

Starving and Deceiving? How Disasters Reshape Politicians' Incentives to Lie

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Abstract

How do disasters reshape politicians' incentives to lie? Using a natural experiment during 1959-1961 in China, the paper empirically identifies and tests the impacts of famine exposure on local politicians' incentives to lie about economic performances. We measure such lies by quantifying GDP manipulation through machine learning XGBoost techniques, then use a difference-in-differences approach to show that leaders who experienced famine in childhood are less likely to lie. To identify the underlying mechanism, we utilize the World Values Survey (WVS) data to reveal that disasters make famine-exposed individuals more risk-averse, thus more reluctant to lie.

Keywords: Famine, Lies, Politicians, GDP Manipulation

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The honesty of leaders is appreciated as a crucial virtue—across time, institutions, and civilizations, from Cicero (“*Where is there dignity unless there is honesty?*”) to Edward Sandys (“*Honesty is the best policy.*”). Conversely, if leaders lie, these lies can be highly detrimental to public interests: they can disrupt the formation of public expectations and convey incorrect information that the public is forced to rely upon (Callander and Wilkie, 2007; Marro, 1985). Lying to the public is a risky maneuver for a politician because the discovery of the lie may lead to social unrest and even to civil strife. Consequently, knowing why politicians lie would help to better protect public interests. Existing literature suggests that exposure to disaster can drastically reshape behaviors at individual levels (Brooke et al., 2015; Lonigan et al., 1991; Shore et al., 1986; Yuriko et al., 2017). However, it remains largely unknown whether the exposure to disaster affects public servants’ propensity to lie. Such knowledge is veiled by two challenges: First, lies are hard to quantify and to analyze empirically. Second, establishing the causality between disasters and lying requires clean identification. This paper confronts these two challenges in context of China by means of the country’s unique institutional organization structure, where the measurement problem of lies is solved by estimating the fraudulent GDP manipulation of local officials, and the identification problem is solved by referring to a natural experiment, namely, the great famine in China (1959-1961).

The great famine induced by the Great Leap Forward campaign in China caused more than 17 million lost lives nationwide during 1959-1961, marking the tragedy as one of the biggest famines of human history (Kung and Chen, 2011). Some of the children who suffered in the famine but survived to serve as county-level leaders in later years. We collect their personal information, among 5,383 county-level leaders in 2,161 counties in China, from 2000-2013, which provides a unique opportunity to cross-compare how their behavior in public offices were influenced by their childhood famine exposures. Meanwhile, the top-down personnel control in China promotes public officials based upon an evaluation of local economic performance (Li and Zhou, 2005). Substantial career incentives thus stimulate local officials to inflate local GDP

figures either through developing the economy, or through manipulating the performance data (Charbonneau and Bellavance, 2012). To quantify politicians' lies, we use novel XGBoost machine learning techniques to recover the true values of local GDP from a series of less manipulable indices, such as night light intensities and air pollution, and compare with the reported values to determine the degree of manipulation. By linking public officials' identities with the severity of their exposure to famine in childhood, we use a difference-in-differences approach to investigate the effect of exposure on their predisposal to lie in reporting GDP figures.

Our reduced form result shows that public officials with childhood (0-6 years) exposure to the great famine of 1959-1961 are 4.2% less manipulative in local GDP calculations, and the reduction in manipulation is more significant for public officials whose hometowns were more heavily struck by the disaster. Moreover, the effect is more substantial for officials who were younger during the great famine, with the magnitude shrinking as the age grows. This is consistent with the existing literature that early year experiences have more profound long-term impacts (Adhvaryu et al., 2018; 2019; Maccini and Yang, 2009; Malmendier and Nagel, 2011; Sviatschi, 2018). We further conduct a series of robustness checks to validate the baseline results and show that famine exposures *reshape* public servants' attitudes toward lying, instead of *selecting* a few conservative or honest individuals.

Next, we explore the mechanism that restrains GDP manipulation. Psychological and medical literature point to the exposure to negative experience—famine, in our context—that leads individuals to become increasingly risk-averse. Given the high stake of GDP manipulation, we conjecture that famine exposures altered officials' risk preferences, which in turn made them more reluctant to lie. Since the officials' risk preferences are not readily available, we utilize the World Values Survey (WVS) data to test a similar group of famine-exposed individuals and show that they are indeed more risk-averse than the non-exposed, even as they share similar personal traits in other social preferences such as altruism, trust, social network, happiness, and time preferences. This suggests that the changes in risk preferences may be the reason for

restraint on the motivation to lie.

This paper deepens our understanding of the long-term impacts of disasters. Recent literature has studied the change of physical and mental conditions of individuals after tsunamis, hurricanes, wars, and financial crises (Almond et al., 2010; Chen and Zhou, 2007; Currie and Vogl, 2013; Kesternich et al., 2014); of labor market performance and human capital (Alderman et al., 2001; Belasen and Polachek, 2008; Currie et al., 2010; Ewing et al., 2009; Handa and Peterman, 2007; Oreopoulos et al., 2008); and of risk preferences (Becchetti et al., 2017; Brown et al., 2018; Callen, 2015; Eckel et al., 2009; Guiso et al., 2018; Kim and Lee, 2014). Our work contributes to this strand of research in two fronts. First, compared to many of the long-term shocks reported in the literature, the famine exposure lasted for three years, which enables us to capture better the changes in individual behavior patterns and underlying preferences.² Second, most existing studies focus on the behavior of individuals, regardless of their occupational externality. In this paper, we focus on a homogenous group with large social externalities—the public servants. We find that childhood exposure to disasters has persistent effects in shaping the risk preferences and, moreover, the public servants’ policy preferences.³ Furthermore, this paper provides an additional channel of disasters’ influence on economic development,⁴ namely, that disasters reshape economic development by altering the risk preferences and, therefore, the policy preferences of future policymakers.

More broadly, we locate the paper in the literature of political selection. Existing explanations of bureaucratic behavior are confined largely to the discussions of institutions, such as elections in democracies (Alesina and Rodrik, 1994; Besley and

² For instance, Cassar et al. (2017) employ the Indian Ocean tsunami in 2004 as a natural experiment; Hanaoka et al. (2018) study the Great East Japan Earthquake in 2008. The disasters in these studies lasted for a few days, and the impacts were restricted to specific regions within a country. As comparison, the great famine lasted for three years, and had profound impact all across China, which allows us to study regional and temporal variations.

³ The sample of officials features another unique advantage, compared to individual samples: the political selection process in China is highly meritocratic, thus the selected officials are often homogenous in competence and cognitive abilities. Therefore, omitted variable bias is less of a concern.

⁴ Existing channels include: 1. Natural disasters resulted in direct political and institutional changes, which consequently led to economic development (Belloc et al., 2016; Cavallo et al., 2003); 2. Natural disasters are perceived as punishments from the God, thus triggering socioeconomic changes in theocracies (Skidmore and Toya, 2002).

Case, 1995; Besley et al., 2010; Ferraz and Finan, 2011; Levitt, 1997) or promotions in non-democracies (Li and Zhou, 2005; Lü and Landry, 2018). Recently, research has begun to focus on the impact of individual characteristics on political actions, such as gender (Ban and Rao, 2008; Chattopadhyay and Duflo, 2004), education and human capital (Besley et al., 2005; He and Wang, 2017), and competence (Chen et al., 2005; Xi et al., 2018; Yao and Zhang, 2015).⁵ This paper delves into the discussion by exploring how varied individual risk preferences may serve as a novel perspective to explain bureaucrats' actions.

I. Background

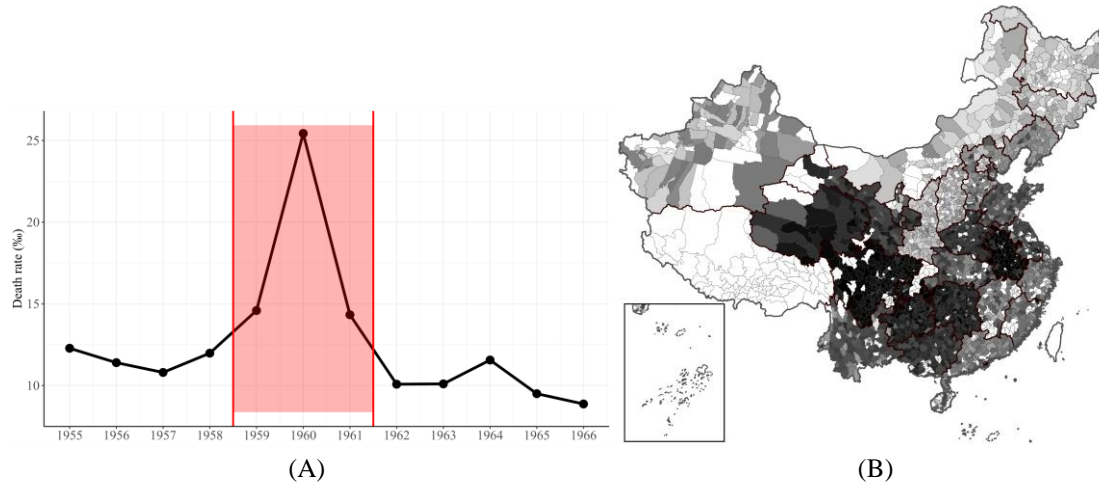
A. *The Great Famine, 1959-1961*

The 1959-1961 famine in China was one of the most severe famines in human history (Kung and Chen, 2011). Scholars estimate total mortality at 17 million to 45 million over these three years.⁶ Chronologically, the famine started in 1959, with annualized mortality rates of 14.60‰, which was 3.10‰ more than the average mortality rate during 1955-57 (11.49‰). The mortality rate peaked at more than 25‰, and started to decline since 1961 and returned to normal beginning in 1962. Panel A in Figure 1 depicts the mortality rate dynamics in China from 1955 to 1966. Panel B, in addition, depicts the regional variation of famine severity between 1959 and 1961: the most damaged regions were mid-China provinces. Anhui, one of the most severely hit regions, had a mortality rate of 56.87‰ in 1960, whereas northeastern provinces were less affected: The mortality rate of Liaoning province in the same year amounted to

⁵ Similar with political selection, the management literature shares the emphasis of personal features of leaders. Benmelech and Frydman (2015), Bernile et al. (2017), Cronqvist and Yu (2017) and Sunder et al. (2017) investigate CEO experience in the military, piloting planes, raising daughters, and surviving disasters, respectively, in order to reveal the impact of personal experience on corporate behaviors. All the results confirm the significance of personal experience, especially early-year experience on behaviors. It thus reiterates the urge to conduct similar analysis in political economy setups.

⁶ Jiang and Li (1988, 1996) estimated abnormal death of 17 million. Due to the governmental background of the authors, this was commonly regarded as a lower bound of the population loss. Other notable estimations include: 23 million from Peng (1987), 27 million from Coale (1981), 29.5 million from Ashton et al. (1984), 32.46 million from Cao (2005a; b), and 45 million from Dikotter (2010).

2.23%, which was only 4% of Anhui's. The significant regional variation enables us to investigate the impacts of famine exposures empirically.



Panel A: Mortality Rates; Panel B: Regional Distribution

Source: Department of Comprehensive Statistics, National Bureau of Statistics of China (1990)

Figure 1. Impacts of the famine, 1955-1966.

B. China's GDP Reliability and Manipulation

There have been longstanding doubts concerning of statistics credibility in China, from environmental protection (Andrews, 2008; Chen et al., 2012; Ghanem and Zhang, 2014), and mining accidents (Fisman and Wang, 2017), to pricing indices (Young, 2003). Given the size of the Chinese economy, it is no surprise that the spotlight is on the credibility of the GDP accounts (Chen et al., 2019; Clark et al., 2019; 2002; Holtz, 2014; Morris and Zhang, 2018; Rawski, 2001). The institutional design of the statistics system in China leaves room for GDP manipulations. The local statistical bureau is *de jure* a subsidiary of the National Bureau of Statistics, but is under *de facto* supervision of the local government. Moreover, the personnel decisions of the local statistical bureaus (e.g., evaluations and promotions) and their budgets are determined by local government leaders (Chen et al., 2020a; Chen et al., 2020b). Meanwhile, all published numbers are subject to approval by local leaders, especially by party secretaries (Pan and An, 2003). Given the promising career prospects and the loopholes in the institutional design, local leaders have both the incentives and the capacity to manipulate GDP reports.

Existing research has explored various approaches to confirm bias in GDP reports.⁷ For instance, one such approach has observed discontinuity in terms of the distribution of GDP growth rate reports around growth targets and jump-ups where reported figures surpass their targets.⁸ We depict such discontinuity in the online appendix Figure B1 and further show that such discontinuity disappears if we manually increase or decrease GDP targets by 0.1%.⁹ Incidents of GDP manipulation are also revealed in reality. In 2015, a county party secretary forced a local private enterprise to over-report revenue from 200 million RMB to 800 million RMB (Xinhua Net, 2015). Furthermore, in early 2018, the provinces of Liaoning, Inner Mongolia, and Tianjin admitted over-reporting GDP in past years by 25% to 33%, respectively (People's Daily, 2018b; Xinhua Net, 2018). The severity and prevalence of GDP manipulation thus provide a unique opportunity to develop a metric of political lies.

II. Data

A. Data of County Party Secretaries

We collect the data of county party secretaries from yearbooks and *Baidu Baike*, the largest search engine in China and one of the most widely used sources for official information. Specifically, we first collect the names of the party secretaries in office during 2000-2013 from provincial and prefectural yearbooks and then search for their vitae in *Baidu Baike* to eventually construct the panel that covers 5,383 county party secretaries in 2,161 counties from 2000 to 2013.

Our main independent variable is the childhood exposure to famine for the county party secretaries. To construct the variable, we first classify the age range to identify

⁷ Among the studies, Clark et al. (2017) believe GDP in China is under-estimated, while Holz (2014), Keidel (2001), Maddison (2001; 2007), Mehrotra and Pääkkönen (2011), Morris and Zhang (2018), and Rawski (2001; 2002) believe that GDP in China is over-estimated.

⁸ The discontinuity in GDP is not unique. Chen et al. (2012) and Ghanem and Zhang (2014) find that once Air Pollution Index (API) are included in the evaluation, similar discontinuity also features around the target, which suggests the wide existence of data manipulation.

⁹ An alternative explanation of such discontinuity points to objective management, as often seen in corporations, especially for revenue management. However, such micro-management techniques are often overly complicated in governments, where GDP data consist of various industries and numerous firms in each industry.

whether they experienced the famine in their childhood. Specifically, we define 0-6 years as the childhood of an individual, which is a critical stage for child development (Belsky et al., 1991; Nelson, 1993; Stern, 2017). Next, we define childhood famine exposure as whether an individual's childhood intersected with the 1959-1961 famine period. We further refer to regional-specific famine excess mortality rates to approximate the severity of the famine. The excess mortality rate is calculated in two steps: First, based on birth cohort information acquired from the 1990 census data, we use non-famine cohorts to interpolate counterfactual birth cohort sizes of 1959-1961; second, we calculate the difference between the factual cohort sizes and the interpolated sizes, thus the excess mortality rate (per Meng et al., 2015).

B. GDP Manipulation

Our main dependent variable is GDP manipulation, defined as the difference between reported GDP and true GDP. Data of reported GDP are retrieved from various yearbooks. Meanwhile, we recover the true GDP by utilizing the night light and air pollution satellite data, with a machine learning XGBoost technique. Night light and air pollution data are highly correlated with economic activity and can hardly be manipulated; thus, these data are widely used to predict and recover true GDP records (Fowlie et al., 2019; Henderson et al., 2012; Morris and Zhang, 2018; Pinkovskiy et al., 2016). The method allows us to predict each county's true GDP in the corresponding years and calculate the degree of GDP manipulation, respectively.¹⁰ Moreover, XGBoost outperforms traditional econometric methods because of its superior predictive power (Chen et al., 2019; Erel et al., 2018).¹¹

We also collect the personal information of officials as control variables, which include age, gender, years of education, tenure year, and counties' socioeconomic

¹⁰ We justify the credibility of our estimates through three avenues. First, we show that the estimated manipulations are all positive when reported GDP are greater than the targets, and oscillate around zero otherwise. Second, our predictions are consistent with the revealed cases of manipulation. Third, our machine-learning-based estimates are also comparable to the night-light-based Henderson estimates. Illustrations of all the three justifications are included in the online appendix A.

¹¹ It is a Scalable Tree Boosting System, which uses the sum of multiple tree regressions as predictions (Chen and Guestrin, 2016). We include the details of the practice in appendix A.

characteristics such as population and GDP. We include the descriptive data summary in Table 1 below.

Table 1. *Summary Statistics*

| Variables | Observations | Mean | SD | Min | Max |
|---------------------------|--------------|-------|-------|--------|-------|
| GDP manipulation | 5383 | 0.012 | 0.137 | -0.380 | 0.598 |
| Famine severity | 5383 | 0.397 | 0.132 | -0.009 | 0.862 |
| Birth year | 5383 | 1960 | 4.996 | 1942 | 1980 |
| Famine exposure | 5383 | 0.474 | 0.499 | 0 | 1 |
| Birth place hit by famine | 5383 | 0.469 | 0.499 | 0 | 1 |
| Gender | 5378 | 0.077 | 0.267 | 0 | 1 |
| Education level | 5080 | 5.428 | 0.716 | 2 | 8 |
| Local origin | 14892 | 0.141 | 0.348 | 0 | 1 |
| Office Tenure | 14892 | 2.377 | 1.541 | 1 | 14 |

III. Results

A. Empirical Strategy

We use a difference-in-differences approach to identify the impact of famine exposure on officials' GDP manipulative maneuvering. The approach utilizes the variations in the birth years and birthplaces of officials. First, by eliciting the differences in birth years, we compare and contrast officials based on whether they had childhood famine exposure. However, the simple comparison may elicit consequences beyond the famine, such as age-specific policy preferences. Therefore, we investigate birthplace variations, which calculate the differences between officials with and without childhood famine exposure in regions mildly hit by the famine and compare these with the differences between the two groups of officials in heavily-hit regions. The difference in such differences constitutes the causal effect of the famine. Specifically, our empirical strategy is summarized in the following equation, where i represents an official, c represents the birthplace, y measures the degree of GDP manipulation in office, and X is a series of controls. β is the coefficient of interest, which captures the impact of

famine exposure.

$$y_i = \alpha + \beta \text{Childhood}_i \times \text{Severity}_c + \gamma X_i + \varepsilon_i \quad (1)$$

B. *Famine Exposure and GDP Manipulation: Baseline*

We report our baseline results in Table 2. The first column presents the result with birth year and birthplace fixed effects. Indeed, we find a negative effect of famine exposure on GDP manipulation. In our sample horizon, officials with famine exposure are usually older. Therefore we add, in Column 2, the age in office to control age-specific risk preferences (per Greenwood and Nagel, 2009; Malmendier and Nagel, 2011). The negative impact of famine exposure remains robust. In Column 3, we further control gender and education level. In Column 4, we introduce provincial-level time trends to control for the unobservable time-varying factors at the provincial level. The negative impact of famine exposure remains robust in both specifications. Furthermore, mass political movements may reshape public beliefs and risk preferences (Costa-Font and Nicińska, 2019). We thus include an interaction term between political radicalism¹² and famine in Column 5, and show a limited correlation between political radicalism and GDP manipulation, while the impact of famine exposure remains significant. To cross-validate the credibility of our GDP manipulation estimates, we further adopt, in Column 6, the night light estimation to proxy GDP manipulation, as in Henderson et al. (2012). The result remains robust.

¹² We follow Kung and Chen (2011) to use the count of “high-yield agricultural satellites” to proxy for political radicalism. The term is used commonly by mainstream Chinese media to describe agricultural production breakthroughs, which are often boasts of non-existent harvests reported by mainstream newspapers such as the People’s Daily (Ashton et al., 1984; Bernstein, 1984; Liang, 2003; Lu, 2008; Xie, 1990). We collect 658 records of such pseudo-achievements in the People’s Daily from August, 1958 to February, 1962.

Table 2. Baseline Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Manipulation | Manipulation | Manipulation | Manipulation | Manipulation | Night Light |
| Famine | -0.035 (0.011) | -0.034 (0.011) | -0.033 (0.011) | -0.040 (0.013) | -0.036 (0.019) | -0.013 (0.008) |
| Age | | 0.002 (0.001) | 0.002 (0.001) | 0.002 (0.001) | 0.002 (0.001) | 0.004 (0.001) |
| Female | | | -0.020 (0.013) | -0.021 (0.014) | -0.019 (0.014) | 0.007 (0.010) |
| Education | | | 0.003 (0.004) | 0.002 (0.004) | 0.002 (0.004) | -0.001 (0.003) |
| Famine* | | | | | -0.008 | |
| Political Radicalism | | | | | (0.022) | |
| Observation | 5,383 | 5,383 | 5,076 | 5,076 | 5,076 | 674 |
| Birthplace FE | YES | YES | YES | YES | YES | YES |
| Birthyear FE | YES | YES | YES | YES | YES | YES |
| Time Trend | NO | NO | NO | YES | YES | YES |

Next, we explore the variations of the famine impacts across birth cohorts and regions. First, we break down the *Childhood* dummy into a continuous variable based on the year of birth and conduct a parallel trend test to estimate the year-by-year impact on each birth cohort. As shown in Figure 2, we find that famine had insignificant effects on cohorts born after 1962 since the entire cohort had no famine exposure. Meanwhile, the negative impacts for cohorts born before 1960 were converging to zero as birth years traced back since older officials tend to be more mature and, thus, had more stable and consistent risk preferences during the famine (Sahm, 2007; Stigler and Becker, 1977). Interestingly, there is a significant bounce from the 1961 cohort to the 1962 cohort. While it illustrates the impact of famine exposure vividly, it also suggests that even a famine exposure in a mother’s womb can change a child’s future behavior, echoing Currie and Vogl (2013).¹³

¹³ This finding also echoes the literature on fetal origin hypothesis (Almond and Currie, 2011; Cronqvist et al., 2015). The fetal origin hypothesis refer to early life experiences such as nutrition conditions and diseases, may have long-run effects on health and well-being. Our finding extends the hypothesis to show that early life experiences may further reshape truth-telling behaviors.



Figure 2. Age and the impacts of famine.

Relatedly, we extend the *severity* variable into the ten percentiles to investigate the heterogeneous effects of famine severity across regions. Figure B2 in the Online Appendix find that moderate famine exposures had limited impact on officials' behavior, while severe famine exposures substantially restrained officials' incentives to lie. Combining the temporal and regional variation analysis, we find that famine exposure restrained lying more effectively when such exposure is more severe, which is consistent with previous studies on disaster exposure (e.g., Kim and Lee, 2014).¹⁴

C. Robustness Checks

We conduct four robustness checks and provide the details in the online appendix. The first check speaks to an alternative explanation that individuals with certain pre-

¹⁴ Relatedly, if the lying incentives are driven by career concerns, we expect officials to over-report GDP data. Consistent with the performance-based promotion schemes in China incentivize over-reports (Li and Zhou 2005, Xu 2011), we show that officials with famine exposure tend to restrain from over-, instead of under-reports (Appendix Table B1).

determined behavior, such as risk-tolerance, may manifest survival bias in the great famine and that the disaster *selects* risk-averse individuals to survive, instead of changing their behavior patterns.¹⁵ To rule out such selection effect, we narrow down our sample to include only the cohorts who were more than 6 years old when the famine hit. The narrowed sample features individuals with more stabilized behavior patterns such as patterns of risk preference and who are thus more likely to be influenced by the selection effect other than a change of preferences. We find no significant results in the older cohorts, thus invalidating the selection effect (online appendix Figure B3).

The second check deals with prediction noise. A machine-learning-based algorithm may produce accurate predictions for samples close to the mean but may feature notable errors for samples at extreme values. We thus use a concentrated sample which takes 200 and 250 sample points from the two sides of the cut-off, and replicate our baseline result. Our baseline result remains robust in the concentrated sample, which suggests that our results are not driven by prediction errors (online appendix Table B2).

The third check introduces additional controls on socioeconomic determinants to reduce the omitted variable bias. Our baseline result remains robust after controlling for local GDP, local population, whether the officials are new to the office, their tenure, and whether they are closer the years before retirement. We find that officials are more likely to lie in their first year in office (online appendix Table B3). This echoes consistently with the existing literature, as these are the officials with greater career concerns (Li and Zhou, 2005; Ferraz and Finan, 2011).

Lastly, we exercise a falsification test to confirm that our causal effect is not the consequence of spurious correlations due to noise or luck: by the random relocation of officials' birthplace, we see no significant results of our coefficient of interest and confirm the non-significant results in 1,000, 3,000, 5,000, and 10,000 random trials (online appendix Figure B4).

¹⁵ The bias can be positive or negative. For example, risk-loving people may try various risky ways to get food and survive the famine, so those survivors can be more risk-loving. On the other hand, the ways that risk-loving people did may be illegal and they could get punished, so survivors can be risk-averse.

IV. Mechanism

We believe the mechanism that prevents disaster-exposed politicians from lying is rooted in changes in individual risk preferences. Among existing studies, many have observed that disasters reshaped individuals to increase their aversion to risk and that such reshaping is persistent over time (van den Berg et al., 2009; Callen et al., 2014; Kim and Lee, 2014; Becchetti et al., 2017; Cassar et al., 2017; Brown et al., 2018; Guiso et al., 2018). Relatedly, a large psychology literature has pointed out that negative shocks in early life such as fear, rage, and helplessness may trigger an emotional excitement overload in the nervous system, leading to long-term risk aversion (Freud, 1957 [1915]; 1933; Hunt, 1979; Lerner et al., 2003). In addition to emotional responses to negative experiences, medical research also suggests negative shocks during childhood influence biological and genetic development, which in turn influences individuals' risk preferences (Fox et al., 2010; Labonté et al., 2012; Mehta et al., 2013). Consequently, we conjecture that being exposed to one of the largest famines in human history may make the officials more risk-averse and, thus, more reluctant to lie.

As the preference profiles of the officials are private information, a direct test of the mechanism remains difficult. As a substitute, we employ the World Value Survey (WVS) data, which features a series of measures of individual preferences and mindsets¹⁶ that lead to lying. In addition to risk preferences, other preferences include altruism, trust, social network, happiness, and time preferences. In particular, time preferences are measured by the patience to make long-term investments, such as expenditures on education, science and technology, public health, and social welfare. With the menu of preferences, we can not only investigate the impact of famine exposure but also compare it with those of other preferences using a similar design to our baseline analysis. To rule out the systematic differences between the WVS sample

¹⁶ Specifically, Li et al. (2010) and Xu and Li (2016) find that people become more altruistic and cooperative after disasters. Bellows and Miguel (2009), Cassar et al. (2011; 2013), Nock (1982) believe negative experience may influence trust to others. Time preference (Callen, 2015), social network (Belsky et al., 1991; Chen and Yang, 2018) and happiness (Adhvaryu et al., 2019) may also be influenced by disasters.

and our officials' data, we compare several important covariates between the two datasets and control factors with systematic differences, such as educational levels.¹⁷

Table 3 estimates the effects of famine experiences on individuals' preferences and social and psychological factors, based on the WVS data. First, we provide confirmative evidence in Column 1 that famine exposure lowers individual risk preferences. Second, we find no evidence that other preferences such as altruism, trust, social network, or happiness are altered by the famine (Column 2-5). Consequently, our baseline results are not driven by these alternate preferences. To further address the potential systematic differences between officials and the general public, we conduct a propensity score weighting method (Hirano and Imbens, 2001; Hirano et al., 2003). The results are robust. In Columns 6-10, we show that the famine experiences did not change people's long-term investment patterns and, thus, did not change their time preferences.¹⁸

¹⁷ The comparison can be found in online appendix Figure B5.

¹⁸ Existing literature also points out that disaster exposure may lead decision makers to be more ambiguous (Wakker, 2010, p. 354). In particular, a famine-exposed official may randomly select a GDP figure to report. We can rule out such ambiguity since our finding shows consistently the restrained manipulation of GDP reports.

Table 3. *Famine and Preferences*

| | (1) | (2) | (3) | (4) | (5) |
|----------------------|-----------------------------|---|------------------------------------|----------------------------------|-------------------|
| | Risk Preference | Altruism | Trust | Social Network | Happiness |
| Famine | -0.689 (0.283) | -0.005 (0.012) | 0.029 (0.040) | 0.091 (0.063) | -0.075 (0.158) |
| Age | -0.053 (0.135) | 0.014 (0.003) | 0.007 (0.003) | | -0.013 (0.015) |
| Education | 0.045 (0.033) | 0.005 (0.001) | 0.008 (0.002) | -0.003 (0.003) | 0.042 (0.011) |
| Income | -0.042 (0.053) | -0.002 (0.004) | 0.020 (0.010) | -0.021 (0.016) | 0.613 (0.038) |
| Observations | 1409 | 5823 | 5572 | 866 | 5741 |
| Fixed Effects | YES | YES | YES | YES | YES |
| | (6) | (7) | (8) | (9) | (10) |
| | Expenditure on Education | Expenditure on Science and Technology | Expenditure on Public Health | Expenditure on Social Welfare | Corruption |
| Famine | -0.009 (0.025) | -0.202 (0.196) | -0.048 (0.070) | -0.139 (0.087) | -0.018 (0.025) |
| Log (GDP) | 0.188 (0.028) | 0.419 (0.112) | 0.096 (0.048) | 0.071 (0.065) | 0.001 (0.017) |
| Female | 0.071 (0.057) | -0.300 (0.228) | -0.103 (0.078) | -0.012 (0.101) | -0.016 (0.032) |
| Education | 0.004 (0.013) | -0.005 (0.072) | -0.039 (0.033) | 0.048 (0.038) | -0.015 (0.011) |
| Years of Services | 0.001 (0.005) | 0.003 (0.025) | 0.001 (0.009) | -0.001 (0.017) | -0.008 (0.002) |
| Observations | 4,419 | 4,682 | 7,463 | 9,756 | 13,776 |
| Fixed Effects | YES | YES | YES | YES | YES |

To summarize, Table 3 provides supportive evidence that famine exposures rendered the exposed politicians more risk-averse, which in turn made them more reluctant to lie. Moreover, we find no evidence that the famine reshaped other social preferences, such as altruism, trust, social network, happiness, and time preferences.

V. Conclusion

The lies of public servants can be highly destructive to the public interest. To uncover the potential determinants of politicians' lying incentives, this paper investigates the impact of famine exposure on GDP manipulation by county leaders in China. We show that leaders who experienced the great famine during 1959-61 showed greater restraint when manipulating local GDP data to achieve enhanced career advancement opportunities. Furthermore, by lending support from the WVS data, we show that exposure to the famine reshapes individuals to be more risk-averse, thus making them more reluctant to lie. The paper thus provides a first collection of quantitative evidence dealing with how disasters reshape the long-term well-being of the society through changing risk preferences that reduce the lying incentives of public servants.

Reference

- Adhvaryu, Achyuta, James Fenske, and Anant Nyshadham. 2019. "Early Life Circumstance and Adult Mental Health." *Journal of Political Economy* 127 (4): 1516–49.
- Adhvaryu, Achyuta, Anant Nyshadham, Teresa Molina, and Jorge Tamayo. 2018. "Helping Children Catch Up: Early Life Shocks and the PROGRESA Experiment." NBER Working Paper 24848.
- Alderman, Harold, Jere R. Behrman, Victor Lavy and Rekha Menon. 2001. "Child Health and School Enrollment: A Longitudinal Analysis." *Journal of Human Resources* 36 (1): 203–5.
- Alesina, Alberto, and Dani Rodrik. 1994. "Distributive Politics and Economic Growth." *Quarterly Journal of Economics* 109 (2): 465–90.
- Almond, Douglas, Lena Edlund, Hongbin Li, and Junsen Zhang. 2010. "Long-Term Effects of the 1959-1961 China Famine: Mainland China and Hong Kong." In *The Economic Consequences of Demographic Change in East Asia*, edited by Takatoshi Ito and Andrew K. Rose. Chicago: University of Chicago Press.
- Andrews, Steven Q. 2008. "Seeing through the Smog: Understanding the Limits of Chinese Air Pollution Reporting." In *China Environment Series*, edited by Jennifer L. Turner, 5–32. Washington: Woodrow Wilson International Center for Scholars.
- Ashton, Basil, Kenneth Hill, Alan Piazza and Robin Zeitz. 1984. "Famine in China, 1958-61." *Population and Development Review* 10 (4): 613–45.
- Ban, Radu, and Vijayendra Rao. 2008. "Tokenism or Agency? The Impact of Women's Reservations on Village Democracies in South India." *Economic Development and Cultural Change* 56 (3): 501–30.
- Becchetti, Leonardo, Stefano Castriota, and Pierluigi Conzo. 2017. "Disaster, Aid, and Preferences: The Long-Run Impact of the Tsunami on Giving in Sri Lanka." *World Development* 94 (June): 157–73.
- Belasen, Ariel R., and Solomon W. Polachek. 2008. "How Hurricanes Affect Wages and Employment in Local Labor Markets." *American Economic Review* 98 (2):

49–53.

- Belloc, Marianna, Francesco Drago, and Roberto Galbiati. 2016. “Earthquakes, Religion, and Transition to Self-Government in Italian Cities.” *Quarterly Journal of Economics* 131 (4): 1875–1926.
- Bellucci, Davide, Giulia Fuochi, and Pierluigi Conzo. 2020. “Childhood Exposure to the Second World War and Financial Risk Taking in Adult Life.” *Journal of Economic Psychology* 79: 102196.
- Belsky, Jay, Laurence Steinberg, and Patricia Draper. 1991. “Childhood Experience, Interpersonal Development, and Reproductive Strategy: An Evolutionary Theory of Socialization.” *Child Development* 62 (4): 647–70.
- Benmelech, Efraim, and Carola Frydman. 2015. “Military CEOs.” *Journal of Financial Economics* 117 (1): 43–59.
- van den Berg, Marrit van den, Ricardo Fort, and Kees Burger. 2009. “Natural Hazards and Risk Aversion: Experimental Evidence from Latin America.” Paper presented at *International Association of Agricultural Economists Conference*, Beijing.
- Bernile, Gennaro, Vineet Bhagwat, and P. Raghavendra Rau. 2017. “What Doesn’t Kill You Will Only Make You More Risk-Loving: Early-Life Disasters and CEO Behavior.” *Journal of Finance* 72 (1): 167–206.
- Bernstein, Thomas P. 1984. “Stalinism, Famine, and Chinese Peasants – Grain Procurements during the Great Leap Forward.” *Theory and Society* 13 (3): 339–77.
- Besley, Timothy, and Anne Case. 1995. “Does Electoral Accountability Affect Economic Policy Choices? Evidence from Gubernatorial Term Limits.” *Quarterly Journal of Economics* 110 (3): 769–98.
- Besley, Timothy, Jose G. Montalvo, and Marta Reynal-Querol. 2011. “Do Educated Leaders Matter?” *Economic Journal* 121 (554): F205-227.
- Besley, Timothy, Torsten Persson, and Daniel M. Sturm. 2010. “Political Competition, Policy and Growth: Theory and Evidence from the US.” *Review of Economic Studies* 77 (4): 1329–52.

- Brown, Philip, Adam J. Daigneault, Emilia Tjernström, and Wenbo Zou. 2018. “Natural Disasters, Social Protection, and Risk Perceptions.” *World Development* 104: 310–25.
- Callander, Steven, and Simon Wilkie. 2007. “Lies, Damned Lies, and Political Campaigns.” *Games and Economic Behavior* 60 (2): 262–286.
- Callen, Michael. 2015. “Catastrophes and Time Preference: Evidence from the Indian Ocean Earthquake.” *Journal of Economic Behavior & Organization* 118: 199–214.
- Cao, Shuji. 2005. “Deaths of China’s Population and Its Contributing Factors during 1959–1961.” *Chinese Journal of Population Science* (1): 16–30.
- Cassar, Alessandra, Andrew Healy, and Carl von Kessler. 2017. “Trust, Risk, and Time Preferences After a Natural Disaster: Experimental Evidence from Thailand.” *World Development* 94: 90–105.
- Cavallo, Eduardo, Sebastian Galiani, Ilan Noy, and Juan Pantano. 2013. “Catastrophic Natural Disasters and Economic Growth.” *Review of Economics and Statistics* 95 (5): 1549–61.
- Charbonneau, Etienne, and François Bellavance. 2012. “Blame Avoidance in Public Reporting: Evidence from a Provincially Mandated Municipal Performance Measurement Regime.” *Public Performance and Management Review* 35 (3): 399–421.
- Chattopadhyay, Raghendra, and Esther Duflo. 2004. “Women as Policy Makers: Evidence from a Randomized Policy Experiment in India.” *Econometrica* 72 (5): 1409–43.
- Chen, Jeffrey C., Abe Dunn, Kyle Hood, Alexander Driessen, and Andrea Batch. Forthcoming. “Off to the Races: A Comparison of Machine Learning and Alternative Data for Predicting Economic Indicators.” In *Big Data for Twenty-First Century Economic Statistics*, edited by Katharine G. Abraham, Ron S. Jarmin, Brian Moyer, and Matthew D. Shapiro. Chicago: University of Chicago Press.
- Chen, Shuo, Xue Qiao, and Zhitao Zhu. 2020. “Chasing or Cheating? Theory and

- Evidence on the Reliability of China's GDP." Working Paper.
- Chen, Tianqi, and Carlos Guestrin. 2016. "XGBoost." In *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 785–94. New York.
- Chen, Wei, Xilu Chen, Chang-Tai Hsieh, and Zheng Song. 2019. "A Forensic Examination of China's National Accounts." *Brookings Papers on Economic Activity* 2019 (1): 77–141.
- Chen, Ye, Hongbin Li, and Li An Zhou. 2005. "Relative Performance Evaluation and the Turnover of Provincial Leaders in China." *Economics Letters* 88 (3): 421–25.
- Chen, Yuyu, Ginger Zhe Jin, Naresh Kumar, and Guang Shi. 2012. "Gaming in Air Pollution Data Lessons from China." *B.E. Journal of Economic Analysis and Policy* 12 (3): 1–43.
- Chen, Yuyu, and David Y. Yang. 2019. "Historical Traumas and the Roots of Political Distrust: Political Inference from the Great Chinese Famine." Working Paper.
- Chen, Yuyu, and Li-An Zhou. 2007. "The Long-Term Health and Economic Consequences of the 1959–1961 Famine in China." *Journal of Health Economics* 26 (4): 659–81.
- Clark, Hunter, Maxim Pinkovskiy, and Xavier Sala-i-Martin. 2020. "China's GDP Growth May Be Understated." *China Economic Review* 62: 101243.
- Coale, Ansley J. 1981. "Population Trends, Population Policy, and Population Studies in China." *Population and Development Review* 7 (1): 85–970
- Cronqvist, Henrik, and Frank Yu. 2017. "Shaped by Their Daughters: Executives, Female Socialization, and Corporate Social Responsibility." *Journal of Financial Economics* 126 (3): 543–62.
- Currie, Janet, Mark Stabile, Phongsack Manivong, and Leslie L. Roos. 2010. "Child Health and Young Adult Outcomes." *Journal of Human Resources* 45 (3): 517–48.
- Currie, Janet, and Tom Vogl. 2013. "Early-Life Health and Adult Circumstance in Developing Countries." *Annual Review of Economics* 5 (1): 1–36.

- Department of Comprehensive Statistics, National Bureau of Statistics of China. 1990. *Compilation of Historical Statistical Data of All Provinces, Autonomous Regions and Municipalities in China (1949-1989)*. Beijing: China Statistics Press.
- Dikötter, Frank. 2010. *Mao's Great Famine: The History of China's Most Devastating Catastrophe, 1958-1962*. New York: Bloomsbury.
- Eckel, Catherine C., Mahmoud A. El-Gamal, and Rick K. Wilson. 2009. "Risk Loving after the Storm: A Bayesian-Network Study of Hurricane Katrina Evacuees." *Journal of Economic Behavior & Organization* 69 (2): 110–24.
- Erel, Isil, Léa Stern, Chenhao Tan, and Michael Weisbach. 2018. "Selecting Directors Using Machine Learning." NBER Working Paper 24435.
- Ewing, Bradley T., Jamie B. Kruse, and Mark A. Thompson. 2009. "Twister! Employment Responses to the 3 May 1999 Oklahoma City Tornado." *Applied Economics* 41 (6): 691–702.
- Ferraz, Claudio, and Frederico Finan. 2011. "Electoral Accountability and Corruption: Evidence from the Audits of Local Governments." *American Economic Review* 101 (4): 1274–1311.
- Fisman, Raymond, and Yongxiang Wang. 2017. "The Distortionary Effects of Incentives in Government: Evidence from China's 'Death Ceiling' Program." *American Economic Journal: Applied Economics* 9 (2): 202–18.
- Fowlie, Meredith, Edward Rubin, and Reed Walker. 2019. "Bringing Satellite-Based Air Quality Estimates Down to Earth." *AEA Papers and Proceedings* 109 (5): 283–88.
- Font, Joan Costa, and Anna Nicińska. 2019. "Did Exposure to Soviet Communism Spur Pro-Social Behaviour?" Paper presented at *NBER Summer Institute SI 2019 Political Economy*, Cambridge.
- Ghanem, Dalia, and Junjie Zhang. 2014. "'Effortless Perfection:' Do Chinese Cities Manipulate Air Pollution Data?" *Journal of Environmental Economics and Management* 68 (2): 203–25.
- Greenwood, Robin, and Stefan Nagel. 2009. "Inexperienced Investors and Bubbles."

- Journal of Financial Economics* 93 (2): 239–58.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2018. “Time Varying Risk Aversion.” *Journal of Financial Economics* 128 (3): 403–21.
- Hanaoka, Chie, Hitoshi Shigeoka, and Yasutora Watanabe. 2018. “Do Risk Preferences Change? Evidence from the Great East Japan Earthquake.” *American Economic Journal: Applied Economics* 10 (2): 298–330.
- Handa, Sudhanshu, and Amber Peterman. 2007. “Child Health and School Enrollment: A Replication.” *Journal of Human Resources* 42 (4): 863–80.
- He, Guojun, and Shaoda Wang. 2017. “Do College Graduates Serving as Village Officials Help Rural China?” *American Economic Journal: Applied Economics* 9 (4): 186–215.
- Henderson, J. Vernon, Adam Storeygard, and David N Weil. 2012. “Measuring Economic Growth from Outer Space.” *American Economic Review* 102 (2): 994–1028.
- Hirano, Keisuke, and Guido W. Imbens. 2001. “Estimation of Causal Effects Using Propensity Score Weighting: An Application to Data on Right Heart Catheterization.” *Health Services and Outcomes Research Methodology* 2 (3–4): 259–78.
- Hirano, Keisuke, Guido W. Imbens, and Geert Ridder. 2003. “Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score.” *Econometrica* 71 (4): 1161–89.
- Holz, Carsten A. 2014. “The Quality of China’s GDP Statistics.” *China Economic Review* 30: 309–38.
- Hunt, J. McVicker. 1979. “Psychological Development: Early Experience.” *Annual Review of Psychology* 30 (1): 103–44.
- Jiang, Zhenghua, and Nan Li. 1988. *Methods and Results of Estimating China’s Population Dynamics*. Beijing: Economic Management Press.
- Keidel, Albert. 2001. “China’s GDP Expenditure Accounts.” *China Economic Review* 12 (4): 355–67.

- Keidel, Albert. 2001. "China's GDP Expenditure Accounts." *China Economic Review* 12 (4): 355–67.
- Kesternich, Iris, Bettina Siflinger, James P. Smith, and Joachim K. Winter. 2014. "The Effects of World War II on Economic and Health Outcomes across Europe." *Review of Economics and Statistics* 96 (1): 103–18.
- Kim, Young-Il, and Jungmin Lee. 2014. "The Long-Run Impact of a Traumatic Experience on Risk Aversion." *Journal of Economic Behavior & Organization* 108: 174–86.
- Kung, James Kai-Sing, and Shuo Chen. 2011. "The Tragedy of the Nomenklatura: Career Incentives and Political Radicalism during China's Great Leap Famine." *American Political Science Review* 105 (1): 27–45.
- Landry, Pierre F., Xiaobo Lü, and Haiyan Duan. 2018. "Does Performance Matter? Evaluating Political Selection Along the Chinese Administrative Ladder." *Comparative Political Studies* 51 (8): 1074–1105.
- Lerner, Jennifer S., Roxana M. Gonzalez, Deborah A. Small, and Baruch Fischhoff. 2003. "Effects of Fear and Anger on Perceived Risks of Terrorism." *Psychological Science* 14 (2): 144–50.
- Lerner, Jennifer S., Roxana M. Gonzalez, Deborah A. Small, and Baruch Fischhoff. 2003. "Effects of Fear and Anger on Perceived Risks of Terrorism." *Psychological Science* 14 (2): 144–50.
- Levitt, Steven D. 1997. "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime." *American Economic Review* 87 (3): 270–90.
- Li, Hongbin, and Li-An Zhou. 2005. "Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China." *Journal of Public Economics* 89 (9–10): 1743–62.
- Liang, Zhiyuan. 2003. "An Official Account of the Experiences of Agricultural High-Yield Satellites in Bo County." *Yanhuang Chunqiu* (1): 22–25.
- Lonigan, C. J., M. P. Shannon, A. J. Finch, T. K. Daugherty, and C. M. Taylor. 1991. "Children's Reactions to a Natural Disaster: Symptom Severity and Degree of

- Exposure.” *Advances in Behaviour Research and Therapy* 13 (3): 135–54.
- Lu, Huilin. 2008. “How Was the ‘Satellite’ Launched? Village Grassroots Cadres and the Great Leap Forward.” *Open Times* (5): 116–26.
- Maccini, Sharon, and Dean Yang. 2009. “Under the Weather: Health, Schooling, and Economic Consequences of Early-Life Rainfall.” *American Economic Review* 99 (3): 1006–26.
- Maddison, Angus. 2001. *The World Economy: A Millennial Perspective*. Paris: OECD.
- Maddison, Angus. 2007. *Chinese Economic Performance in the Long Run*. 2nd ed. Paris: OECD Development Centre.
- Malmendier, Ulrike, Stefan Nagel, and Zhen Yan. 2017. “The Making of Hawks and Doves: Inflation Experiences on the FOMC.” NBER Working Paper 23228.
- Marro, Anthony. 1985. “When the Government Tells Lies.” *Columbia Journalism Review* 23 (6): 29–41.
- Mehrotra, Aaron, and Jenni Pääkkönen. 2011. “Comparing China’s GDP Statistics with Coincident Indicators.” *Journal of Comparative Economics* 39 (3): 406–11.
- Mehta, D., T. Klengel, K. N. Conneely, A. K. Smith, A. Altmann, T. W. Pace, M. Rex-Haffner, et al. 2013. “Childhood Maltreatment Is Associated with Distinct Genomic and Epigenetic Profiles in Posttraumatic Stress Disorder.” *Proceedings of the National Academy of Sciences* 110 (20): 8302–7.
- Meng, Xin, Nancy Qian, and Pierre Yared. 2015. “The Institutional Causes of China’s Great Famine, 1959–1961.” *The Review of Economic Studies* 82 (4): 1568–1611.
- Morris, Stephen D., and Junjie Zhang. 2018. “Validating China’s Output Data Using Satellite Observations.” *Macroeconomic Dynamics* 23 (8): 3327–54.
- Nelson, Katherine. 1993. “The Psychological and Social Origins of Autobiographical Memory.” *Psychological Science* 4 (1): 7–14.
- Oreopoulos, Philip, Mark Stabile, Randy Walld, and Leslie L. Roos. 2008. “Short-, Medium-, and Long-Term Consequences of Poor Infant Health: An Analysis Using Siblings and Twins.” *Journal of Human Resources* 43 (1): 88–138.
- Pan, Zhenwe, and Yuli An. 2003. “Where Does the One Trillion Gap Come from: An

- Investigation on the Gap between National and Provincial Accounting Data.” *China Statistics* (11): 10–11.
- Peng, Xizhe. 1987. “Demographic Consequences of the Great Leap Forward in China’s Provinces.” *Population and Development Review* 13 (4): 639–70.
- Pinkovskiy, Maxim, and Xavier Sala-i-Martin. 2016. “Lights, Camera ... Income! Illuminating the National Accounts-Household Surveys Debate.” *Quarterly Journal of Economics* 131 (2): 579–631.
- Rawski, Thomas G. 2002. “Measuring China’s Recent GDP Growth: Where Do We Stand?” *China Economic Quarterly* 2 (1): 53–62.
- Rawski, Thomas G. 2001. “What Is Happening to China’s GDP Statistics?” *China Economic Review* 12 (4): 347–54.
- Sahm, Claudia R. 2012. “How Much Does Risk Tolerance Change?” *Quarterly Journal of Finance* 2 (4): 1250020.
- Shore, J. H., E. L. Tatum, and W. M. Vollmer. 1986. “Psychiatric Reactions to Disaster: The Mount St. Helens Experience.” *American Journal of Psychiatry* 143 (5): 590–95.
- Skidmore, Mark, and Hideki Toya. 2002. “Do Natural Disasters Promote Long-Run Growth?” *Economic Inquiry* 40 (4): 664–87.
- Stern, William. 2017. *Psychology of Early Childhood: Up to the Sixth Year of Age*. 1st ed. London: Routledge.
- Sunder, Jayanthi, Shyam V. Sunder, and Jingjing Zhang. 2017. “Pilot CEOs and Corporate Innovation.” *Journal of Financial Economics* 123 (1): 209–24.
- Sviatschi, Maria Micaela. 2020. “Making a Narco: Childhood Exposure to Illegal Labor Markets and Criminal Life Paths.” Working Paper.
- Wakker, Peter P. 2010. *Prospect Theory: For Risk and Ambiguity*. Cambridge: Cambridge University Press.
- Xi, Tianyang, Yang Yao, and Muyang Zhang. 2018. “Capability and Opportunism: Evidence from City Officials in China.” *Journal of Comparative Economics* 46 (4): 1046–61.

- Xie, Chuntao. 1990. *The Mad Tide of the Great Leap Forward*. Zhengzhou: Henan People's Press.
- Xu, Chenggang. 2011. "The Fundamental Institutions of China's Reforms and Development." *Journal of Economic Literature* 49 (4): 1076–1151.
- Yao, Yang, and Muyang Zhang. 2015. "Subnational Leaders and Economic Growth: Evidence from Chinese Cities." *Journal of Economic Growth* 20 (4): 405–36.
- Young, Alwyn. 2003. "Gold into Base Metals: Productivity Growth in the People's Republic of China during the Reform Period." *Journal of Political Economy* 111 (6): 1220–61.