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Literature Review

Methods and Data Sources Applied in Chinese Anti-corruption Research

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1. Introduction

1.1 What is corruption and Chinese anti-corruption after 2012

Although there lacks a uniform definition of corruption in academia (Song & Chen, 2012), corruption is characterized as the abuse of public power for private gain in general (Philp, 2006). Political corruption defined here refers to the corruption that involves political decision-makers. The types of crimes for corruption differ in different situations. However, they generally include exchanging bribes for political favors, such as local firms attempting to obtain large government contracts or subordinates pursuing higher office promotions. After the 18th National Congress of the Chinese Communist Party in 2012, Xi Jinping (the General Secretary of the CCP) pledged to crack down on both "tigers" and "flies," namely senior officials and local civil servants in corruptive cases. The CPC Central Committee is committed to the strict governance of the party. The majority of the investigated officials were suspended from office and faced allegations of bribery and authority abuse.

In order to inhibit corruption, Xi vowed to avoid extravagance and to minimize bureaucratic visits and meetings. The "Eight-point Regulation"(*Zhong yang ba xiang gui ding* 中央八項規定) lays out the detailed criteria for how government officials can improve their style of work in eight aspects. The ruling party has also made great efforts to rectify unacceptable working styles of formalism, bureaucratism, hedonism, and extravagance (*Si feng* 四風) since it was introduced in December 2012. It intends to reverse the injustice and establish institutional protection by tightening internal regulations.

According to the statistics of the Central Commission for Discipline Inspection (CCDI), during the five years from the 18th to the 19th National Congress of the Communist Party of China, a total of 440 Party members and officials at or above the province- or military-level (省軍級) and other centrally-administered officials were investigated. More than 8,900 cadres at the department- and bureau- level (廳局級), and 63,000 officials at the county and department level (縣處級) were punished (Deng, 2018). Since the 19th National Congress of the Communist Party of China, more than 70 centrally administered officials have been under investigation. From January to September 2018, the national discipline inspection and supervision organs filed 464,000 cases and sanctioned 406,000 people. Take the centrally administered officials as an example. During 2012-2017, the average number of people investigated and punished each year was 88. However, the number of people investigated and punished has dropped by about 20% in 2018 (Deng, 2018).

1.2 The importance of anti-corruption

When Xi came into power, the Communist Party was facing the worst corruption level since the founding of the government. In Xi's view, the existence of corruption will undoubtedly cause the collapse of the Party and the state (Yuen, 2014). From the Communist Party's point of view, this is a noble purpose. The Party's substantial and long-term strategic pledge is to fight corruption and promote political legitimacy, a prominent political issue of great concern to the people. In addition to saving the Party, there is another motive, namely, the consideration of centrality. Whether it is to govern the country or push ahead with reform, greater power must be concentrated. Thus, the CCP needs to combat corruption to consolidate and centralize the political power domestically. The Party's unified leadership is based on its power and a fundamental guarantee for China's economic and social growth, ethnic harmony and progress, and permanent

peace and stability. By intensifying the fight against corruption, it has the effect of strengthening and consolidating the power of the Chinese Communist Party and gaining the confidence and support of the people.

1.3 Fields of Anti-corruption Research in China

Our literature mainly focused on relevant research papers published after 2012. Based on our reviewed literature, the following literature review regarding methods in the field will be narrowed down to four research areas: perception, internal party working mechanism, economic impacts, and the role of media in China's anti-corruption efforts. For the first area, it discusses people's perception of corruption. Secondly, it introduces the structure of corrupt networks inside the party or the working mechanism. By studying the corruption patterns of officials at all levels and different professions in China and combining the current research on corruption issues, it inspires the direction of future research on corruption. Third, researchers concentrate on investigating the impacts of anti-corruption on economic growth. They analyse the economic factors in corruption activities and reveal their behavior patterns in order to enlighten the effective anti-corruption methods and measures. Besides, the role of the media in China's anti-corruption is also being studied by various scholars. They conduct research on the effects and relationships between corruption incidents and media. Limitations of traditional methods in different topics will be criticized along with discussing possible applications of the big data technology in the process. The advantages and disadvantages of computational social science will also be discussed in the following sections.

2. Traditional Methods Applied in China's Anti-corruption Research

2.1 Introduction regarding methods and data sources in the field

In studying anti-corruption in China, scholars mainly apply a purely qualitative method or a combination of qualitative and quantitative methods depending on different research topics. Purely qualitative research methods usually include observations in the fields, interviews, surveys with open-ended questions, case studies, or secondary research through existing datasets. It intends to shed light on the underlying mechanisms of some corruptive behaviors or anti-corruption efforts. Combining qualitative and quantitative methods advanced the empirical findings generated from pure qualitative research using hypothesis testing and robustness checking to establish causal inferences. The secretive nature of corruptive activities and lacking a consensus on the definition of corruption (Song and Cheng, 2012) indicate the difficulty of obtaining relevant data sources for quantitative analysis. Thus, scholars usually employ a self-compiled dataset generated from self-designed surveys, existing national or international surveys, and government documents.

With the popularization of the internet, increasing anti-corruption data published by government official websites are available for the public. As a result, more and more anti-corruption research in China adopts the big data method to conduct web-scraping as a complementary way to build up their datasets. However, it is noteworthy that big data technology is in the ascendant rather than becoming the mainstream method. Some subtle information can only be obtained through in-depth interviews or survey questions. In other words, the big data method is limited to specific research topics. Still, it has significantly broadened the research in the field of studying China's anti-corruption movement.

2.2 Gauging perceptions

Corruption perception is an important topic in terms of anti-corruption research, as it has close connections with political trust and support for the regime. The mainstream method for perception-related studies relies heavily on survey experiments, including self-conducted surveys and existing survey datasets. Song and Cheng (2012) conducted the first non-governmental cross-regional expert survey of corruption perceptions in 36 major cities in China. They identified the most vulnerable parts in the political and economic systems, thus facilitating and controlling corruption in China. Gong et al. (2015) built up an original dataset collected from two self-designed surveys regarding perceptions of corruption among university students in Hong Kong and Mainland China in 2010-2011. Li et al. (2016) also utilized a survey of 1604 randomly selected residents in Shanghai in 2008 to test the perception of anti-corruption efficacy in China. Using the self-collected dataset from the survey experiment, they conducted hypothesis testing to quantitatively examine the relationship between public trust and "sense of anti-corruption efficacy." Wu and Zhu (2016) also conducted hypothesis testing to examine the adverse effects of corruption experience on happiness and the modification effect of the general corruption environment. Instead of using a self-conducted survey, they employed the nationwide Asian Barometer Survey (ABS) in China in 2002.

Admittedly, the secretive nature of corruptive behaviors and the complex definition of corruption significantly hamper measuring people's perceptions regarding corruption-related activities. However, it is noticeable that the data generated from survey experiments, regardless of self-conducted or international ones, are significantly lagged behind the ongoing anti-corruption dynamics. All the aforementioned studies did not measure how people's perceptions changed after

Xi Jinping's recent anti-corruption efforts. Besides, the results obtained from survey experiments cannot be over-generalized. Although these surveys adopted a random sampling strategy, applying the results in other cultural settings should be cautious and rigorous. As increasing people publish their comments towards China's anti-corruption online, scholars may consider using big data technology to capture the perception dynamics through web-scraping and text analysis. The computational social science method could help scholars track changes in people's perceptions of time without geographical constraints.

2.3 Internal party working mechanism

The big data method offers little help when revealing underlying mechanisms of the party's internal working structure. Most studies in this branch adopt qualitative analysis by conducting in-depth interviews with officials applying hybrid research methods using panel data collected from surveys and government documents. A bunch of empirical research draws provincial-level panel data to investigate the impact of China's anti-corruption campaign. For example, Nie and Wang (2016) use panel data from 31 provinces from 2003 to 2014 to investigate the influence of airborne Secretaries of Discipline Inspection Commissions (SDICs) on anti-corruption efforts. Similarly, Li et al. (2017) studied the informal and formal power in China's anti-corruption campaigns by establishing panel data models on the provincial SDICs served in 30 provinces from 2000 to 2012. Gao (2017) also developed a panel data of 31 provinces between 2010 to 2015 to test whether "tigers" harbored more "flies" in the local political networks. Although data about patrol groups could be obtained from the Central Commission for Discipline Inspection (CCDI) website and provincial government websites, using big data methods may take more time than the traditional data processing method, since data grasping, and cleaning work is troublesome.

Other studies delve into the policy recommendations for anti-corruption measures by conducting textual data analysis and surveys. Both Fabre (2017) and Yong and Song (2015) employed existing surveys, CCDI's reports, secondary data from other research and statistical data from the National Bureau of Statistics to investigate current anti-corruption measures and generate policy recommendations for future efforts. Pure qualitative studies leave no room for big data approach. For example, Zhu (2012) applied a game-theoretic approach to shed light on whether severe penalties would deter corruption in China. Both Guo (2014) and Fu (2015) investigate Xi's anti-corruption campaign's political nature based on CCDI's high-level officials' speeches, historical background, and factors such as structural, institutional, and factional impacts. Chang (2018) delves into the corruption networks in the current Chinese anti-corruption campaign through a social network approach. In light of establishing the new anti-corruption institution, namely the National Supervisory Commission, Li and Wang (2019) provided insights about this new Chinese anti-corruption model based on field interviews and government reports. It is nearly impossible for a big data approach to play a role in the research, which requires no "big data".

2.4 Economic impacts of corruption and anti-corruption

The economic consequences of corruption have received extensive attention from academia. Both political scientists and economists have comprehensive discussions about how corruption affects private businesses in China. Traditionally, data sources include in-depth interviews, government publications, news from media reports, financial market databases, statistical data from government websites, and surveys. For example, Zhu and Wu (2014) utilized the results of two survey questions from the All-China Federation of Industry and Commerce (ACFIC) between 1997 and 2006 to identify how corruption has spread across industries. Although

the survey samples are relatively small, this study reveals the most corrupt sectors, such as the real estate (RE) sector. It is noteworthy that the data sources employed in the field could be mixed instead of simplex. In the study of exploring corruption predictability and private business, Zhu and Zhang (2017) used three data sources, including field interviews to explore possible channels, 2012 World Bank Enterprise Survey data of 2700 firms in 25 prefectures in China, and self-compiled data set which contains 25 municipal party committees from 2002 to 2011.

Studying corruption in the Chinese RE sector is a critical branch in the anti-corruption branch. The RE sector is one of the most vulnerable sectors in terms of corrupt behaviors. Scholars such as Zhu (2012) mainly use a qualitative method to study the Chinese RE industry's corruptive chain. On the other hand, Lu (2017) and Chen and Kung (2019) mainly use the quantitative method by gathering a massive amount of data and using an explicit causal mechanism to explore the effects of China's anti-corruption campaign on the land market. Studies in other economic sectors, such as estimating loss in the financial market because of corruption (Kim et al., 2018), corrupt collusion between companies and government officials (Hao et al., 2020), and the effect of public governance on firms' incentives to commit fraud (Zhang, 2016) grasp data from official websites and financial databases. Facing considerable amounts of online data generated in the process, relying on the traditional methodologies may be troublesome and time-consuming. The big data method has its edge in collecting a considerable amount of data in this kind of research; thus, it could be utilized as a complementary method for traditional ways.

2.5 The role of media in China’s anti-corruption efforts

The big data method may fit best in studies regarding mass media and anti-corruption efforts. It is increasingly clear that mixtures of big data and traditional research methods are anti-

corruption study trends in recent years. Before the anti-corruption campaign, studies such as Zhu et al. (2013) use traditional methods, which are ABSI's 2002 survey and a self-compiled dataset based on corruption cases reported in local Chinese newspapers in 2002 to study the relationship between different information sources and popular perceptions of corruption in China. Mo (2013) conducted a case study analysis based on major anti-corruption cases reported online since 2011 to study the media's role in China's anti-corruption and the rule of law. Tang and Narisong (2014) designed an experimental study to test how the internet influences public support in China. However, as anti-corruption data has been rapidly accumulated with increasing data published on official websites, more and more research adopt big data in this field. It is also because social media's popularization enables scholars to grasp netizens' comments online for research use. For example, both Jiang et al. (2019) and Zhu et al. (2019) use the big data method to study China's anti-corruption campaign through online resources. Technology strategies such as web-scraping, test clustering, visualization analysis, and test analysis are used as main approaches in obtaining data sources. Compared with sources generated from big data, traditional methods may fail to evaluate people's perceptions in some taboo questions regarding national leaders, corruption experiences, or political ideologies.

3. Applying computational methods in Anti-corruption Research

3.1 Background

Information is being produced and stored at an unprecedented rate, especially in China, which has highly digitized public service. It might come from *TikTok* short videos which show the life of the general public, people express their emotions on Weibo accounts, share their opinions on *douban*, call friends on cell phones, post their feelings and photographs on WeChat, and mark

their locations with GPS on phones. News outlets circulate news and information via online platforms like blogs and WeChat official accounts, these are used to post content and receive comments from their followers. The critical opinion leaders contribute their messages to the public with advertising if needed. The state council disseminates information about what their goals and requirements are, makes announcements on essential issues, and local governments inform the citizens about how they serve their citizens. Computational advances have profound influence on the devices that the general public use to live their everyday life, cloud storage makes a great impact on how data is stored, and unprecedented methodology to analyze extensive collections. The results are the most immense and the most informative datasets in the history of China.

Big data helps researchers to learn about quantities that were untouchable in the past. The opportunity for fact-descriptive inference creates the chance for researchers who focus on China anti-corruption topics to ask causal questions and create new theories that previously would have been impossible (Zhu et al. 2019). The researchers know how people react when corruption exists because their digital traces were left behind on the internet. Furthermore, when paired with experiments or proper research designs, "big data" can result in data-driven answers to controversial questions. Moreover, combining the social scientists' research experience and mindset makes the utility of datasets more influential.

3.2 Advantages

3.2.1 Reaping benefit from abundant data available

The anti-corruption data has accumulated rapidly along with the CCP's continuous moving forward to combat corruptive activities. Increasing data published in different years and various

regions are now available on various official websites. As a result, more regularity and correlations have appeared thereupon. It is limited for the traditional data processing technology to grasp the data's overall characteristics and the developing trend, let alone discovering the regularity of data (Jiang et al. 2019). Big data could help to show heterogeneity, which is relatively challenging for smaller datasets to obtain. The fast-paced development of data sources calls for new technologies. Big data technologies have been applied in many research fields to counter several defects of conventional methodologies. The advancement of technology enables big data methodology to research news, network, official information regarding China's clean government and anti-corruption (Jiang et al. 2019). Existing research on political support analyzes data collected via self-designed surveys and independent interviews. The big-data approach can increase the number of respondents and types of observations and variables available for analysis momentously (Grimmer 2015).

3.2.2 Tackling taboos in traditional methods and increasing credibility

Zhu et al. (2019) utilize the big data approach to learn the social reactions to China's anti-corruption campaign by collecting netizens' comments online. The data source is obtained through web-scraping techniques from five popular websites (Sina, Sohu, Tencent, Phoenix, and Caixin) between 2012 and 2015 following the downfall of "big tigers" (i.e., officials at or above the vice provincial level). The researchers then analyzed netizens' comments to examine theories describing possible public endorsements for different CCP party leaders and various political sectors, including the legal system. Zhu et al. (2019) pointed out that the online comments enable assessment of perceptions on the ruling party and state leaders from the grassroots during the nationwide anti-corruption campaign, as these questions remain a taboo in public surveys.

The big-data approach intensity the source reliability of answers regarding respondents' political endorsement and stands in authoritarian China during independent interviews and public surveys (Zhu et al. 2019). It provided opportunities to review down-to-earth opinions and reactions towards anti-corruption campaigns in the era of Xi because netizens in China enjoy a relatively more considerable extent of "freedom of speech" on the internet (Zhu et al. 2019). However, we can see that their freedom has been limited in the past few years. Finally, netizens bear particular points of view compared with the official. Their various virtual protests show latent social mobilize capacity in an authoritarian political environment. They can be regarded as "critical citizens" because they are active on the internet, eager to spend hours surfing the web to be better informed, and their high acceptability towards different opinions like skepticism, as shown in the Arab Spring protests (Lynch 2012; Norris 1999).

3.2.3 Replicability and persistency

Existing research on political endorsement mainly analyzes data collected through surveys and interviews. Even though they have various strong points, they are time-consuming and fail to reach a wider public opinion diversity. Instead, the big data approach could help scholars understand how laypeople respond to the anti-corruption campaign initiated by Xi by techniques such as web-scraping and test analysis for online comments. It can also predict whether the general public altered their attitudes before new anti-corruption policies became the talk of town. The traditional methods such as surveys, however, cannot make predictions by using pre-anti-corruption campaign information.

Besides, the big data approach plays an important role in increasing not only the amount and types of observations, but also new variables for further analysis (Grimmer, 2015). For

example, compared with a single exploration on one anti-corruption campaign, the big data method could track the ongoing process persistently. Thus, it could help to shed light on the anti-corruption dynamics. In the study employed big data methods by Zhu et al. (2019), more than 370,000 online comments were collected. This integrally large amount of data is not feasible to obtain via conventional survey studies. Other scholars could replicate the outcome by using the same datasets to check the robustness of the conclusions. Future research could also trace the changes as long as the websites and database still allow access to the pages.

Admittedly, the methodology alone is inadequate to conclude sound causal inferences, and there are several limitations for it (Jiang et al. 2019). However, having as much data as possible can help social scientists infer causal relations using massive datasets (Grimmer 2015). Big data technology is still developing. It also has practicality for collaboration with different research groups in integrity and anti-corruption by related network information to mutually share their data (Jiang et al. 2019).

3.3 Limitations

Scholars are usually limited to several research topics when using computational social science methods and data in Anti-corruption Research. Popular topics include the real estate industry, corporate, and stock market, as these types of data are easier to get online. There are several open databases and access to online data targeting these aspects, allowing scholars to collect and manipulate the data in these limited research topics. Chen and Kung (2019) have done an anti-corruption investigation using the financial market and stock market data. Most of the data used are collected from the WIND database and China Stock Market & Accounting Research (CSMAR). They could apply the big data method to identify princeling firms as land transaction

data could be traced back easily through online platforms and databases such as "A Million Transactions." Lu (2017) used the information collected from China's land website to analyze residential land sales during the anti-corruption campaign. However, for some topics such as media, information is relatively restricted as the state tightly controls the mass media. Thus, analyzing the sensitive topics from collected data from mainstream media in China may not be sufficient and may not reflect the real situation. Li et al. (2017) investigated the power of the government officials in an anti-corruption agency and the impact on the effectiveness of China's anti-corruption campaign by using linear panel data models with various control variables. These kinds of topics are less suitable for big data technologies since the data is hard to grasp. Netizens may not fully express their opinions or emotions using mainstream media when related to high power government officials. As the media was controlled and monitored by the state, online opinions expressed during the event period can threaten netizens' real lives. Mo (2013) has researched mass media by using a case study. Independent studies on significant cases of anti-corruption reported nationwide on the internet were done. Although Big data could be collected through social media, it was hard to utilize big data in this research topic due to China's unique social media system and culture.

Moreover, the unique social media culture could lead to insufficient data to do complex models for some topics. Zhang (2016) studies the effect of public governance on a firm's incentive on committing fraud. The model he used required rich and sufficient data that is enough to support his research. Limitation on China's social media causes loss of data that might not support complex models and theories. Scholars had limited control and knowledge over what was included in the social media dataset. It may limit the analysis, the topics, or change the original question that the scholars were trying to answer.

Lack of theoretical basis is another shortcoming for using computational methods and data. Building a computational model requires scholars to make many reasonable assumptions to fill in the gaps between real-life situations and simulation's language. Sometimes, it is challenging to fit in existing data with theories to demonstrate a reasonable and straightforward assumption. Solely relying on big data would be insufficient in this case. Zhu and Zhang (2017) argue that corruption predictability is a crucial factor determining corruption's effects and is remarkably affected by government leadership stability. The paper only identified informal institutions that did not identify direct measures of corruption predictability. Compared to consolidated liberal democracies, the theoretical frameworks apply more to countries with centralized corruption.

Moreover, there may be a lack of theoretical basis or an overly broad attempt to make meaningful inferences about the relationships and effects implied in the study. Fabre (2017) demonstrates that China's anti-corruption campaign aims to break down the walls of vested interest groups and maintain the status quo of anti-redistribution by the authority of stability and is used to eliminate the president's political rivals. Textual data analysis was used to look for relevance and patterns in words and concepts. However, the flawed theories using computational social science data and methods might lower the persuasiveness and credibility of explaining the anti-corruption campaign's reasons and incentives behind.

Machine learning and big data analytics may generate the illusion that these methods and data can provide a way to show the causal inference of complex relationships. However, it should be acknowledged that one of the limitations of social science computational methods is that they are not capable of revealing causal relations. These computational methods can indeed show us a lot of beautiful data visualization and graphs. However, as mentioned above, these methods and

data lack a theoretical basis, thus not proving a meaningful inference about the relationships. Zhu (2012) discusses the ineffective deterrence of corruption by using a game-theoretic approach instead of using a big data approach. The research finds three critical criteria to deter corruption by forming a corruption-investigation game based on Tsebelis's crimes and sanctions model, namely increasing the penalty, promoting incentives for the investigator, and maintaining enough proportion of officials' incentives to break down corruption. In using computational methods, it would be rather useless to help with proofing the causal relations as it can only show the relations but not providing evidence for the incentives behind. Besides, in the world of social network analysis, Zhu, Huang, and Zhang (2019) use data-driven methods to examine the effect of campaign-style anti-corruption efforts on political support. The big data approaches used are web-scraping and text analysis, using a regression model to test the result. Big data has the potential to discover valued insights and information. As large datasets usually are without a clear relationship and structure, using the big data approach may place less emphasis on theory framing. This shortage leads to limited usage for causal inferences, especially in predictive and prescriptive analytics, which is carried out to determine the analytic results' cause and effect.

4. Conclusion

In summary, the emergence and application of big data methods, to a certain extent, can help to elucidate the complexity and particularity of political phenomena. It brings profound and rich insights to the Chinese political researchers and provides stronger persuasive powers for their theories. Different scholars have used big data methods to make reasonable political communication attempts, internet politics, and analytical method innovation. The big data approach revolutionizes the existing models of data acquisition and management in political

science research. It makes it possible to get comprehensive data quickly and easily instead of sampling it, further broadening the definition of data in traditional politics. Structured data such as historical text, social media, multimedia, unstructured data, and relational data can be studied. Also, the application of big data methods to political science study has dramatically broadened the academic boundaries and social values of political science.

However, it is also noteworthy that big data techniques could only function as a complementary tool instead of mainstream methods in studying Chinese anti-corruption politics and corruptive behavior. The nature of secretness and the increasing complex evolution of corruption put a damper on applying the big data method, as some mechanisms can only be revealed through qualitative methods such as in-depth interviews. Hence, combining the big data techniques with traditional research methods could bring scholars in the field of Chinese anti-corruption new opportunities in the internet era.

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