have greater effects where the party's reach is more extensive. According to the estimates of 3-4, an increase in subscriptions by one standard deviation, or 6.56 per thousand people, leads to a 31% increase in the growth-prohibiting effect of anticorruption with annual data and a 19% increase with three-year average data. The effectiveness and efficiency of the Party's propaganda system and policy implementation in general matters.

4. Anticorruption and Growth: Endogeneity Concerns

As well documented in the literature (see Manion, 2004; Quade, 2007; and Gong, 2011 among others), the anticorruption campaigns in China usually take place in a top-down manner—when, where, and how hard to run an anticorruption campaign are decided by the Central Committee of the Party at the national level, rather than at the provincial level. For instance, the work report of Wang Qishan, Secretary of the CCDI, reveals that the Party sent anticorruption task forces to five provinces in 2013, suggesting that the campaign in these provinces were more intense than elsewhere. As a result, it is unlikely for provincial leaders to initiate an anticorruption campaign to distract public attention or get promoted when they anticipate an economic slowdown in their province. That is, the endogeneity issue should be less of a concern at the provincial level.

One, however, could argue that perhaps the Central Committee of the Party deliberately chooses the provinces with slower economic growth to fight corruption harder in order to distract public attention to economic troubles. A related possibility is that slower growing provinces

receive greater scrutiny, again leading to more intense anticorruption campaigns. In addition, the Party could choose not to run anticorruption campaigns in more prosperous provinces or run them to a lesser extent because Party officials do not want to “rock the boat” in these provinces. If this were the case, the estimated relationship of interest even with fixed-effects models would have a bias toward finding a detrimental impact of anticorruption on growth. To better address these concerns: we take two approaches. We first consider dynamic-GMM estimation using lagged values of the endogenous variables as instruments. We then consider an external instrument.

4.1 Dynamic GMM Estimation

To employ the dynamic GMM techniques, we first replace the dependent variable in (1) with year- t income:

$$\ln income_{i,t} = \beta_0 + \beta_1 \ln anticorruption_{i,t} + \beta_2 \ln income_{i,t-1} + CX_{i,t} + \mu_i + \varepsilon_{i,t} \quad (3)$$

We then estimate (3) using the difference-GMM estimator of Arellano and Bond (1991) as well as the system-GMM estimator of Arellano and Bover (1995) and Blundell and Bond (1998). The system and difference GMM techniques have been widely applied in the growth literature. In the case of persistent explanatory variables, Bond et al. (2001) suggest that the first-differenced GMM estimator can produce biased coefficients since the lagged levels of these variables would serve as weak instruments. Alternatively, the Blundell and Bond (1998) system GMM estimates equation (3) in both first differences and levels which obtains more moment conditions thereby increasing efficiency.²³ See Blundell and Bond (1998), Hauk and Wacziarg (2009) and Roodman (2006) for further details.²⁴ An advantage of these dynamic-GMM methodologies is also to address the lagged endogenous variable on the right hand side in (1) and (3).

[Insert Table 2 Here]

As for the estimates of the system and difference GMM models, we stress three points. First, the results are in line with those of the fixed-effects models that the Party’s anticorruption

²³A critical assumption, however, of system-GMM is that the fixed effects are not correlated with changes in the endogenous variables.

²⁴ For these specifications, we use a Sargan test to examine whether these instruments are valid. A key assumption is that ε is not serially correlated and so we also test the residual for first and second order serial correlation. As shown below, the null hypothesis of valid instruments is not rejected, but the null hypothesis of no second order serial correlation is rejected in half of the specifications using the 5% significance level. This is exactly why we will adopt an external instrument later in this section and even undertake an event study in the next section.

campaigns have a negative influence on growth. Second, the coefficients of initial income are less than unity, which offers support to the convergence hypothesis. Third, the estimated effects of other controls are consistent with those in the OLS models, except for that of the share of the private sector in total employment which is considered as a measure of institutional changes. The correlation between the private share of total employment and economic growth becomes positive and statistically significant at 1% in three of the four GMM estimations.

Unfortunately, dynamic GMM methodologies are not panaceas to overcome endogeneity concerns. For instance, using lags as instruments might not be appropriate in the presence of serially correlated errors and our diagnostic checks do raise concerns regarding the presence of second order serial correlation. Rajan and Arvind Subramanian (2008) discuss other concerns with these methodologies. Due to these concerns, we next consider an external instrument in an attempt to better identify the causal effect of anticorruption on growth.

4.2 Instrumental Variable (IV) Estimation

We instrument for anticorruption using the ratio of articles containing the key phrase “中央 (the central government or the Central Committee of the Party, in Chinese)” to all articles in the Party’s organ in each province.²⁵ The instrumental variable gauges how frequently a provincial organ mentions decisions and policies of the central government, which we consider as a measure of a province’s loyalty to the central government or the Central Committee of the Party. As a former chief editor in the Commentary Department of the PD, Wu (1994) points out that the rate at which the official newspapers reprint editorials and other articles of the PD is seen as indicators of the loyalty of provincial governments to the national government. This is very much in line with what has been observed during the anticorruption campaigns. Take the corruption scandal of Bo Xilai again as an example. Right after Bo was removed from his post in March 2012, every provincial organ published at least one article the next month explicitly showing their support to the decision of the Central Committee of the Party.

[Insert Figure 7 Here]

For our instrument to be appropriate, it must be correlated with our anticorruption proxy but not correlated with the residual in (1). Although provinces rarely launch their own anticorruption campaigns, a question still arises as to what extent they cooperate with directives from the central government. Presumably, ones that are more likely to cooperate will more

²⁵ With this IV estimation, we do not use our proxy normalized by the number of government-related articles because the key phrase in our instrument “central government” already contains the phrase “government.”

often mention the central government's role in these campaigns. Thus, we expect a positive association between the instrumental variable and our anticorruption measure, which is confirmed by Figure 7. Model 3-18 in Table 3 presents a more formal investigation, showing that a one standard deviation increase, or 33%, in loyalty measured by the frequency of central-government-related articles in the provincial organs is on average associated with a 0.55 standard deviation, or 23%, increase in anticorruption measured by the frequency of corruption-related articles. Not only is the coefficient statistically significant, but the Cragg-Donald Wald F test rejects the hypothesis that loyalty is a weak instrument for anticorruption.

[Insert Table 3 Here]

A valid instrument also needs to satisfy an exclusion restriction that conditional on the controls in the model loyalty would not be associated with economic growth except for a direct effect of anticorruption. Simply speaking, is the instrument plausibly exogenous? To the best of our knowledge, there is no empirical evidence in the literature which links the loyalty of a province to the central government of China to its economic performance. This is probably because in contrast with its political system the Chinese economy often grew in a bottom-up manner in the past several decades. Many studies, such as Zhu (2012) and Lardy (2014) among others, show that the private sector has already dominated in the economy in the 2000s in terms of output, employment, and productivity growth. In fact, several coastal provinces, such as Guangdong, that grew much faster than other regions of the country have long been considered as "rule breakers" when they experimented new economic policies without permission of the central government in the 1990s.

Of course, one can still question the exogeneity of the instrument. As Durlauf et al. (2004) argue, growth theory continuously extends its boundary and now becomes so broad that it is always possible to find a theory suggesting that an instrument can affect growth other than through the endogenous variable. Specific to our study, one might argue that a more loyal province could be given favorable consideration that boosts growth. Therefore, these results should still be interpreted cautiously.

The second-stage and reduced-form estimations are reported in models 3-19 and 3-20 of Table 3. The results of both models are consistent with the previous ones using the fixed effects and GMM models, namely anticorruption has a negative and statistically significant influence on economic growth. The magnitude of the harmful effect is also similar to that estimated with the fixed effects models.

5. Event Study Analysis of the Sentencing of Provincial Officials

The above sections purport to show that anticorruption campaigns have short run, negative effects upon economic growth. To help support this conjecture we consider an alternative approach. Instead of looking at the anticorruption *efforts* made by the Party and proxied by newspaper counts, we now consider specific *outcomes* of the Party's anticorruption campaigns and their possible effects upon growth. Over the years hundreds of thousands of government officials were removed from posts during the campaigns and later thrown into jail due to corruption charges.²⁶ Although considering each case is impossible, we can investigate whether growth is lower during the year when a major political leader was convicted of corruption. The major political leaders of a province include the secretary of a provincial party committee, vice secretaries, the governor, and vice governors. According to the CCDI, the corruption cases involving these high-ranking government officials are often classified as "major" cases. Such removals usually necessitate substantial effort of the Party as it can trigger many political fights and under-the-table deals. The efforts can often be reflected by a surge of corruption-related articles in the Party's organs because the Party needs to assure lower-ranking officials and the public that the corrupt figure deserves penalties and the Party wants to use these major cases to educate lower-ranking officials. That is, the event study analysis is coherent with the newspaper counting strategy advanced earlier. The only difference between the two is that we here focus now on these specific cases. A major case could shock a provincial economy profoundly. The Chinese government even took specific steps to offer economic assistance to Chongqing after the secretary of its party committee, Bo Xilai, was removed from his post in 2012 because of his corruption scandal.²⁷

We consider the following fixed-effects model:

$$Growth_{i,t} = \varphi_0 + \varphi_1 Dummy_{i,t} + \varphi_2 \ln income_{i,t-1} + CX_{i,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \quad (4)$$

where $Dummy_{i,t}$ equals 1 if there is a major corruption case in province i in year t and 0 otherwise. A negative value for φ_1 implies that the occurrences of these major corruption cases lowered growth. To check the robustness of the results, we create another dummy which equals one *only* if the secretary of the provincial party committee or the governor is convicted of corruption and zero otherwise. Owing to the dual structure of the Party and its government in the Chinese bureaucratic system, both the secretary and the governor are considered "first-in-command". We further hypothesize that anticorruption hinders a provincial economy even more when its "first-in-command" is caught due to corruption charges because they are commonly believed to be more influential, both politically and economically, than their deputies. Other variables and

²⁶ For instance, the CCDI report shows that more than 100,000 people have indicted for corruption, mostly government officials, since the ongoing campaign was launched in 2013.

²⁷ On April 21, 2012. China worries stability of Chongqing after Bo Xilai was suspended, *The Wall Street Journal* (Chinese edition), retrieved from: <http://cn.wsj.com/gb/20120421/bch083405.asp>

their data are exactly the same as those in (1).

As before, endogeneity concerns arise to the extent that officials with poor economic records are more likely to be investigated and later sentenced. However, we believe that the timing of sentencing helps to address these concerns. In China, sentencing usually takes place about one to two years after an official is investigated by the CCDI and/or removed from his or her post.²⁸ Therefore, we are examining growth after the onset of an investigation, making it less likely that the investigation is being triggered by lower growth.²⁹ Of course, if growth shocks are persistent then past negative shocks could trigger both investigations and lower future growth, thereby causing a negative association between the two. To address such a possibility, we regressed the major case dummy on the previous year's growth rate using a logistic model with provincial and yearly fixed effects. The coefficient on lagged growth was not significant, suggesting that no evidence arises that these sentences were being triggered by recent economic slowdowns. (Results available upon request.)

[Insert Table 4 Here]

For the first dummy variable, we find 31 major corruption cases among the provinces between 2000 and 2014.³⁰ We manually gather the details of the cases, including names of corrupt government officials, their posts, province, and sentence dates, from several news sources and CCDI reports. In terms of the second dummy variable, there are 7 first-in-commands from 7 different provinces who were convicted of corruption during the sample period. The details of these cases are listed in Appendix II.

²⁸ In China, if the CCDI announces its investigation toward a high-ranking government official, it usually means that the investigation has already been completed and the CCDI has already held solid evidence of his or her criminal behaviors. The announcements often suggest that the CCDI is ready to transfer the evidence to the People's Procuratorate to be criminally prosecuted. In most of the 31 cases we consider, sentencing takes places one to two years after the CCDI announces its investigation.

²⁹ In the text, we focus upon the sentencing date in creating our dummies. An alternative would be to focus upon the initial announcement of a CCDI investigation. The announcement usually comes out along with the Party's decision of removing the official from his or her post. We focus on sentencing for the following reasons. First, the CCDI announced 25 investigations in 2014, the last year of our sample, but did not provide any details of these cases. Therefore, we are not sure whether these officials will be convicted of corruption or of other charges. Second, we cannot include these cases when examining lagged effects. Third, as discussed in the text, since sentencing follows a year to two-year investigation it is less likely that the negative association between lower growth and sentencing is due to lower growth causing the sentencing. Finally, the CCDI announced many of its investigations at the end of the year, making it unclear if these cases would have even affected growth during that same year. Nevertheless, we still created analogous dummies based upon the CCDI announcement years. Results were robust (and available upon request).

³⁰ The 31 major cases actually come from 20 provinces since 7 provinces have more than one major cases occurring over the sample period.

The results in Table 4 are consistent with our earlier findings. Holding other controls constant, the growth rate of GDP per capita of a province declines on average by 0.7 percentage points during the year when sentencing occurs and by one percentage point when a first-in-command is convicted of corruption. As expected, removing a first-in-command from his or her post generates a larger negative impact. One can also consider how persistent these effects are. Columns 3-23 and 3-26 include lags one through three of these respective dummies. The first two lags are significant but not the third (which is also much smaller in magnitude), suggesting that the detrimental impact of these convictions lasts about two years after sentencing.

6. Conclusion

This paper presented a new approach for measuring the intensity of anticorruption efforts in China, namely by using the frequency of their inclusion, along with corruption more generally, in the Party's official newspapers. We also show how these proxies compare with other measures of corruption, both the commonly used indices such as those from the WGI and the conviction rate, as well as ones taken from newspaper counts. An advantage of our measure is that it shows much greater intertemporal variation which is not surprising given that the intensity of anticorruption campaigns is likely to be less persistent than corruption itself. A disadvantage of our approach is that it cannot be used more generally as not all countries have official news sources under such tight government control.

Using our new anticorruption proxies, we find that the anticorruption campaigns run by the Party hinder economic growth in the short run. Of course, such campaigns could raise growth in the long run if they are successful at lowering corruption. Unfortunately, our short sample period does not allow us to examine long-run effects among these variables although one would also need time-varying, provincial measures of corruption. Nevertheless, our approach suggests that such an examination will be warranted once more years of data become available and will be the subject of our future research.

A second benefit of our approach is the creation of our anticorruption proxies which can be used by others in various research avenues. To what extent are anticorruption campaigns accompanied by other policies? What types of leaders are more prone to launch such campaigns? Do certain types of events or trends more likely to trigger anticorruption efforts? How long do such campaigns usually last? Do they have other effects on the economy other than growth effects? Future work will address these and other questions.

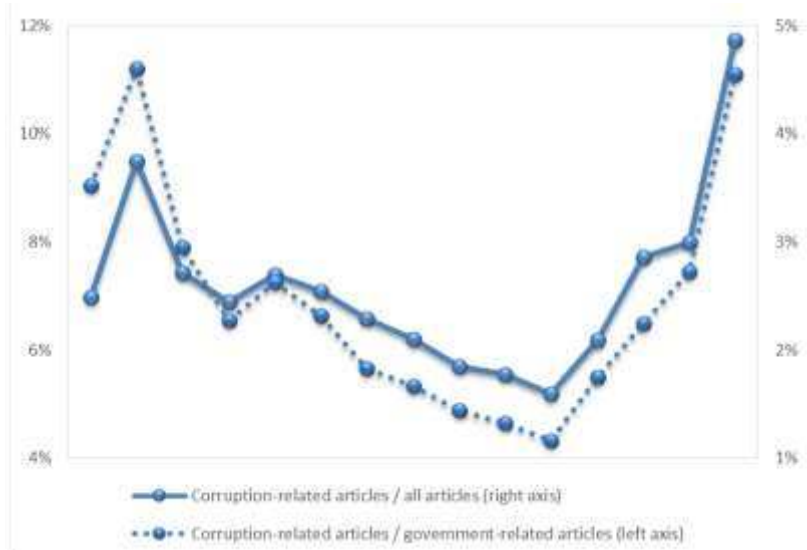


Fig. 1. Evolution of Province-level Medians of Our Proxies

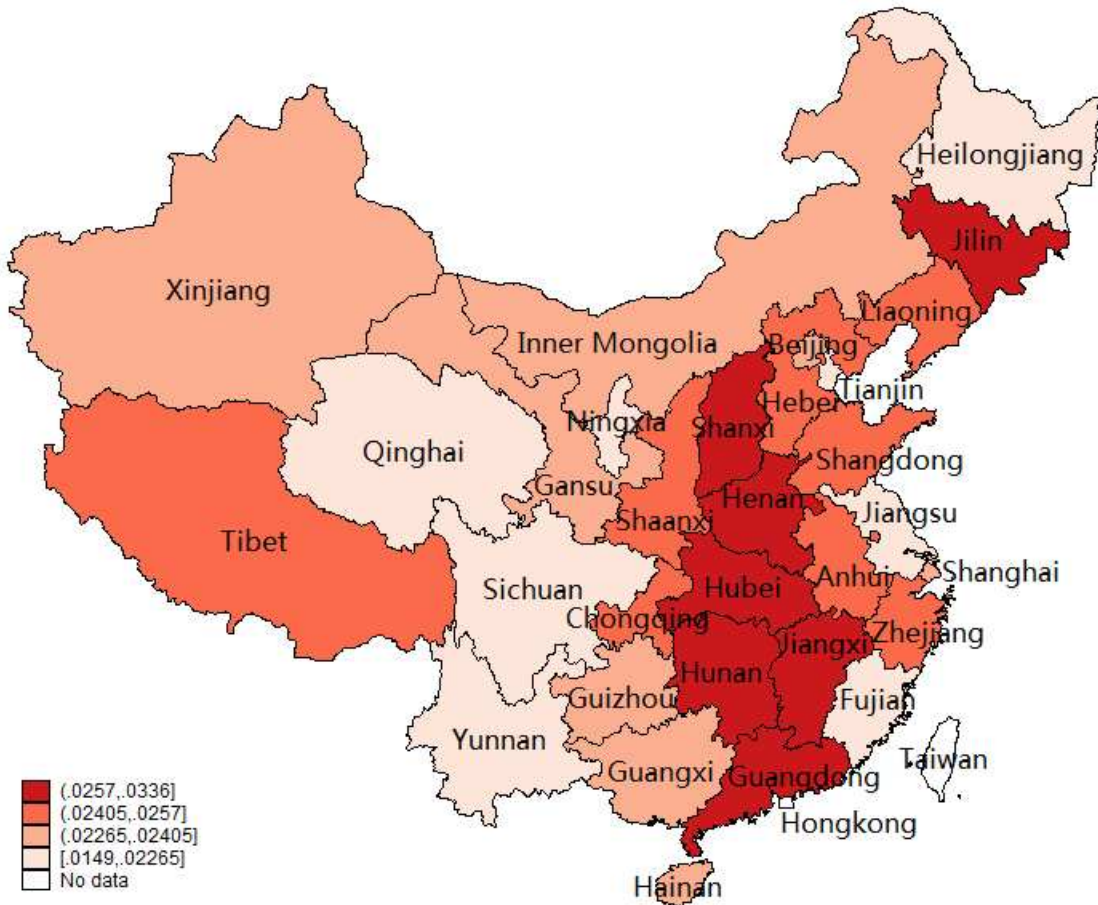


Fig. 2. Cross-provincial Fluctuations of the Party’s Anticorruption Efforts³¹

³¹ The map is made with china_map from <http://fmwww.bc.edu/RePEc/bocode/c>. It’s based on the data of the ratio of corruption-related articles to all articles. For the coloring purpose, we try our best to evenly divide 31 provinces into four groups to avoid any arbitrary criterion of grouping. The highest frequency group colored dark red has only 7 provinces and all other groups has 8.

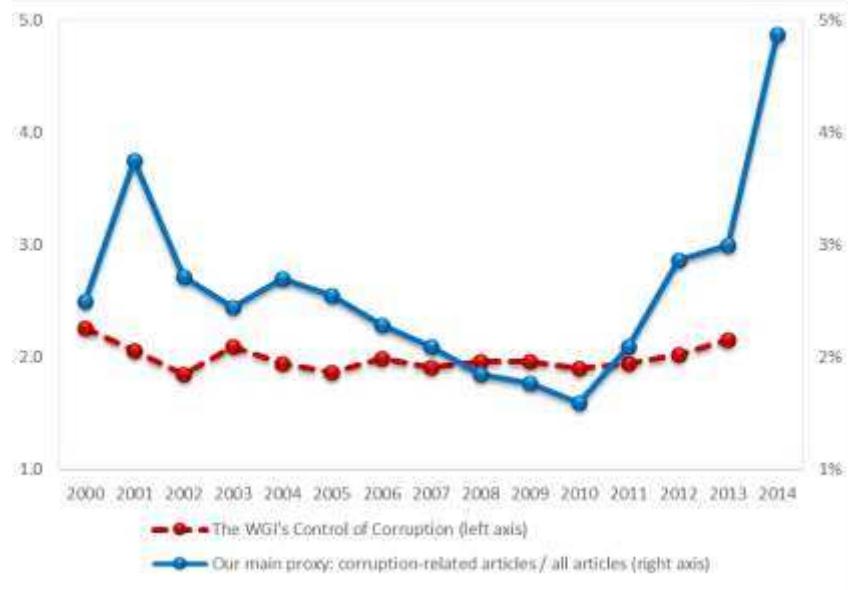


Fig. 3. the WGI's Control of Corruption and Our Main Proxy

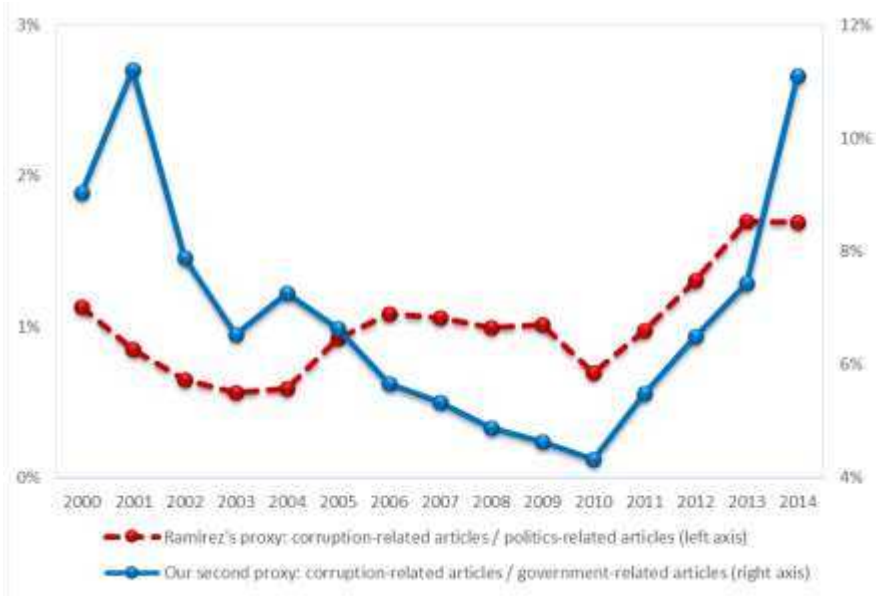


Fig. 4. Ramirez's Proxy and Our Proxy

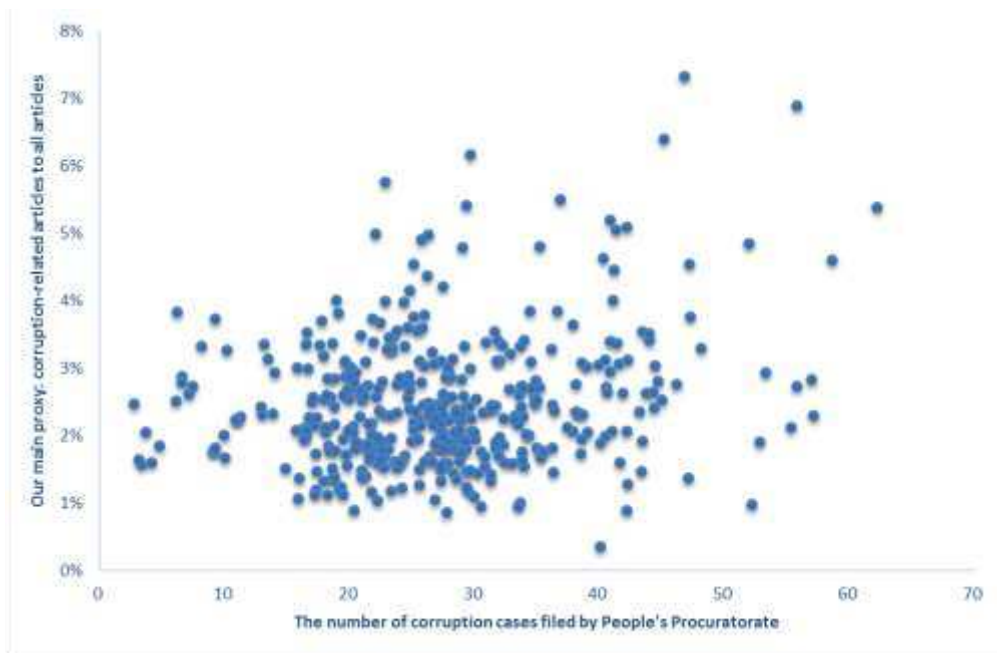


Fig. 5. The Conviction Rate of Corruption and Our Main Proxy

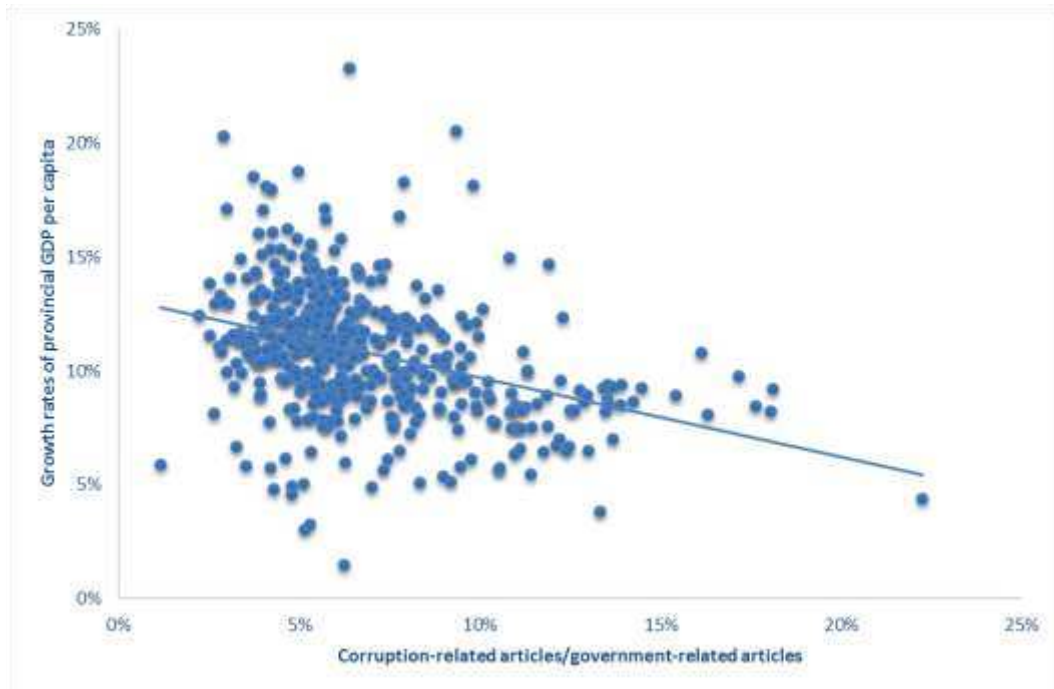
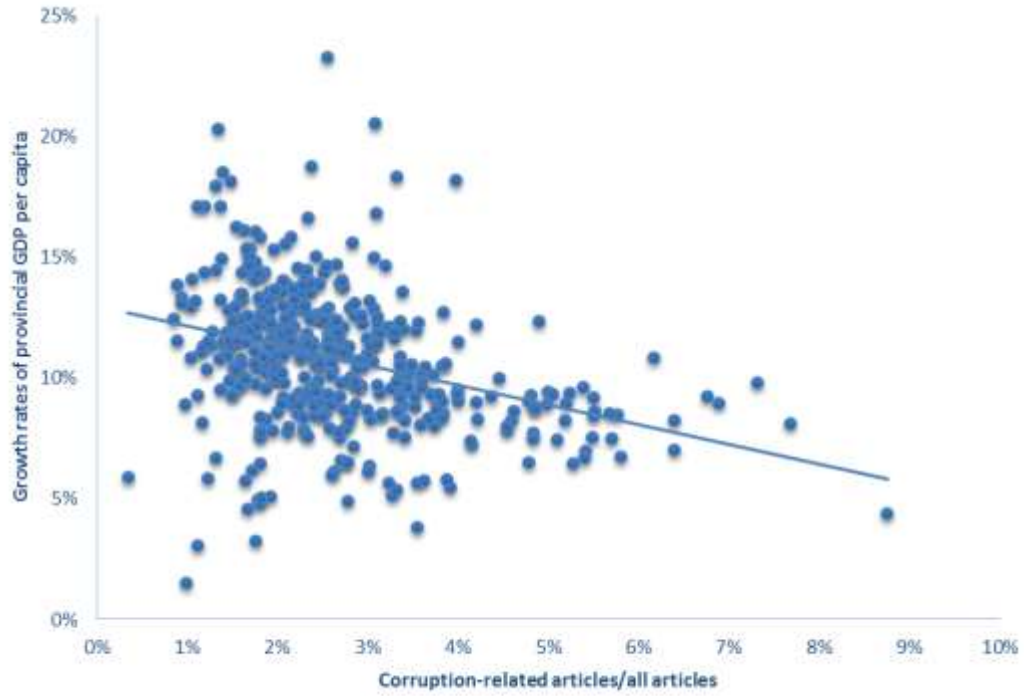


Fig. 6. Anticorruption and Growth across 31 Provinces between 2000 and 2014

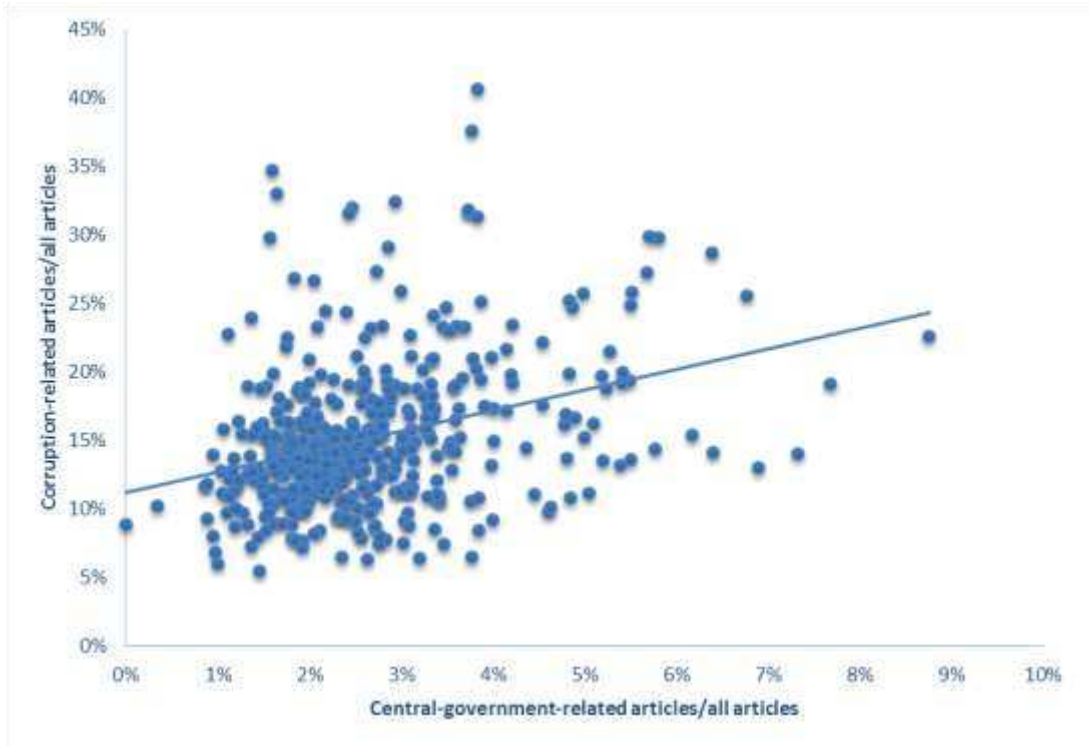


Fig. 7. Anticorruption and Loyalty across 31 Provinces between 2000 and 2014

Table 1: Baseline Results on Anticorruption and Growth

Regressor	Model							
	3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8
Panel A: annual data								
Anticorruption #1: corrup/all (in logs)	-2.049*** (0.673)	-0.957*** (0.226)	-0.844*** (0.266)	-0.538** (0.272)				
Subscriptions × log anticorruption #1				-0.037* (0.020)				
Anticorruption #2: corrup/gov (in logs)					-2.555*** (0.509)	-0.565** (0.237)	-0.500* (0.262)	-0.230 (0.317)
Subscriptions × log anticorruption #2								-0.048* (0.026)
Initial income (in logs)	-0.964** (0.402)	-2.258* (2.391)	-0.295 (1.859)	-0.664 (2.275)	-1.108*** (0.365)	-1.990 (2.395)	-0.057 (1.878)	-0.063 (2.343)
Physical investment (in logs)			1.285*** (0.440)	0.697 (0.701)			1.295*** (0.457)	0.707 (0.714)
$n + g + \delta$ (in logs)			-2.356*** (0.377)	-2.426*** (0.354)			-2.354*** (0.399)	-2.427*** (0.384)
Human capital			0.016 (0.463)	0.010 (0.505)			-0.039 (0.478)	-0.085 (0.518)
Private share (in logs)			-1.543* (0.900)	-1.500 (1.108)			-1.644* (0.930)	-1.519 (1.146)
Constant	12.716*** (4.003)	29.565 (24.057)	3.850 (17.593)	7.274 (21.102)	14.714*** (3.853)	28.916** (23.901)	3.683 (17.679)	3.563 (21.989)
Adjusted R-square	0.139	0.621	0.706	0.698	0.180	0.615	0.702	0.692
No. of observations	437	437	434	392	437	437	434	392
Province fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Panel B: three-year average data								
Anticorruption #1: corrup/all (in logs)	-2.831*** (0.172)	-2.842*** (0.877)	-2.498*** (0.631)	-1.708*** (0.412)				
Subscriptions × log anticorruption #1				-0.061*** (0.013)				
Anticorruption #2: corrup/gov (in logs)					-2.717*** (0.328)	-1.952** (0.934)	-1.977*** (0.599)	-1.366** (0.668)
Subscriptions × log anticorruption #2								-0.079** (0.032)
Adjusted R-square	0.344	0.683	0.745	0.721	0.319	0.654	0.727	0.735
No. of observations	124	124	124	120	124	124	124	120

Notes: The dependent variable in the fixed-effects models is the growth rate of income. The robust standard errors are in parentheses. Asterisks indicate statistical significance at the * 10 percent, ** 5 percent, or *** 1 percent level.

Table 2: GMM Estimations on Anticorruption and Growth

Regressor	Model							
	System GMM				Difference GMM			
	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16
Panel A: annual data								
Anticorruption #1: corrup/all (in logs)	-0.034*** (0.003)	-0.022*** (0.004)			-0.024*** (0.004)	-0.020*** (0.003)		
Anticorruption #2: corrup/gov (in logs)			-0.037*** (0.003)	-0.024*** (0.004)			-0.026*** (0.004)	-0.021*** (0.004)
Initial income (in logs)	0.990*** (0.004)	0.945*** (0.011)	0.986*** (0.004)	0.946*** (0.012)	0.986*** (0.006)	0.960*** (0.010)	0.983*** (0.006)	0.958*** (0.345)
Physical investment (in logs)		0.028*** (0.008)		0.025*** (0.008)		0.010* (0.006)		0.010 (0.090)
$n + g + \delta$ (in logs)		-0.030*** (0.006)		-0.029*** (0.005)		-0.027*** (0.005)		-0.026 (0.064)
Human capital		0.003 (0.004)		-0.001 (0.005)		0.001 (0.003)		0.001 (0.121)
Private share (in logs)		0.163*** (0.050)		0.153*** (0.061)		0.108*** (0.030)		0.102 (1.248)
Constant	0.074* (0.040)	0.553*** (0.121)	0.140*** (0.041)	0.572*** (0.142)	0.159** (0.065)	0.385*** (0.103)	0.201*** (0.066)	0.419 (2.760)
No. of observations	411	409	411	409	379	375	379	375
Sargan test (p -value)	0.209	0.253	0.216	0.230	0.167	0.216	0.165	0.195
AR(1)	$z=-3.312$ ***	$z=-3.142$ ***	$z=-3.409$ ***	$z=-3.151$ ***	$z=-3.056$ ***	$z=-3.302$ ***	$z=-3.108$ ***	$z=-1.399$
AR(2)	$z=-1.205$	$z=-3.100$ ***	$z=-1.658$ *	$z=-3.097$ ***	$z=-1.322$	$z=-2.863$ ***	$z=-1.658$ *	$z=-2.481$ **

Notes: The dependent variable in the system and difference GMM models is the level of income though they all examine the effect of anticorruption on growth. The robust standard errors are in parentheses. Asterisks indicate statistical significance at the * 10 percent, ** 5 percent, or *** 1 percent level.

Table 3: IV Estimation on Anticorruption and Growth

Regressand	Model			
	IV estimations (First stage)		IV estimations (second stage)	Reduced form
	Anticorruption: corrup/all (in logs)		Growth rate of GDP per capita	Growth rate of GDP per capita
Regressor	3-17	3-18	3-19	3-20
Loyalty: central/all (in logs)	0.707*** (0.077)	0.730*** (0.074)		-0.750* (0.453)
Anticorruption #1: corrup/all (in logs)			-1.068* (0.594)	
Initial income (in logs)		-0.699*** (0.188)	-0.404 (1.958)	0.420 (1.819)
Physical investment (in logs)		0.033 (0.075)	1.292*** (0.433)	1.232*** (0.466)
$n + g + \delta$ (in logs)		0.028 (0.026)	-2.355*** (0.372)	-2.416*** (0.372)
Human capital		0.103 (0.056)	0.050 (0.456)	-0.041 (0.487)
Private share (in logs)		0.251 (0.176)	-1.483 (0.907)	-1.613* (0.945)
Costant	-2.345*** (0.149)	3.964** (1.724)	3.839 (17.696)	-1.313 (16.506)
F-statistic on omitted variable		186.562		
Adjusted R-square	0.656	0.668	0.706	0.702
No. of observations	437	434	434	435

Notes: The robust standard errors are in parentheses. Asterisks indicate statistical significance at the * 10 percent, ** 5 percent, or *** 1 percent level.

Table 4: Event Study on Anticorruption and Growth

Regressor	Model					
	3-21	3-22	3-23	3-24	3-25	3-26
Dummy for major corruption cases	-0.986*** (0.266)	-0.694*** (0.227)	-1.104*** (0.368)			
Dummy for major corruption cases (1-year lag)			-1.1084*** (0.301)			
Dummy for major corruption cases (2-year lag)			-1.511*** (0.359)			
Dummy for major corruption cases (3-year lag)			-0.752 (0.544)			
Dummy for first-in-command corruption cases				-1.607*** (0.646)	-1.001*** (0.408)	-1.520** (0.717)
Dummy for first-in-command corruption cases (1-year lag)						-1.592*** (0.486)
Dummy for first-in-command corruption cases (2-year lag)						-1.253*** (0.353)
Dummy for first-in-command corruption cases (3-year lag)						-0.603 (0.554)
Initial income (in logs)	-1.595 (2.021)	1.592 (1.903)	-0.912 (2.218)	-1.727 (2.036)	1.334 (1.926)	-1.303 (2.375)
Physical investment (in logs)		0.715 (0.597)	1.189 (1.089)		0.834 (0.592)	1.617 (1.090)
$n + g + \delta$ (in logs)		-2.550*** (0.441)	-2.937*** (0.471)		-2.558*** (0.458)	-3.002*** (0.526)
Human capital		-0.469 (0.544)	-0.347 (0.744)		-0.444 (0.541)	-0.155 (0.776)
Private share (in logs)		-0.225 (1.134)	-1.533 (1.655)		-0.516 (1.126)	-2.493* (1.443)
Costant	26.535 (19.918)	-7.765 (16.922)	15.465 (18.309)	27.799 (20.063)	-5.531 (17.142)	17.306 (20.061)
Adjusted R-square	0.605	0.682	0.670	0.603	0.681	0.649
No. of observations	465	431	339	465	431	339
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the growth rate of income. The robust standard errors are in parentheses. Asterisks indicate statistical significance at the * 10 percent, ** 5 percent, or *** 1 percent level.

Appendix I: Summary Statistics of the Anticorruption Measures

Summary Statistics I: Over Time Variation of Corruption/ALL

Year	Mean	Median	S.D.	Max.	Min.
2000	2.40%	2.49%	1.04%	4.60%	0.35%
2001	4.27%	3.74%	1.37%	7.32%	2.36%
2002	3.16%	2.71%	1.40%	6.17%	0.89%
2003	2.54%	2.44%	0.76%	4.46%	1.45%
2004	2.58%	2.70%	0.59%	3.65%	1.22%
2005	2.83%	2.55%	0.82%	4.90%	1.18%
2006	2.20%	2.29%	0.38%	2.79%	1.16%
2007	2.14%	2.10%	0.60%	3.60%	1.27%
2008	1.81%	1.85%	0.45%	2.87%	1.04%
2009	1.76%	1.77%	0.42%	2.85%	0.86%
2010	1.67%	1.60%	0.58%	3.83%	0.94%
2011	2.16%	2.09%	0.63%	3.70%	1.23%
2012	2.82%	2.86%	0.69%	4.37%	1.65%
2013	3.08%	2.99%	0.74%	4.99%	1.88%
2014	4.99%	4.87%	1.28%	8.85%	3.24%

Summary Statistics II: Over Time Variation of Corruption/Government

Year	Mean	Median	S.D.	Max.	Min.
2000	8.90%	9.04%	3.53%	14.47%	1.16%
2001	11.79%	11.21%	3.14%	18.05%	6.34%
2002	8.40%	7.89%	3.32%	16.13%	2.51%
2003	6.98%	6.54%	2.17%	11.33%	3.31%
2004	7.14%	7.26%	2.01%	11.90%	3.24%
2005	6.99%	6.64%	1.99%	12.28%	2.62%
2006	5.67%	5.66%	1.01%	7.38%	2.78%
2007	5.47%	5.32%	1.39%	9.26%	2.99%
2008	4.69%	4.89%	1.10%	7.60%	2.65%
2009	4.52%	4.64%	1.09%	7.01%	2.24%
2010	4.45%	4.32%	1.24%	7.86%	2.81%
2011	5.47%	5.50%	1.43%	8.61%	3.18%
2012	6.45%	6.49%	1.52%	9.20%	2.98%
2013	7.25%	7.44%	1.62%	11.85%	4.56%
2014	11.57%	11.10%	3.16%	22.45%	6.92%

Summary Statistics III: Cross-province Variation of Corruption/ALL

Province	Mean	Median	S.D.	Max.	Min.
Beijing	2.50%	2.29%	0.81%	3.91%	1.12%
Tianjin	2.54%	2.02%	1.33%	5.80%	1.27%
Hebei	2.40%	2.53%	0.78%	3.85%	1.50%
Shanxi	3.25%	2.78%	1.70%	8.85%	1.96%
Inner Mongolia	2.54%	2.28%	1.30%	5.77%	1.19%
Liaoning	2.44%	2.44%	1.22%	4.85%	0.86%
Jilin	3.40%	2.80%	1.60%	6.89%	1.60%
Heilongjiang	2.52%	2.12%	0.80%	4.01%	1.50%
Shanghai	2.41%	2.30%	0.94%	4.76%	1.00%
Jiangsu	2.50%	2.26%	1.13%	5.63%	0.98%
Zhejiang	2.50%	2.57%	0.77%	4.15%	0.89%
Anhui	2.89%	2.46%	1.12%	5.22%	1.32%
Fujian	2.16%	1.95%	0.86%	4.20%	0.94%
Jiangxi	3.04%	2.61%	1.49%	6.81%	1.38%
Shandong	3.19%	2.52%	1.86%	7.83%	1.45%
Henan	3.12%	2.83%	1.54%	6.40%	1.18%
Hubei	2.93%	2.99%	1.26%	5.26%	1.10%
Hunan	3.15%	3.36%	1.24%	5.77%	1.60%
Guangdong	3.50%	3.11%	1.22%	6.36%	1.96%
Guangxi	2.54%	2.33%	1.08%	5.10%	1.35%
Hainan	2.62%	2.30%	1.05%	5.58%	1.70%
Chongqing	2.69%	2.43%	1.42%	7.32%	1.37%
Sichuan	1.92%	1.77%	0.80%	3.70%	0.89%
Guizhou	2.49%	2.34%	0.82%	3.87%	1.58%
Yunnan	2.05%	1.49%	1.21%	4.88%	0.35%
Tibet	2.54%	2.52%	0.78%	3.83%	1.57%
Shaanxi	2.73%	2.46%	0.91%	4.90%	1.63%
Gansu	2.72%	2.33%	1.23%	5.68%	1.47%
Qinghai	2.51%	2.16%	1.26%	6.17%	1.06%
Ningxia	2.50%	2.02%	1.12%	5.48%	1.59%
Xinjiang	2.56%	2.40%	1.14%	5.42%	1.12%

Summary Statistics IV: Cross-province Variation of Corruption/Government

Province	Mean	Median	S.D.	Max.	Min.
Beijing	7.55%	6.99%	2.36%	11.36%	4.78%
Tianjin	5.85%	5.68%	2.53%	12.03%	2.99%
Hebei	7.93%	7.60%	2.50%	12.50%	5.05%
Shanxi	8.82%	7.60%	4.28%	22.45%	5.39%
Inner Mongolia	6.73%	5.63%	3.40%	14.47%	3.72%
Liaoning	6.11%	5.21%	3.35%	13.54%	2.24%
Jilin	8.52%	7.38%	3.59%	15.42%	4.08%
Heilongjiang	6.70%	5.98%	1.86%	9.96%	4.21%
Shanghai	6.90%	6.27%	2.54%	12.30%	3.52%
Jiangsu	6.11%	5.88%	1.95%	11.09%	3.90%
Zhejiang	6.30%	6.26%	1.81%	9.74%	2.51%
Anhui	7.99%	6.70%	2.87%	13.67%	4.24%
Fujian	6.47%	5.17%	3.08%	12.99%	2.93%
Jiangxi	8.33%	7.61%	3.48%	18.23%	4.39%
Shandong	7.51%	6.64%	3.85%	16.50%	3.83%
Henan	8.37%	7.89%	3.98%	18.05%	3.72%
Hubei	8.33%	8.30%	3.04%	13.71%	3.79%
Hunan	8.54%	7.89%	3.57%	17.65%	4.76%
Guangdong	7.28%	6.69%	2.09%	12.11%	4.92%
Guangxi	5.41%	4.97%	2.38%	10.88%	2.89%
Hainan	6.56%	5.88%	1.94%	11.16%	4.43%
Chongqing	6.15%	5.49%	3.28%	17.16%	3.55%
Sichuan	5.06%	4.62%	1.99%	9.02%	2.51%
Guizhou	5.99%	5.73%	2.04%	9.70%	3.72%
Yunnan	4.98%	3.42%	2.92%	11.10%	1.16%
Tibet	5.51%	5.39%	1.92%	9.05%	2.98%
Shaanxi	6.98%	6.42%	2.48%	12.28%	4.27%
Gansu	7.41%	6.50%	2.95%	13.64%	4.20%
Qinghai	6.85%	5.82%	3.25%	16.13%	3.07%
Ningxia	6.18%	5.46%	2.36%	12.56%	4.33%
Xinjiang	6.76%	5.91%	3.32%	13.68%	3.21%

Appendix II: Major Corruption Cases

Year	Province	Official	Post ^{[a],[b]}	Sentence	Charges ^{[c],[d]}
2000	Jiangxi	Hu, Changqing	Vice gov.	Death penalty	Bribery of RMB 5.44
2000	Zhejiang	Xu, Yunhong	Vice gov.	10 year imprisonment	Power abuse and bribery
2000	Guangxi	Cheng, Kejie	Gov.	Death penalty	Bribery of RMB 41
2001	Liaoning	Mu, Suixin	Vice gov.	Death penalty with reprieve	Bribery of RMB 6.6
2002	Fujian	Shi, Zhaobin	Vice sec.	13 year imprisonment	Bribery of RMB 0.6
2002	Chongqing	Qin, Changdian	Vice gov.	1 year probation	Bribery of \$3,000
2002	Guangxi	Liu, Zhibing	Vice gov.	15 year imprisonment	Bribery of RMB 0.86
2003	Hebei	Cong, Fukui	Vice gov.	Death penalty with reprieve	Bribery of RMB 9.36
2003	Hebei	Cheng, Weigao	Secretary	Disciplined within Party	Power abuse
2003	Yunnan	Li, Jiating	Gov., vice sec.	Death penalty with reprieve	Bribery of RMB 18
2004	Anhui	Wang, Huaizhong	Vice gov.	Death penalty	Bribery of RMB 5.17
2004	Hubei	Zhang, Guoguang	Gov., vice sec.	11 year imprisonment	Bribery of RMB 0.57
2004	Guizhou	Liu, Fangren	Secretary	Life imprisonment	Bribery of RMB 6.77
2004	Guizhou	Liu, Changgui	Vice gov.	11 year imprisonment	Bribery of RMB 1.34
2005	Liaoning	Liu, Ketian	Vice gov.	12 year imprisonment	Bribery of RMB 1.31
2005	Xinjiang	Aman Haji	Vice gov.	12 year imprisonment	Bribery of RMB 8
2006	Shanxi	Hou, Wujie	Vice sec.	11 year imprisonment	Bribery of RMB 0.88
2006	Sichuan	Li, Dachang	Vice gov.	7 year imprisonment	Power abuse
2007	Anhui	Wang, Zhaoyao	Vice sec.	Death penalty with reprieve	Bribery of RMB 7.04
2007	Anhui	He, Minxu	Vice gov.	Death penalty with reprieve	Bribery of RMB 8.41
2007	Guangdong	Liu, Weiming	Vice gov.	Not publically released	Power abuse, bribes
2008	Shanghai	Chen, Liangyu	Secretary	18 year imprisonment	Power abuse and bribery
2008	Beijing	Liu, Kehua	Vice gov.	Death penalty with reprieve	Bribery of RMB 7

2008	Shandong	Du, Shicheng	Vice sec.	Life imprisonment	Bribery of RMB 6.26
2009	Guangxi	Sun, Yu	Vice gov.	18 year imprisonment	Bribery of RMB 3.28
2011	Ningxia	Li, Tangtang	Vice gov	Life imprisonment	Bribery of RMB 7
2012	Inn. Mongolia	Liu, Zhuozhi	Vice gov.	Life imprisonment	Bribery of RMB 8.17
2012	Chongqing	Wang, Lijun	Vice gov.	15 year imprisonment	Bribery of RMB 3.05
2013	Jilin	Tian, Xueren	Vice gov.	Life imprisonment	Bribery of RMB 19.19
2013	Chongqing	Bo, Xilai	Secretary	Life imprisonment	Bribery of RMB 21.79
2013	Shandong	Huang, Sheng	Vice gov.	Life imprisonment	Bribery of RMB 12.23

Notes: [a] The post that the corrupt official was removed from or had held within three years before sentence;
 [b] Secretary and vice secretary stand for the secretary or vice secretary of the provincial committee of the Party, respectively;
 [c] For some cases the specific amount of RMB of bribery was not released on public media;
 [d] RMB values are in millions

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