

# Risk-Taking and Public Leadership: Evidence from Chinese Villages

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## Abstract

This paper studies the causal impact of risk-taking on public leadership, by exploiting Chinese “zodiac year” culture that creates within-individual variation in risk appetite. Employing a representative village panel, I find that lower risk-taking of village heads leads to improved governance processes and greater perceived responsiveness by villagers. I also observe consistent expenditure changes, with higher public good spending and a comparable decline in administration spending that is prone to misuse. However, risk-averse leaders are also less likely to promote policy innovation. Collectively, risk avoidance can shift leader focus toward addressing constituent interests when incentives for responsiveness are limited, with a potential trade-off between accountability and public entrepreneurship.

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# 1 Introduction

Public officials are commonly assumed to be unwilling to take risks. This is often taken as a problem in governance, which can undermine innovation and reform efficiency (Balla and Gormley Jr, 2017; EBRD, 1999; De Vries, Bekkers and Tummers, 2016). However, if one considers the need to perform duties and garner positive feedback from constituents, a certain degree of risk aversion can, in theory, improve performance when it makes limited punishments available in the public sector more effective at incentivizing officials (Bendor, 1988; Leyden and Link, 1993; Dewatripont, Jewitt and Tirole, 1999). While risk-taking has been an important component in economic models, there is no empirical evidence linking individual risk-taking to the quality of government.

This paper fills this gap by taking advantage of unusual features of Chinese society, to study how village heads' behaviors change as a function of exogenously induced shifts in risk-taking. To capture *within-individual* variation in risk appetite, I exploit strongly held "zodiac year" superstitions. According to these beliefs, individuals face a greater volatility of fortune (luck) and should be conservative during their zodiac years. In particular, the superstition generates an individual-specific shift in risk-taking every twelve years, which will differ across individuals depending on their birth year (the concurrent work by Fisman et al. (2023) further reinforces this point in the private sector). This enables me to identify the causal effects of risk appetite on bureaucratic performance.<sup>1</sup> Specifically, I hold location and leadership constant, and compare governance processes and outcomes when a leader is in their zodiac years to outcomes when they are not.

My empirical analysis employs a nearly representative panel of Chinese villages from 2013 to 2018. In China, each village is co-governed by a Party Secretary (who represents the Communist Party of China) and a Village Chief.<sup>2</sup> This leadership pair is responsible for the management of local affairs to ensure the grassroots self-governance of villagers. While village elections, petitions, and reputational sanctions allow villagers to provide input into local governance, village heads still possess discernible power in policy implementation due to imperfect monitoring and weak contract enforcement (Wang, 2014). They may use their

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<sup>1</sup>In the absence of an objective probability distribution of outcomes, the superstition can change risk-taking by altering either risk aversion or probability assessments of undesirable states, which is symmetric in the subjective expected utility framework. Therefore, I adopt the term "risk avoidance" to denote a lower inclination for risk-taking resulting from either preference changes or belief changes.

<sup>2</sup>In the period of study (post-2010s), the difference in the roles between the Party Secretary and the Village Chief is relatively ambiguous: the division of labor between the two leaders has a substantial overlap in their roles (De Janvry et al., 2023), and the *de facto* power of a leader can also vary across villages or even individuals (Wang, 2014). Therefore, my main analysis reads a leadership pair  $\times$  year as the unit of observation, and I discuss the heterogeneity of positions in additional analyses.

power to ignore feedback and engage in rent extraction, or to address the needs and concerns of the village citizenry. Conceptually, we can read village heads as agents who choose policy implementation, with their constituents (citizens and upper-level governments) acting as principals. Village heads perceive potential risks of punishment for deviating from their constituents' contracts. As heads tend to be more risk-averse in their zodiac years – or, theoretically equivalently, perceive more likelihood of being detected or harsher punishment – the zodiac treatment may shift more of their focus toward addressing constituents' needs to mitigate potential risks.<sup>3</sup> However, it may also discourage village heads from pursuing innovative actions not specified by constituents but that might sometimes benefit local development.

I begin with a sanity check that village heads exhibit a lower risk appetite during their zodiac years. First, I identify the frequency of leaders' risk-taking-related language, based on manually collected meeting minute data from two provinces. Consistent with the qualitative notion, my quantitative results indicate a significant increase in the usage of risk-averse language during leaders' zodiac years. Second, I use manually collected data and representative individual surveys to confirm that zodiac year superstitions are not systematically related to other confounding psychological forces, such as cognitive ability and prosocial preferences. These results collectively bolster the relevance of risk-taking in response to zodiac year shocks.<sup>4</sup>

The first set of analyses focuses on governance processes and accountability. Similar to other contexts, village heads in China are responsible for governing villages through collective procedures, which include various joint meetings that involve village bureaucrats and citizens to better confer and implement policies, as well as frequent information disclosure for transparency. Lower risk-taking may prompt leaders to adhere more closely to collective governance processes for two reasons, both of which mitigate the risk of dissatisfying constituents: One, increased feedback gathering enables village heads to better learn about villagers' needs, facilitating more effective and appropriate responses; Two, adherence to these governance procedures *per se* reflects a commitment to fulfilling constituents' expectations. Holding the Party Secretary and the Village Chief constant, having either of them in their zodiac year is associated with a higher level of governance processes involving feedback gathering – measured by the frequency of joint conferring sessions and villager representative

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<sup>3</sup>In many domains (e.g., public good provision), villagers and upper-level governments can likely have aligned interests (Wang and Yao, 2007). When there are conflicts of preferences among different constituent groups – such as when some upper-level officials have extractive preferences that mis-align with villager interests – which group of constituents dominates will be context-specific, depending on their ability to input and punish village heads. I therefore relegate this to empirical tests.

<sup>4</sup>I also discuss whether villagers treat leaders differently during leaders' zodiac years in the paper later.

meetings – along with increased governance transparency.<sup>5</sup> There is no discernable change in the frequency of routine Party meetings, implying that what we observe is not mechanical (not purely due to increased village affairs). Importantly, the rich data also provide villager perception of leader performance, enabling me to directly examine changes in responsiveness. Consistent with the process changes, citizens perceive village leaders to be more responsive during their zodiac years. The event study plots confirm that these changes are primarily associated with leaders' zodiac years rather than being a consequence of general cohort trends, with anticipatory patterns (minor lead effects in year -1) lending additional support to the risk-taking framework.<sup>6</sup>

I further corroborate the responsiveness changes by investigating whether there are coherent shifts in the allocation of public expenditures. The zodiac year event of village heads increases the public good spending share by 4 percentage points on average, and the impact tends to be specific to village demographics and thus the needs of villagers. This shift is accompanied by a comparable decline in the share of administration expenses, which is the primary source for rent extraction and waste (Wang and Yao, 2007). Overall, the above results suggest that zodiac leaders' lower risk-taking can change performance, leading to a greater focus on addressing citizen interests and improving their accountability, in an institutional setting in which *de jure* institutions exist yet the incentives to be responsive may still be limited (Martinez-Bravo et al., 2022).<sup>7</sup>

The second set of analyses explores the impact of risk-taking on policy innovation. Both OLS and Probit estimates suggest that village heads are less likely to embark on policy innovation during their zodiac years, and a placebo test using county-level policy experiments further reinforces the validity of my finding. These patterns further corroborate the risk-taking explanation and suggest that the improved responsiveness we observe above may largely occur within the existing governance framework. Together, these combined results point to a potential trade-off between accountability and public entrepreneurship, as a result of changes in leaders' risk-taking.

I conclude by discussing interpretations and further implications. First, heterogeneity

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<sup>5</sup>The usage of village-level meetings to measure governance processes is buttressed by prior political science literature (e.g., Oi and Rozelle, 2000; Niou, 2002).

<sup>6</sup>In theory, when decision-makers are relatively sophisticated, they may adjust their behaviors in anticipation of future potential risks before their zodiac years. The extent to which these anticipatory patterns matter is ultimately an empirical question, which can be explored by using event-study specifications.

<sup>7</sup>In the context of strong vertical control in China (Martinez-Bravo et al., 2022), these results also suggest that the two primary constituents – villagers and upper-level governments – likely have largely aligned interests in local governance during my sample period. While extractive upper-level officials or some conflicts of interest can exist, they do not dominate overall.

analyses suggest that, while both Party Secretaries and Village Chiefs can generate policy changes, the zodiac effects are more pronounced in the presence of centralized leadership (when one individual holds both the positions of the secretary and the chief). The finding not only reinforces the role of individual leaders, but also speaks to the theories on power structure (e.g., [Jones and Olken, 2005](#); [Li, 2018](#); [Ottinger and Voigtländer, 2021](#)). Second, given the nature of reduced-form estimates, I investigate the role of villager strategic demand – apart from leader-side changes, their zodiac events might also serve as a coordinating device for villagers to actively seek their favored policies. To this end, I use civic activeness measures collected in the later years of the survey and find suggestive evidence on the limited role of villager demand. Lastly, I discuss external validity and limitations to be considered when extrapolating my empirical results on risk-taking.

This work contributes to the study of incentives and performance in the public sector. While risk-taking in the private sector has been extensively studied (e.g., [Bertrand and Schoar, 2003](#); [Graham, Harvey and Puri, 2013](#); [Cohn et al., 2015](#); [Koudijs and Voth, 2016](#); [Pan, Siegel and Wang, 2020](#); [Fisman et al., 2023](#)), we know relatively little about how it motivates public employees. Despite the evidence that public employees tend to be more risk-averse than the average population ([Bellante and Link, 1981](#); [Bonin et al., 2007](#); [Guiso and Paiella, 2008](#); [Pfeifer, 2011](#); [Buurman et al., 2012](#)), the extant literature remains silent on how it shapes performance. By holding selection constant, my empirical strategy eliminates the threat of sorting and uncovers the role of risk-taking within the public sector. The findings suggest that risk avoidance of public leaders may serve as a utile tool to provide better incentives when the regime prioritizes rule-bound administration and accountability, but it may also yield a trade-off when policy innovation is of significance.<sup>8</sup>

This paper also adds to the growing literature on the role of individual leaders ([Jones and Olken, 2005](#)). Previous studies have focused on leaders' ascriptive traits and social experience.<sup>9</sup> While many of them are motivated by understanding attitudinal shifts arising from certain identities or experience (e.g., [Levitt, 1996](#); [Chattopadhyay and Duflo, 2004](#); [Washing-](#)

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<sup>8</sup>My findings on policy innovation additionally speak to the literature on risk-taking and innovation (e.g., [March, 1991](#); [Azoulay, Graff Zivin and Manso, 2011](#); [Manso, 2011](#); [Hirshleifer, Low and Teoh, 2012](#); [Nanda and Rhodes-Kropf, 2017](#); [Carson et al., 2022](#)). I contribute by presenting novel empirical evidence in the context of public organizations.

<sup>9</sup>For instance: leader gender ([Chattopadhyay and Duflo, 2004](#); [Clots-Figueras, 2011](#); [Ferreira and Gyourko, 2014](#); [Brollo and Troiano, 2016](#); [Besley et al., 2017](#); [Dube and Harish, 2020](#); [Lippmann, 2022](#)), ethnicity ([Hodler and Raschky, 2014](#); [Burgess et al., 2015](#); [Nye, Rainer and Stratmann, 2015](#); [Beach and Jones, 2017](#); [De Luca et al., 2018](#)), religion ([Bhalotra et al., 2014](#); [Bhalotra, Clots-Figueras and Iyer, 2021](#); [Wang, 2021](#)), and ability ([Ottinger and Voigtländer, 2021](#)). For leader experience, see for example: [Göhlmann and Vaubel \(2007\)](#); [Washington \(2008\)](#); [Dreher et al. \(2009\)](#); [Besley, Montalvo and Reynal-Querol \(2011\)](#); [Diaz-Serrano and Pérez \(2013\)](#); [Jochimsen and Thomasius \(2014\)](#); [Van Effenterre \(2020\)](#); [Carreri and Teso \(2021\)](#).

ton, 2008), separating a true preference or belief shift remains a challenge (Washington, 2008). This paper makes progress by exploiting within-governor variation in risk appetite. In addition, my analysis of grassroots governors also complements the literature on front-line officials (Tsai, 2007; Khan, Khwaja and Olken, 2019; Banerjee et al., 2021; Xu, 2021).

Finally, my work speaks to the effects of culture on development (Banfield, 1958; Guiso, Sapienza and Zingales, 2006; Alesina and Giuliano, 2015; Gorodnichenko and Roland, 2020; Nunn, 2022). Although the “zodiac year” culture only induces temporal shock within individual rulers, it offers an ideal setting to disentangle the role of cultural beliefs from other confounders to establish causality. My work differs from the existing literature on superstitions by examining policy outcomes that have a broad bearing on local development.<sup>10</sup> Besides “zodiac years”, a large set of cultural norms in Ancient China is associated with risk avoidance (Sun, 2009; Greif, Iyigun and Sasson, 2011; Liu, Meng and Wang, 2014; Tang, 2020). While it is not clear whether the emergence of such norms is driven by the need for substituting formal institutions (Posner, 1980; Leeson, 2012; Leeson and Suarez, 2015; Gershman, 2015), these long-lasting cultural forces throughout China’s history might in part account for the stability and longevity of its society.

## 2 Background

### 2.1 “Zodiac year” superstitions and risk-taking

The “zodiac year” superstition dates back to the astrology of the Han Dynasty (202 BC–220 AD). It builds on Chinese zodiac culture, which assigns an animal attribute to each lunar year in a repeating 12-year cycle, with the animal attributed to a person’s year of birth known as their “zodiac sign”.<sup>11</sup> In particular, years that have the same animal attribute as a person’s zodiac sign are referred to as their “Zodiac Birth Year”. For instance, an individual born in the lunar year 1989 has the zodiac sign of the snake. Based on the 12-year zodiac cycle, each subsequent year of the snake is their zodiac year (i.e., 2001, 2013, 2025, etc.). According to Chinese astrology, during zodiac years, one’s birth animal attribute is in conflict with *Tai Sui God* (Jupiter in Western astrology), producing greater volatility and a higher risk of misfortune. This conflict is believed to put individuals at risk of ups and downs – e.g., career and relationship challenges, accidental difficulties – throughout the year.

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<sup>10</sup>For how superstitions shape behavior and firm-level outcomes, see for example: Leeson and Coyne (2012); Nunn and Sanchez de la Sierra (2017); Halla, Liu and Liu (2019); Chen et al. (2020); Fisman et al. (2023); Liu et al. (2021); Mocan and Yu (2020); Li et al. (2021); Le Rossignol, Lowes and Nunn (2022); Wu, Zhang and Zhou (2023).

<sup>11</sup>The twelve animals are the rat, the ox, the tiger, the rabbit, the dragon, the snake, the horse, the goat, the monkey, the rooster, the dog, and the pig. Notably, zodiac signs in themselves are not particularly relevant to my identification, since the zodiac year superstition applies to individuals with any zodiac sign.

Of particular relevance to my setting, the “zodiac year” superstition is in essence a set of beliefs regarding risk-taking. It claims that individuals encounter greater volatility in their zodiac years, featuring higher perceived uncertainty; and given greater volatility in almost every aspect, it is generally advised to approach one’s zodiac year conservatively – direct guidance promoting lower risk-taking. Consequently, the superstition can likely induce a first-order shift in risk-taking, reshaping a person’s utility function and thus potentially altering individual decision-making. [Fisman et al. \(2023\)](#) provide systematic evidence relating zodiac year superstitions directly to risk avoidance in the private sector – individuals and private firms tend to behave conservatively during their zodiac years.<sup>12</sup>

The zodiac superstition remains strongly held and is still taken seriously in China. Even official media features a large volume of stories and reports associated with zodiac year beliefs.<sup>13</sup> Intriguingly, a rich body of anecdotal evidence suggests that Chinese political elites are heavily influenced by such superstitious beliefs. According to a 2007 survey conducted by the National Academy of Governance, more than 52.4 percent of grassroots bureaucrats believe in supernatural in some form.<sup>14</sup>

Later, before proceeding with the main analysis, I conduct a sanity check combining case study and survey data to confirm the first-order role of risk-taking in my context.

## 2.2 Village governance in China

Villages serve as the fundamental organization unit in rural China. As with other layers of Chinese governance, each village is co-governed by a pair of leadership groups – a Communist Party Branch, led by its Party Secretary (PS), and a Village Committee, led by a Village Chief (VC). This leadership pair is responsible for implementing policies handed down from upper governments and managing village affairs through democratic procedures ([Zhang et al., 2004](#)). In particular, PSs and VCs are responsible for governing villages through various decision-making platforms, such as different types of meetings, to promote grassroots governance aligned with the interests of the community and villagers. Institutional details related to decision-making processes and village expenditures are discussed as they become relevant in empirical analyses later.

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<sup>12</sup>See also [Chen et al. \(2020\)](#), [Li et al. \(2021\)](#), [Liu et al. \(2021\)](#) and [Wu, Zhang and Zhou \(2023\)](#).

<sup>13</sup>For example, in 2018, Xinhua News Agency, China’s largest state-run press agency, published an article titled “A Fresh ‘Zodiac Birth Year’ of Herders” that described zodiac year conventions among Inner Mongolia villagers. Meanwhile, in 2021, China News Services, the second-largest official media in China, re-posted the UN Secretary’s New Year greetings with the title “UN Secretary-General Antonio Guterres’s Chinese New Year Greetings: The Year of the Ox - My ‘Zodiac Birth Year’”. See [http://www.xinhuanet.com/local/2018-02/16/c\\_1122423691.htm](http://www.xinhuanet.com/local/2018-02/16/c_1122423691.htm) and <https://www.chinanews.com/shipin/cns-d/2021/02-11/news880379.shtml>

<sup>14</sup>See [https://www.cas.cn/xw/zyxw/yw/200705/t20070511\\_1021150.shtml](https://www.cas.cn/xw/zyxw/yw/200705/t20070511_1021150.shtml) (in Chinese).

Conceptually, compared with leaders at other levels of government in China, PSs and VCs are held relatively accountable. First, in the period of my study (2010s), VCs are mostly elected by members of their villages based on general suffrage (supervised by upper-level governments), and PSs are generally selected through a two-stage procedure involving a higher level of government nominating several candidates for villagers to elect. They may thus contend with some concerns about elections, villager petitions, and democratic reviews conducted by upper-level governments which gather feedback from villagers to assist nominations. Second, PSs and VCs are from within the village and are typically well-known by their villagers. It is also worth noting that they do not belong to the formal bureaucratic ladder – that is, village leadership is not a stepping stone to higher positions in the Chinese bureaucracy (Martinez-Bravo et al., 2022).

However, in practice, village heads still maintain discernible *de facto* power in local governance. As with any front-line leaders in weak institutional settings, village heads are able to utilize formal (e.g., signature right<sup>15</sup>) and informal (e.g., kinship networks, favor exchange, or even cheating) approaches to influence decision-making processes and policy enforcement (Tsai, 2007; Zhong, 2015; O’Brien and Li, 2017). Meanwhile, due to weak rule of law and compact social structures of villages, ordinary villagers, as vulnerable groups, may not “afford to offend” if they challenge their village heads too much (Wang, 2014). Furthermore, compared to other government layers, villages are relatively distant from upper-level governments, making daily top-down supervision difficult. Consequently, rural leaders usually perceive limited risk in ignoring constituent interests, making discretionary and unchecked use of public power endemic in rural China (Wang and Yao, 2007).

## 3 Data and Empirical Strategy

### 3.1 Data

My empirical analysis employs village-level data from 234 sampled villages for the period 2013 - 2018.<sup>16</sup> The data are derived from the China Rural Survey, a nearly representative survey managed by the Department of Grassroots Political Power and Community at the

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<sup>15</sup>For instance, signature rights over the use of land under collective control and administrative spending, which are nominally supervised by all villagers, have long been sources for rent extraction (Wang, 2014).

<sup>16</sup>Some villages appear less than six times due to changes in administrative divisions or additional concerns (e.g., adding additional sampled villages to cover some specific regions during some years). I later show that the results remain robust if only using the balanced sample.



Ministry of Civil Affairs.<sup>17</sup> The survey is used for internal research and governmental consulting, which combines administrative records from both township governments and village gazetteers, with finer entries elicited from annual revisits. The survey includes detailed information on geographic and demographic features, production, public finance, as well as measures of governance quality (e.g., governance processes and transparency). The geographical coverage of the samples is mapped in [Figure 1](#).

The explanatory variable of interest is whether a village leader is in their zodiac year. The survey provides detailed demographic characteristics for both the PS and the VC of each village, including their name, gender, and age. As the survey does not record the exact date of birth, I augment the data by conducting a follow-up phone survey for individuals whose zodiac signs are ambiguous (e.g., a chief born on January 20, 1955, will be assigned to the “Year of the Horse”, whereas a chief born on January 25, 1955, will be assigned to the “Year of the Goat” because the Chinese Lunar New Year on January 24, 1955, serves as the zodiac cutoff).<sup>18</sup> Accordingly, I am able to accurately identify the zodiac sign of each village leader.

As noted, since the power separation between the PS and the VC is ambiguous, in my main specification, I construct a dummy that is one if either the PS or the VC of a village is in their “zodiac birth year” for that year’s observation. The heterogeneity between PSs and VCs is examined later. [Figure 2](#) visualizes the share of leaders in their zodiac years over time. Consistent with the exogeneity of the 12-year zodiac cycle, the share of zodiac-year PSs or VCs for each year is maintained at around 8% ( $1/12$ ), with minor fluctuations. The number of leadership pairs featuring at least one in their zodiac year is also stable, averaging 13% (smaller than  $1 - \frac{11}{12} \times \frac{11}{12}$ ). The lack of event independence is explained by the possibility of the positions of PS and VC being held concurrently by a single individual (32% in the data).

[Table 1](#) summarizes the main variables, which are detailed as they become relevant later.

## 3.2 Empirical strategy

My identification exploits the feature that the “zodiac year” superstition generates an individual-specific shift in risk avoidance every 12 years, which differs across village leaders

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<sup>17</sup>The first wave was conducted in 2008, led by the Institute of China Rural Studies, Central China Normal University. The access to the data for this paper is available from 2013 onwards, with the exception of sampled villages in Xinjiang and Tibet provinces due to confidentiality (the two regions account for only 2% of the total Chinese population).

<sup>18</sup>Only 28 observations in the sample need this additional survey to confirm their zodiac signs. The response rate is 100%, which is justifiable given that one’s zodiac is generally not privacy in the Chinese rural setting.

depending on their year of birth. I estimate the following equation:

$$Y_{vt} = \beta * Zodiac_{sct} + x'_{st}\gamma_s + x'_{ct}\gamma_c + \tau_t + \theta_{sc} + \varepsilon_{vt} \quad (1)$$

where the outcome of interest for village  $v$  in year  $t$  is a function of:  $Zodiac_{sct}$ , a dummy that is one if either its Party Secretary ( $s$ ) or Village Chief ( $c$ ) is in their “zodiac year” associated with lower risk-taking in year  $t$ ;  $\tau_t$ , year fixed effects;  $\theta_{sc}$ , leadership pair fixed effects;  $x'_{st}$  and  $x'_{ct}$ , leader specific controls (age and tenure). Given there is no rotation of PSs and VCs between villages, village fixed effects are fully subsumed by leadership fixed effects. The standard errors are clustered at the village level; alternative clusters are later used for robustness.

While the term “zodiac year” is lunar-based, China has been using the internationally accepted Gregorian calendar since 1949 and the village data are also based on it. Therefore, the unit of observation ( $vt$ ) is at the village  $\times$  Gregorian year level, and the treatment variable ( $Zodiac_{sct}$ ) is constructed by matching the leader zodiac sign with the Gregorian year.<sup>19</sup> Although the Chinese lunar year does not align precisely with the Gregorian calendar, the difference between them is always about one month only. As a result, the measurement error arising from linking zodiac year treatment to Gregorian outcomes may not be a significant issue, and such idiosyncratic discrepancy could likely yield a bias toward zero in our estimates, resulting in conservative lower bounds. [Table B1](#) displays the Gregorian years with assigned zodiac year signs covered in this study.

My specification is based on the assumption that, conditional upon baseline covariates, there is no other confounder that is simultaneously correlated with both the outcome of interest and the leader being in their zodiac year. As demonstrated by [Figure 2](#), in any given year, a plausibly random one-twelfth of PSs or VCs is experiencing a zodiac year event. Additionally, [Figure 3](#) corroborates the uniform distribution of age around the zodiac year event. These findings provide descriptive support for interpreting  $\beta$  as the causal effect.

As the zodiac superstition is built on exogenous astrological rules, there are few candidates threatening the identification. Importantly, I introduce  $\theta_{sc}$ , the leadership pair FEs, to hold selection constant, exploiting within-leadership variation only. This alleviates concerns regarding the selection margin (e.g., a candidate’s behavior may systematically differ in their “zodiac year” due to lower risk-taking, altering their probability of political entry) and also

<sup>19</sup>For example, Gregorian Year 2017 is considered the Year of the Rooster; but rigorously speaking, Lunar Year 2017 (featuring the accurate Year of the Rooster) spans from Gregorian January 28, 2017 to Gregorian February 16, 2018. In this case, for the Gregorian Year 2017, I consider  $Zodiac=1$  if a village leader has the zodiac sign of Rooster; and  $Zodiac=0$  for the Rooster leader in other Gregorian years in my data (2013, 2014, 2015, 2016, and 2018).

enables clear interpretation of  $\beta$ , the estimate of interest. As around 54.2% of leadership pairs in the sample exhibit variation in the zodiac year treatment, my results are not likely to be driven by a few outliers due to limited remaining variation. [Table B2](#) provides evidence for a strong balance between characteristics of villages with variation in *Zodiac* vs. those with no variation in *Zodiac*.

Finally, to account for political and electoral cycles, I also introduce a set of dummies for each leader's tenure (e.g., [Xi, Yao and Zhang, 2018](#); [Chen and Zhang, 2021](#)). The baseline specification also adopts quadratic controls for leaders' age. An advantage of my setting is that village heads are not part of the formal bureaucratic ladder and are not subject to regular promotion and retirement tracks; consequently, there is no other age-specific effect for 36, 48, and 60-year-old officials. Later, I present robustness checks using a range of more stringent specifications.

### 3.3 Sanity check: zodiac leaders and risk-taking

Before proceeding with the main analysis, I check the relevance of the treatment – zodiac leaders are associated with lower risk-taking – by combining both case studies and survey data.

Evidence from village minutes and short surveys. Although direct evidence on the relationship between zodiac leaders and risk avoidance would be more indicative, the China Rural Survey does not elicit leaders' risk appetite. To overcome this limitation, I worked with college student survey teams supported by the Communist Youth League Committee of a Chinese university to conduct a case study. Specifically, the retrospective survey covers 42 sampled villages of two provinces (including those participating in the China Rural Survey), covering 124 rural leaders between 2014 and 2018. One province is coastal and relatively developed, covering an area similar to Belarus; another is inland with a relatively average development, covering an area similar to England.

To assess the risk appetite of village heads, I first analyze the use of risk-related language in village meeting minutes ([Gentzkow, Kelly and Taddy, 2019](#); [Hassan et al., 2019](#)). Since 2013, the Chinese Communist Party has placed increased emphasis on the management of documents and meeting records, enabling us to observe the key content expressed by each village leader in each governance meeting. I first identified a set of risk-averse expressions and a set of risk-loving expressions, based on emotional and administrative dictionaries. The risk-averse expressions include: “risks”, “uncertainty”, “steadily”, “cautious”, and “on guard”, along with their corresponding expressions in other word classes. The risk-loving expressions

include: “boldly”, “bravely”, and “recklessly”, along with their corresponding expressions in other word classes. Finally, the placebo expression used is “firstly” as an ordinal number. To construct quantitative measures, the survey team counted the frequency of these three groups of expressions used by each leader in governance meetings each year, and normalized the total count by the number of meetings held during that year. This allows us to create frequency measures at the leader-year level.<sup>20</sup>

**Table B2** presents the case study results. For a given PS or VC, experiencing the zodiac year is associated with an increase of approximately one standard deviation in the use of risk-averse language. Coherently, we observe a significant decline in the frequency of risk-loving expressions. In addition, the estimated effect on the placebo outcome (the usage of ordinal numbers) is close to zero. I also find little change in leaders’ attendance rates – a pattern consistent with Chinese practice, in which local leaders are usually present at key meetings unless ill or under investigation. Together, these combined results provide empirical evidence that village leaders exhibit lower risk-taking during their zodiac years.

Second, the survey also includes a short questionnaire for villagers, asking about their customs during the zodiac year. The survey results suggest that, in addition to lower risk-taking and wearing red, there are no other prevalent norms associated with the superstition (**Table C2**).

**Complementary evidence on parameters other than risk-taking.** To further reinforce the first-order role of risk-taking, I complement by examining the association between zodiac superstitions and a range of psychological factors, using the 2018 wave of the Chinese Family Panel Studies (CFPS).<sup>21</sup> In this survey, a subset of respondents is randomly selected to elicit their individual risk appetite. Since these cross-sectional observations are randomly selected from a representative individual pool, as in **Fisman et al. (2023)**, the causal impact of the zodiac year can still be estimated. The risk appetite is elicited by providing seven lotteries in a virtual risky gamble, and the corresponding measure of risk-taking tendency constructed is on a 7-point integer scale, where 1 is the lowest and 7 the highest. Despite the limited sample size (428 observations), the data provide an opportunity to quantitatively compare the effect of zodiac years on risk appetite versus other psychological parameters.

**Table B3** presents the results. Column 1 of Panel A corroborates the significant impact (about 0.31 standard deviation decrease) on risk-taking. Meanwhile, the zodiac year event

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<sup>20</sup>Most village minutes are not allowed to be photocopied, preventing us from conducting further textual analysis using machine learning techniques. We therefore follow the spirit of **Hassan et al. (2019)** by identifying risk-related synonyms.

<sup>21</sup>CFPS is one of the most commonly used survey data of Chinese individuals. See <https://www.issp.pku.edu.cn/cfps/en> for more details about the CFPS.

does not appear to be associated with other prominent psychological parameters, such as cognitive ability, good deeds, pro-social preferences, and generalized trust. Importantly, the magnitudes of the estimated effects on these factors are remarkably marginal (using the standard deviation as a benchmark), compared with the estimated effect on risk-taking. These findings, along with the short survey outcomes, suggest a plausible first-order role for risk-taking in my empirical setting.

## 4 Empirical Analyses

### 4.1 Governance processes and responsiveness

The self-governance in rural China intends to leverage local villagers' informational advantages to hold front-line leaders accountable (Martinez-Bravo et al., 2022). Similar to most grassroots contexts, rural governance institutions are designed to form a committed, transparent collective decision-making platform to gather villager preferences to assist policy implementation. In the presence of lower risk-taking, village leaders may be less willing to take the uncertainty associated with disregarding constituent needs and violating associated governance processes. This may, in turn, increase their adherence to feedback gathering and thus improve responsiveness.

The comprehensive dataset used in this paper documents the frequency of different meetings held by village governments, as well as the village affair publicity based on minutes from their meetings. This provides an opportunity for measuring governance processes from various perspectives. The usage of frequencies of village-level meetings to examine governance processes is bolstered by literature from the political science field (e.g., Oi and Rozelle, 2000; Niou, 2002).

#### 4.1.1 Background: village governance processes

This section summarizes governance processes (post-2010s) from three perspectives to guide my empirical analysis.<sup>22</sup>

First, within the governance bodies in each village, the Village Party Branch (VPB), led by its PS, and the Village Committee, led by its VC, are the two major decision-making platforms. The VPB should “exert the effect of the leading core” and observe the Party's routine

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<sup>22</sup>The implementation of rural democracy in China is complex and has experienced a long evolution, not stabilizing until 2006. Given the data span 2013-2018, I focus on the stylized patterns of village governance in this period. See “Organic Law of the Villagers' Committees of the People's Republic of China (Standing Committee of the National People's Congress, 2010 Revision)” for details about the responsibilities of village governments and the nature of decision-making processes.

of holding Party member sessions regularly. The frequency of VPB meetings depends on the volume of village affairs and may vary by region.<sup>23</sup> Building upon agendas set by the VPB, joint VPB-VC meetings serve as the primary mechanism for drafting proposals and discussing relevant local affairs, involving a larger and more representative group of local members. It follows that the VPB-VC meeting plays a central role in conferring detailed village affairs and promoting local policies.

Second, the Village General Meeting (VGM) acts as the official supreme institution for decision-making in each village and is considered to be a form of direct democracy that engages all villagers. Given the high costs of convening VGMs, the Villager Representative Assembly (VRA) is often utilized. This is a village-level council formed by a small group of villagers authorized by the VGM; it is able to discuss local economic and political affairs, review, approve, and reject budgets and proposals, and finalize relevant decisions (Zhong, 2015).

Third, transparency of village affairs (“village affair publicity”) empowers the citizenry to know and supervise each local governance process. The Organic Law stipulates that all village affairs that affect villager interests must be publicized by village governments regularly. The most common institutionalized form is using “village affairs publicity boards” to post relevant documents and reports. The enforcement of transparency rules varies greatly among villages (Tsai, 2007).

Table B4 further details the key functions and participants of the aforementioned institutions according to official documents.

#### 4.1.2 Impacts on governance processes and responsiveness

Following the framework described above, three sets of quantifiable indicators are used. The first set measures decision-making processes within the village government, considering the annual frequency of VPB sessions and the frequency of VPB-VC joint meetings. The second set measures governance processes formally involving village residents, considering the frequency of VRAs and the frequency of VGMs. The third set measures the transparency of governance, using the frequency of updating village affair publicity boards as a proxy.

The first two columns of Table 2 examine decision-making processes within the government body, which can help aggregate both upper-level governments’ and local citizens’ preferences. Holding the leadership pair constant, risk avoidance has no significant impact on the frequency of VPB sessions (Column 1), but it increases the number of VPB-VC joint

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<sup>23</sup>See “Regulations on the Work of Grassroots Rural Organizations (CPC Central Committee, 2006)”.

meetings by an average of two additional meetings per year (Column 2). The near-zero effect on VPB sessions is consistent with the fact that they act primarily as a routine platform for local Party members to deal with Party affairs, only considering the big picture of village governance. However, substantial increases in VPB-VC joint meetings can be of relevance, since they involve a more representative group of village members to detail local policy implementation and budget-making. Collectively, an increase in VPB-VC joint meetings (compared to VPB sessions) may plausibly reflect an increased willingness of leaders to confer and gather feedback, which can reduce potential deviations from constituent incentives to mitigate risks of punishment.

**Table 2** then examines governance procedures formally involving the general public. Column 3 shows a positive impact on the frequency of VRAs (village-level councils), implying that zodiac leaders are also more likely to actively involve villager representatives in local governance. In Column 4, we observe little change in the frequency of VGM meetings. One potential explanation in line with the notion laid out earlier is that, as convening VGMs is in practice demanding (the mean number of VGMs per year is only 1.86 in the sample), villager leaders may not perceive it as a cost-effective approach to confer and collect feedback. Alternatively, it could simply suggest a limited scope of improvement in grassroots governance during leaders' zodiac years. Nevertheless, the near-zero estimates in Columns 1 and 4 help attenuate the concern that the positive changes to VPB-VC and VRA frequencies may merely result from increased village affairs.

The final two columns investigate the impacts on transparency. The estimated coefficient of 2.308 in Column 5 indicates that village affair publicity boards are updated more frequently during a leader's zodiac year. Column 6 further controls the frequency for each type of meeting. Despite the econometric ambiguity induced by this approach, the estimate remains largely unchanged.

A caveat about the analyses thus far is that they only capture changes in formal decision-making processes. Given the compactness of social networks in rural China, governance may also build on the informal interaction between village heads and villagers (Tsai, 2007). I therefore complement the process results using leaders' responsiveness perceived by villagers. If risk-averse leaders are more inclined to follow governance codes and address constituents' needs, then we expect a consistent increase in their responsiveness. The rural survey has been eliciting reviews of village leaders from a fixed pool of respondents since 2014. Specifically, it explores three dimensions to proxy local leaders' performance: responsiveness, prestige, and social proximity to villagers. In my analysis, each variable is a village-year-level aggregate ordinal measure on a 4-point integer scale, with 1 the lowest ("poor") and 4 the highest

(“excellent”).<sup>24</sup>

Table 3 presents the OLS and Ordered Probit estimates. Columns 1 and 2 indicate that rural leaders are associated with greater perceived responsiveness (23% standard deviation) in their zodiac years. There is a positive but not statistically discernable impact on leaders’ prestige (“Wēi-xìn” in Chinese), which is a somewhat ambiguous term in Chinese: on the one hand, it may feature the social status of village leaders; on the other hand, it may reflect credibility and reputation. Columns 5 and 6 examine perceived social proximity, which may be largely constant for a given leadership given the compact social structure of Chinese villages. The estimated coefficients, as expected, are close to zero.<sup>25</sup>

Finally, Figure 4 visualizes the main results using event study plots, allowing the effect of time relative to the leader’s zodiac year to vary. Specifically, I estimate a dynamic version of the specification (1) in a  $[-3, +3]$  window, and each panel visualizes the estimated coefficients (from one augmented regression) for the year relative to the zodiac year event along with the 95% confidence intervals. Given the treatment is temporal (only active when the event time = 0), I follow the existing event study routine using the TWFE specification (Wooldridge, 2021). Changes in governance are largely unique to the leader’s zodiac year (with the preceding year exhibiting some changes to a lesser extent), and the impact vanishes after the zodiac event. This implies that the zodiac effect observed is not the consequence of general time trends. While not statistically significant, the lead effects here can be most straightforwardly reconciled with the presence of “precautionary/anticipatory motives” that align with the risk-taking framework. A plausible explanation, supported by qualitative accounts gathered by the author, is that some forward-looking leaders may take into account the potential impact of meetings and proposals at the end of a year on policy outcomes in the following year. As a result, they may change their behavior to neutralize the anticipated risks as they approach their zodiac years.<sup>26</sup>

## 4.2 Allocation of village funds

If zodiac leaders are associated with greater responsiveness toward constituent feedback, we may expect the allocation of public resources – which is central to local development and

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<sup>24</sup>On average, about 15 villagers are interviewed per village. At the time of this study, the author cannot access the individual-level data.

<sup>25</sup>This result also helps calm the concern about falsification. If villagers are intimidated by their leaders, then we may expect comparable increases in all domains (i.e., villagers simply say good about everything).

<sup>26</sup>This finding aligns with the precautionary pattern documented in an earlier version of Fisman et al. (2023) that examines the zodiac effects on individual insurance purchases and corporate M&A behavior. Also, it is worth noting that the observed leading effect is unlikely to be a result of measurement error by linking lunar-based zodiac years to Gregorian outcomes. This is because the lunar year consistently lags behind the Gregorian year (Table B1).



citizen welfare – to shift toward the majority’s needs. Due to the lack of detailed expenditure entries, the analysis here aims to provide further evidence to support my previous findings.

#### 4.2.1 Background: village expenditure structure

The re-centralization since 2003 has curtailed the fiscal autonomy of village governments, making illegal the use of ad hoc fees to fund public investment (Martinez-Bravo et al., 2022). Accordingly, the central government has increased village public financing. To ensure transparency in the allocation of these funds, all important financial decisions are supposed to be authorized by villagers and overseen by village leaders. However, in reality, independent supervision by villagers might not be achieved effectively because citizens are constrained by their clientelist and factional relationships (Wang, 2014), and many of them lack sufficient civic literacy. This leaves room for village leaders to exercise discretion in the allocation of public funds.

Village governmental expenses are usually grouped into the following broad categories: production and construction, welfare and redistribution, reimbursement, collective enterprise, administration and other expenses. The first three categories together are sometimes referred to as “public good expenditures”, which are likely to benefit the majority of the villagers (Wang and Yao, 2007). Table B5 provides details about each category. Notably, administration expenses are particularly prone to discretionary misuse by local leaders (Wang and Yao, 2007; Wang, 2014).<sup>27</sup> My case study of two provinces also buttresses this notion quantitatively.<sup>28</sup>

Table 1 provides descriptive statistics for each expenditure category.<sup>29</sup> The “construction and production” and “administration and other” expenses are the two primary sources of spending. Each constitutes more than 30% of the village expenditure on average. Welfare and redistribution spending, which does not immediately contribute to production but benefits citizen well-being, constitutes only 14% of total public spending on average. This pattern is consistent with observations that social welfare and related public goods in rural China have

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<sup>27</sup>See Wang (2014, page 71) for example: “In theory, the village entertainment expenditure [which is part of its administration expenses] should only occur in the process of doing necessary public affairs...In reality, however, due to a lack of transparency and oversight, village cadres actually have considerable discretion on how to spend on entertainment. In many villages, a significant part of administration funds is often overspent and even abused.”

<sup>28</sup>Specifically, it included a survey of village heads and citizens to gauge their perception of uncertainty and discretion surrounding each expenditure category. The statistical results in Table C1 confirm that administration spending is perceived to be less transparent and more susceptible to misuse and embezzlement.

<sup>29</sup>Unlike other levels of government, budget-making is less institutionalized at the village level. Typically, villages make only coarse budget plans at the start of the year, with actual expenditures being determined through joint sessions and representative meetings (or by village leaders for smaller amounts), depending on actual needs. For this reason, the survey only records actual expenditures.

long been under-provided (Zhang, 2011).

## 4.2.2 Changes in village expenditures suggestive of responsiveness

Table 4 presents the estimated impacts of zodiac leaders on village expenditures. Each outcome variable represents the realized expenditure for the given year. Columns 1-5 focus on changes in expenditure shares. Column 1 shows that, given a leadership pair, having either in their zodiac year is associated with a 4 percentage point increase (0.19 standard deviation) in the share of funding allocated to welfare and redistribution, while Columns 2-4, featuring estimates close to zero with no statistical significance, implying that the increase in welfare expenses does not sacrifice production investment. Instead, the coefficient *Zodiac* in Column 5 shows a 6 percentage point decrease in the share of funding allocated to administration expenses. Given the magnitudes of estimates of changes to welfare spending and administration spending are largely comparable, Column 6 further examines the extensive margin using the total amount spent. The estimate is indistinguishable from zero, alleviating the concern that increased public good expenditures are accompanied by the possibility of a deficit. As with the previous analysis, Figure A1 provides a set of event study plots for all related dependent variables.

Although the data do not contain fine-grained entries for us to pinpoint what exactly changes in public good provision, Table B6 provides additional indications by exploring heterogeneity based on additional survey questions conducted after 2014. The estimates suggest that the impact of zodiac leaders on public good provision tends to be specific to citizen needs: a higher share of senior citizens (school-age children) is associated with a higher likelihood of increased input in elderly care (educational investment).

Collectively, the results above suggest that lower risk-taking of rural leaders can reshape the allocation of public resources, with the changes plausibly reflecting improved accountability. Notably, my analysis does not assume that all village heads are rent-seekers. Rather, the emphasis here is their increased focus toward the needs of constituents due to risk avoidance, which is not specific to the types of village leaders (“corrupt” or “clean”). Relatedly, the results so far also provide an empirical test on whether the preferences of extractive superiors (if exist) – who prefer village leaders to extract more rents to entertain them – can overall dominate the preferences of other constituents (citizens and other clean officials). The decreased administration spending and increased perceived responsiveness suggest against this possibility.

### 4.3 Further results on policy innovation

Grassroots China has long acted as the vanguard for policy innovation. For instance, the groundbreaking de-collectivism movement by Xiaogang village in 1978 has replaced the long-standing collective farming mode, marking the beginning of land property reforms in China (McMillan, Whalley and Zhu, 1989; Lin, 1992). Another example is the self-governance experiment by Hezhai village in 1980, which has greatly contributed to the central government's policy learning of local elections (Tan, 2006). Risk avoidance in zodiac years may discourage village heads from initiating innovative policies, as such policies fall outside existing contracts, leading to greater uncertainty about potential outcomes and constituents' reactions (Wang and Yang, 2022). Furthermore, a greater emphasis on aggregating others' feedback also increases the difficulty of adopting innovation, as other officials and villagers may likely have dispersed preferences over unfamiliar policies.

To quantitatively examine the impact on local policy innovation, I directly use the information from the survey, which records if the village government has promoted any autonomous policy innovation in a given year. I only use the binary outcome to capture the extensive margin, because not all years of the survey detail the number and content of innovative policies. Although this information is provided by village leaders, given that all grassroots policy experiments are formally documented and verified by upper-level governments, falsification is unlikely to be a significant issue. To provide a more concrete idea about innovative policies in the 2010s, I provide two examples observed in my sampled villages:

1. **Party member credit management.** Wanhua Village has been implementing a party member credit system since 2014, carrying out quantitative performance evaluation. This was done two years earlier than the relevant policies promoted by the county government.
2. **"Red and White" Council.** In 2016, several villages in Macheng County experimented with the "Red and White Council" institution, focusing on addressing the issue of heavy social and financial burdens for local weddings and funerals. The main innovation is that the council was composed of respected local elites instead of government officials. Their approach was disseminated by the National Office for Spiritual Civilization through its briefings.

Table 5 presents the estimation results. The OLS estimate shows that the zodiac leader is associated with a 7 percentage point decrease (0.23 standard deviation) in the probability of initiating innovative policies. To account for the binary nature of the dependent variable, Column 2 employs Probit estimation, which yields consistent results. Next, Columns 3-4

conduct a placebo test using rural-related policy experiments implemented by the county government to which a village belongs, based on data collected from county yearbooks. Since these policies are determined by the county government and cover all villages under its administration, individual village leaders should not have significant influence over them. In line with this notion, both OLS and Probit estimates are indistinguishable from zero when using the placebo outcome. [Figure 5](#) corroborates these findings using the event study plots.

Overall, the above results indicate that risk-averse village heads tend to generate less policy innovation. Accordingly, it can be inferred that the increased responsiveness towards citizens documented may be largely achieved by employing pre-existing decision-making platforms and policy instruments. It is therefore natural to speculate that in contexts where policy experiments are of great significance, risk-taking by front-line leaders may potentially result in a trade-off between accountability and public entrepreneurship ([Bellone and Goerl, 1992](#); [Teodoro, 2011](#)).

## 5 Discussion

### 5.1 Robustness

My main specification holds the leadership pair constant and controls the quadratic form of the leader's age. [Table B7](#) provides a series of robustness checks adopting various specifications. Each cell reports the result of a separate regression.

**Alternative clusters for statistical inference.** The baseline model allows the error terms to be correlated at the village level in order to obtain more conservative standard errors. The first part of [Table B7](#) adds standard errors based on two alternative clusters: one at the leadership pair level, and the other at the PS and VC level separately using the two-way clustering method. To demonstrate robustness for multiple hypothesis testing, I also present adjusted sharpened q-values following [Anderson \(2008\)](#). All results remain robust to these alternative criteria for statistical inferences.

**Selection of village leaders.** I then explore to what extent the selection margin matters, which relates to the use of leadership fixed effects. To this end, I replace leadership fixed effects with village fixed effects to re-estimate the model. As shown in the second row, the magnitudes of most estimated coefficients decline by a small amount, but all empirical patterns remain consistent. This confirms the discernible but limited confoundedness generated by the selection/sorting of public leaders in my identification.

**Additional controls.** The third row of [Table B7](#) adopts an alternative approach to con-

trolling for age, with quadratic age controls replaced with splines, using knots at each of 30, 42, 54, and 66 (at the middle points between zodiac years) for both PSs and VCs. The results are largely unaffected. Since the implementation of top-down reforms and policies in rural China is usually determined by provincial governments, I further control for province-year fixed effects to exploit only within-province variation. The results of the fourth row indicate that my findings are highly robust to this stringent set of controls. The fifth row demonstrates the results based on an even more stringent set of controls, allowing each village to possess a specific linear time trend. Introducing village-specific trends reduces the precision of my estimates, which is justified given the limited time span of our data (6 years). Nonetheless, the coefficients remain largely comparable in magnitude.

**Balanced samples.** The last row of [Table B7](#) tests the robustness to the usage of balanced observations, by dropping sampled villages that have experienced changes in administrative divisions or survey attrition. This results in a total of 1,086 remaining observations. All empirical patterns remain constant.

## 5.2 Interpretation and mechanisms

**Leadership structure.** There are two local leadership structures in grassroots China: single (*Yi-jiān-tiāo*) and dual. In the single leadership structure, one individual holds both the positions of the PS and the VC – which has gained increasing popularity in the 2010s due to the “the Party leads on everything” agenda. As power is not shared between two individuals and thus no supervision within the local leadership, the single leadership structure may be more prone to unchecked power misuse ([Li, 2018](#); [De Janvry et al., 2023](#)). While the leadership structure can be associated with other factors, examining the zodiac year effects by leadership structure could still provide useful insights if it yields consistent patterns across different outcomes.

Panel B of [Table B8](#) presents the results. In line with the conjecture, the zodiac year effects are generally more prominent for the single leadership. This finding, though suggestive, speaks to the notion that centralized leadership is more likely to exhibit stronger responses to changes in leader preferences.

**Heterogeneity between PSs and VCs.** Relatedly, one may wonder if there is any heterogeneity between PSs and VCs during their zodiac years. On the one hand, their power separation is relatively ambiguous in the period of study (post-2000s) – they have substantial overlap in their roles in governance, both of them are under the supervision of upper-level governments, and their selection both involve input from local villagers. On the other hand,

VCs are generally considered to bear more risks of ignoring villager interests, since they are selected in a way more akin to elections.

Panel C of [Table B8](#) re-estimates the baseline model but allowing the zodiac effect to vary by position. More specifically, I break it down into three different cases: (1) PSs in zodiac years but VCs not, (2) VCs in zodiac years but PSs not, and (3) PSs and VCs both in their zodiac years. The former two cases mechanically require a dual leadership. The results suggest that PSs and VCs can both input and generate discernible changes, with VCs showing comparatively larger magnitudes in most outcomes. However, the most salient effect comes from when both of them are in their zodiac years. Combined with the leadership structure finding above, it can be inferred that zodiac leader effects are most pronounced when power is centralized and held by a single individual. Collectively, these heterogeneity findings provide a coherent picture in line with the theory that power structure, as a part of institutional features, plays a significant role in the impact of individual leaders (e.g., [Jones and Olken, 2005](#); [Li, 2018](#); [Ottinger and Voigtländer, 2021](#)). Besides, they also provide a useful check for the sensitivity of the form of explanatory variables.

**Villagers' strategic demand during leader zodiac years.** A nuanced question about the interpretation of my reduced form estimates is, in addition to changing leaders' behavior, whether leaders' zodiac years affect the behavior of villagers. Given a leader's zodiac is largely common knowledge in rural China, their zodiac year could be conceived by local villagers as an ideal opportunity to demand more about certain policy areas. Therefore, one may wonder to what extent the estimated effect is a combination of the "supply" (shifts in leader preferences) and "demand" (villager strategic demand) effects.

First, conceptually speaking, the demand changes should build up on a first-order shift in leader preferences and thus not a virtually antagonistic explanation. If villagers engage in local governance more actively to seek their interests during leaders' zodiac years only, then this is an indication of a temporary increase in leader responsiveness. Otherwise, in equilibrium, rational citizens would apply the same strategy in other years as well. That is to say, citizens take advantage of the heightened responsiveness resulting from their leaders' risk avoidance during zodiac years.

Second, while it is empirically challenging to separate each channel, I provide two quantitative pieces of suggestive evidence to shed some light on this question. One, the short survey conducted in the two provinces has elicited villager perception about the role of leader willingness versus citizen demand in shaping local policies. The statistical analysis indicates that while villagers have opportunities to contribute to policy-making, their input is contingent on

leader willingness to take action (Question 3 of Part 1, [Appendix C](#)). Two, I take advantage of the 2017 and 2018 waves of the village panel, which collect two measures of civic activeness in village governance: (1) civic overall participation in rural governance, and (2) civic activeness in village councils. Each variable is measured on a 5-point integer scale, where 1 is the lowest and 5 the highest, aggregated from responses from village committee members being interviewed each year. Although the data only span two years, these measures reflect the perceived civic activeness and thus serve as ideal proxies to investigate the extent to which the governance body is captured by villagers' aggressive demand. [Table B9](#) presents the results. The mean perception of civic engagement is 3.7 out of 5, suggesting that villagers generally engage in grassroots governance to some degree. However, I do not find marked changes in perceived civic activeness during leaders' zodiac years, and the result is robust to both OLS and Ordered Probit models.

While these results do not rule out the coordinating device mechanism, they suggest that individual leaders' preferences still remain central and relatively dominant to policy outcomes (and more generally, local development) in grassroots China.

### 5.3 External validity and limitations

As with any other empirical study, people may wonder to what extent my findings could hold beyond the particular context exploited in this paper. I provide a tentative discussion here to argue that what I observe in this context is of special interest and bears some general lessons.

From the outset, this study adds to the very limited work on Chinese political economy at the grassroots level. Villages represent the most fundamental level of governance in China and serve as the forefront of political experimentation and state-building ([Ying, 2014](#)), with 580 million residing citizens (42% of China's total population in 2018). However, given the data limitation, prior work has predominantly focused on top elites and senior officials.<sup>30</sup> The village-level analysis here helps shed some light on the significance of grassroots leaders, whose performance has a direct bearing on the well-being of over half a billion people. My analysis suggests that local governance is still heavily influenced by their preferences, which may even include non-standard factors like superstitions.

More broadly, my findings contribute to the discussion of how to better incentivize and

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<sup>30</sup>There is a good rationale to speculate that the zodiac effects observed in this study may also apply to higher-level Chinese officials, who face even greater subjective uncertainty. As noted, there is numerous anecdotal evidence suggestive of how superstitious they are (see Section 2). On the other hand, senior officials may also have better ways to neutralize such perception of negative risks. Due to data limitations on the decision-making and governance processes of senior officials, I am not able to empirically examine the impact on them.

regulate front-line leaders – a challenge faced by many regimes worldwide. In the absence of effective monitoring (e.g., [Banerjee et al., 2021](#); [Sanchez de la Sierra et al., 2022](#)), local officials may have limited incentives to gather feedback and be responsive, as there is no sufficient perceived punishment. In this regard, not only does this paper study the local heads of Chinese villages, but it also sheds light on a setting where there exists some form of institutions for constituents to input yet the *de facto* incentives for accountability remain limited. This feature may hold in many developing settings. Accordingly, lower risk-taking in this stage can serve as an additional form of incentive regulation for public leadership – an increase in unwillingness to bear the uncertainty generated by their deviation from the contract – which, in turn, may improve performance. Nevertheless, if we consider the multi-tasking nature of public agencies ([Holmstrom and Milgrom, 1991](#); [Besley et al., 2022](#)), I also highlight a potential trade-off between public entrepreneurship and rule-bound governance, which can be particularly significant during the process of political or economic transition. This suggests that the impact of bureaucratic risk-taking on societal welfare can be context-specific, which falls outside the scope of this study but presents a relevant avenue for future research.

Moving from the personnel to societal and institutional perspectives, my results also relate to the role of culture in shaping development. Superstitious beliefs are widely held across human societies, despite lacking scientific grounding ([Nunn and Sanchez de la Sierra, 2017](#)). A large body of superstitions in ancient China can be associated with risk-taking ([Sun, 2009](#)). Why would such culture occur and persist? One rationale is that promoting risk aversion can help stabilize society, which is particularly valued for the Chinese economy and polity. Alternatively, as astrology was administered by intellectuals to serve rulers, anthropological studies suggest that it was an implicit tool to constrain the tyranny of ancient rulers ([Sun, 2009](#); [Pankenier, 2013](#)). In such scenarios, supernatural forces might serve as the only deterrent for unchecked rulers, causing them to perceive punishment risks and discipline themselves.<sup>31</sup> My findings on responsiveness provide some support to this theory, speaking to the economic literature on the functionality of cultural beliefs in weak institutions (e.g., [Leeson and Suarez, 2015](#); [Nunn and Sanchez de la Sierra, 2017](#); [Le Rossignol, Lowes and Nunn, 2022](#)).

There are at least two limitations that call for caution when extrapolating my results.

First, in practice, it is infeasible to exploit idiosyncratic shocks like superstitions to alter risk-taking. In the short run, screening candidates not only based on their ability but also risk appetite and related traits may be a practical approach (e.g., [Hanna and Wang, 2017](#); [Ashraf et al., 2020](#); [Callen et al., 2022](#); [Gulzar and Khan, 2023](#)). In the long run, changes in social

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<sup>31</sup>Apart from zodiac and birth chart beliefs, some traditions may even attribute astrological events (e.g., eclipses) to heaven's anger at ruler malfeasance ([Miao, Ponticelli and Shao, 2021](#); [Sun and Li, 2023](#)).



norms or reward structures surrounding risk-taking can influence human capital supply for the state, although this is not necessarily specific to the public sector.

Second, the focus of this paper is from a personnel economic standpoint – risk-taking can change bureaucratic performance. As noted, its aggregate impact on societal welfare will be context-specific. For instance, the positive impact of risk avoidance on responsiveness toward citizens may only be effective when there exists some room for citizens to input, or the interests of citizens and higher-level officials (the two major constituents) are largely aligned. In a setting with extremely extractive top rulers who can shield local governors from all bottom-up punishment, risk avoidance can likely aggravate extraction. In such cases, top-down intimidation dominates, causing risk-averse leaders to prioritize the needs of their corrupt superiors. Nevertheless, given the salient vertical control in the Chinese setting after the 2000s (Martinez-Bravo et al., 2022) – in which local leadership has relatively limited room for citizen input – my results may still provide some suggestive references for contexts in which incentives to be accountable toward the public are not sufficient but generally greater than in the Chinese setting.

## 6 Conclusion

This paper studies the effects of risk-taking on public leadership, leveraging the enduring Chinese “zodiac year” belief, which generates within-individual variation in risk-taking according to exogenous astrological rules. Employing a nearly representative panel of Chinese villages, I find that risk avoidance of village leaders prompts responsiveness, accompanied by a coherent shift in village expenditure structures. However, risk-averse leaders are also less likely to embark on policy innovation, suggesting a potential trade-off between accountability and public entrepreneurship.

To my knowledge, this paper provides the first empirical evidence linking individual risk-taking to governance outcomes. Although the findings are based on the context of rural China, they may offer some broader insights by highlighting the role of risk appetite in shaping public leadership, which can be potentially operationalized to select and incentivize public workers in various contexts. The leverage of astrological determinants of leader preferences could also open door to more research in related areas.

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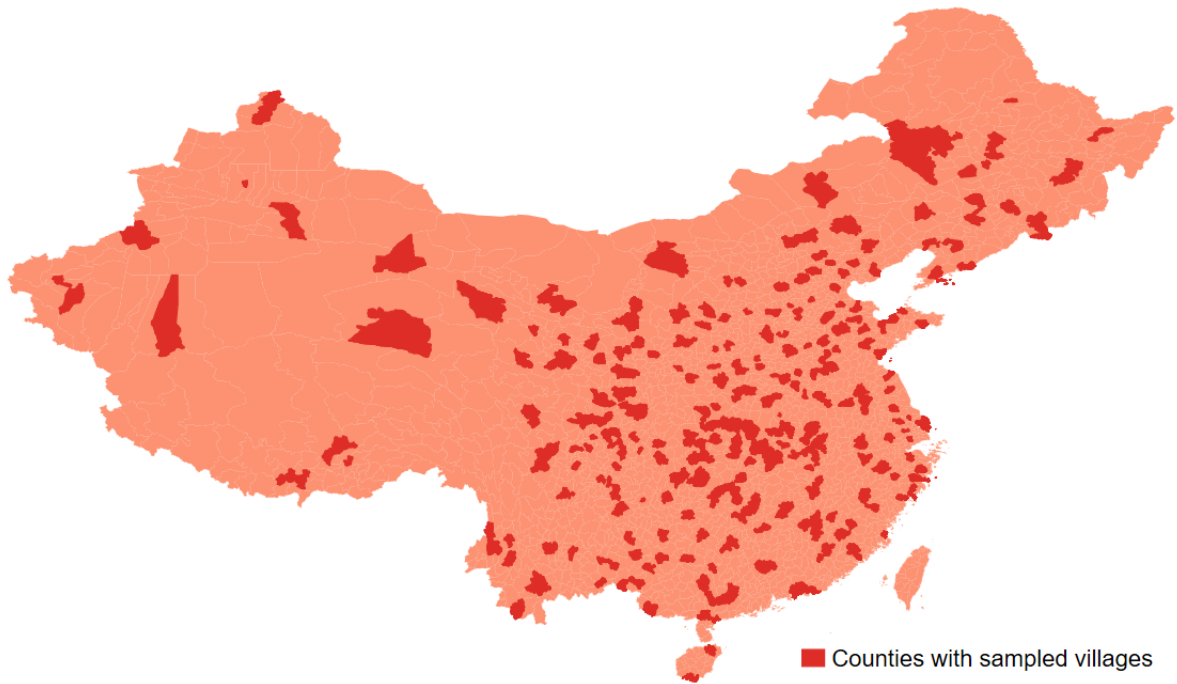
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## Figures

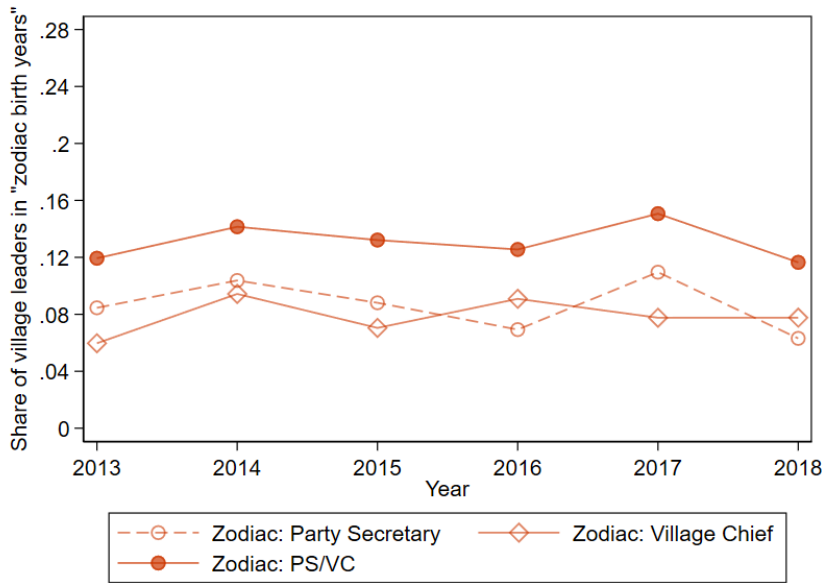
Figure 1: Map of village samples



*Notes:* The map highlights the counties with sampled villages in the data. The data of sampled villages in Xinjiang and Tibet are not accessible at the time of this study.

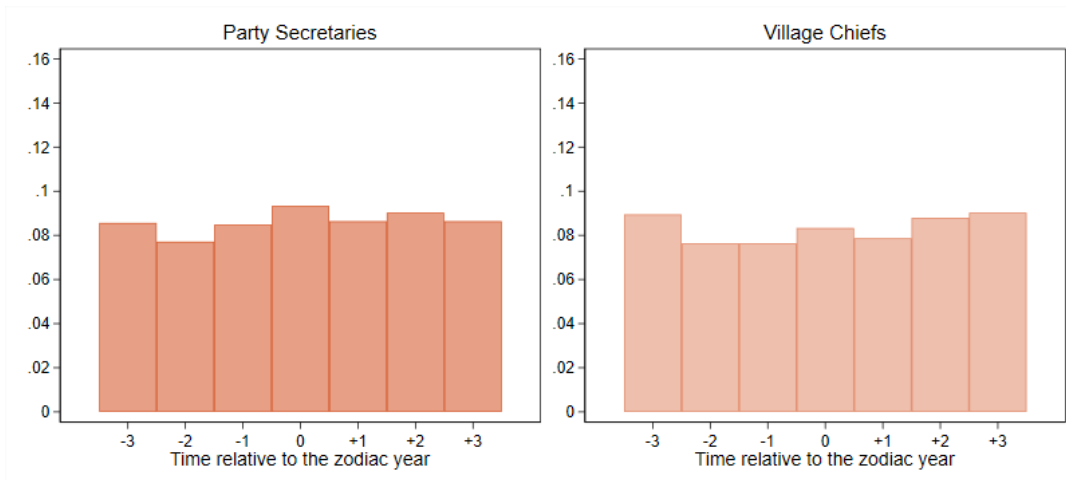
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Figure 2: Share of village leaders in zodiac years



Notes: The figure plots shares of village Party Secretaries and Village Chiefs in their zodiac years over time, respectively. In addition, the solid dots visualize shares of leadership pairs with at least one governor (either the PS or the VC) in their zodiac year.

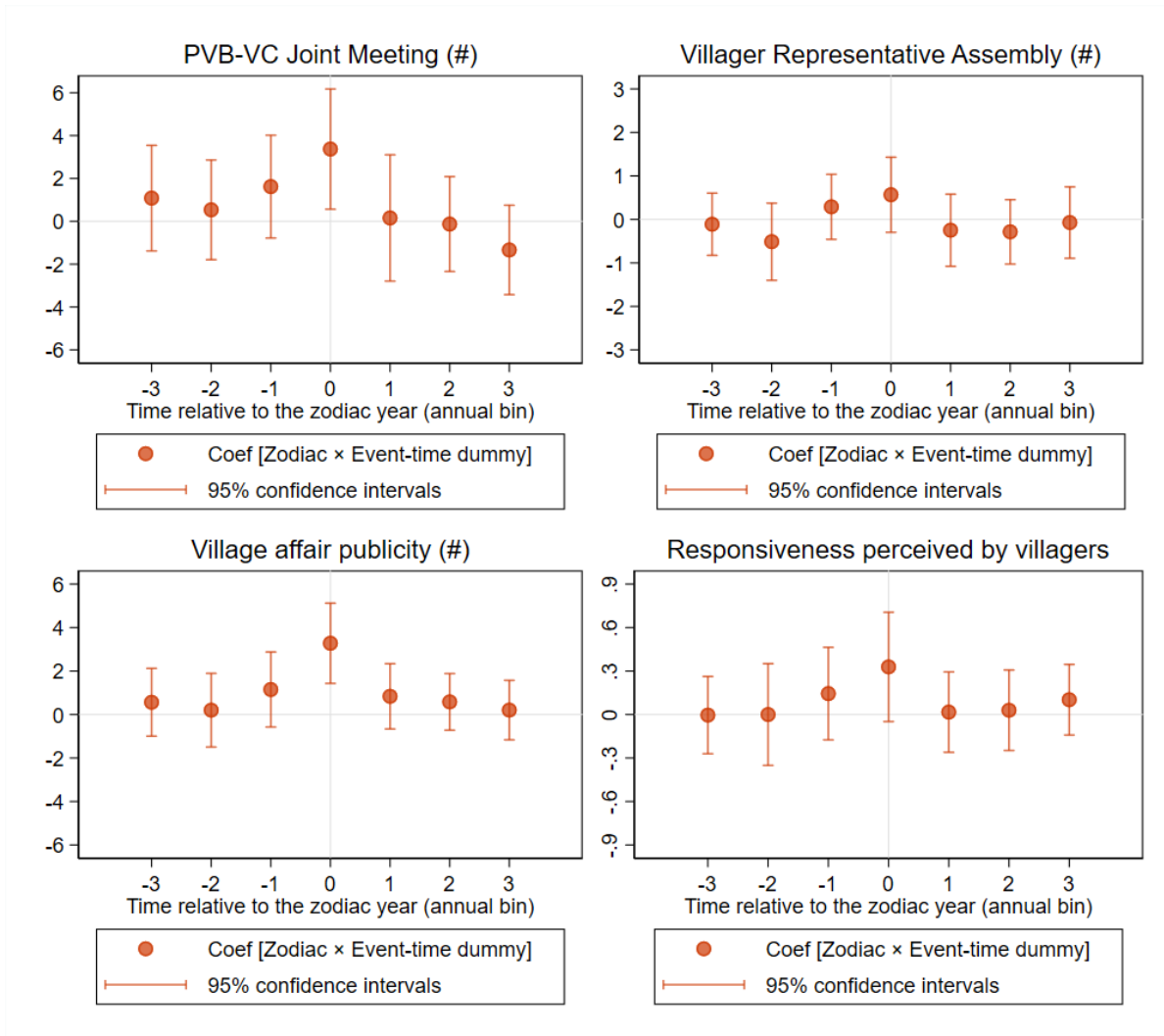
Figure 3: Distribution of age around zodiac years ( $\mathbf{1}_{\{Zodiac_{t+k}\}} = 1$ )



Notes: The figure presents the share of observations around the Party Secretary (left panel) or the Village Chief's (right panel) zodiac year event in a [-3,+3] window.

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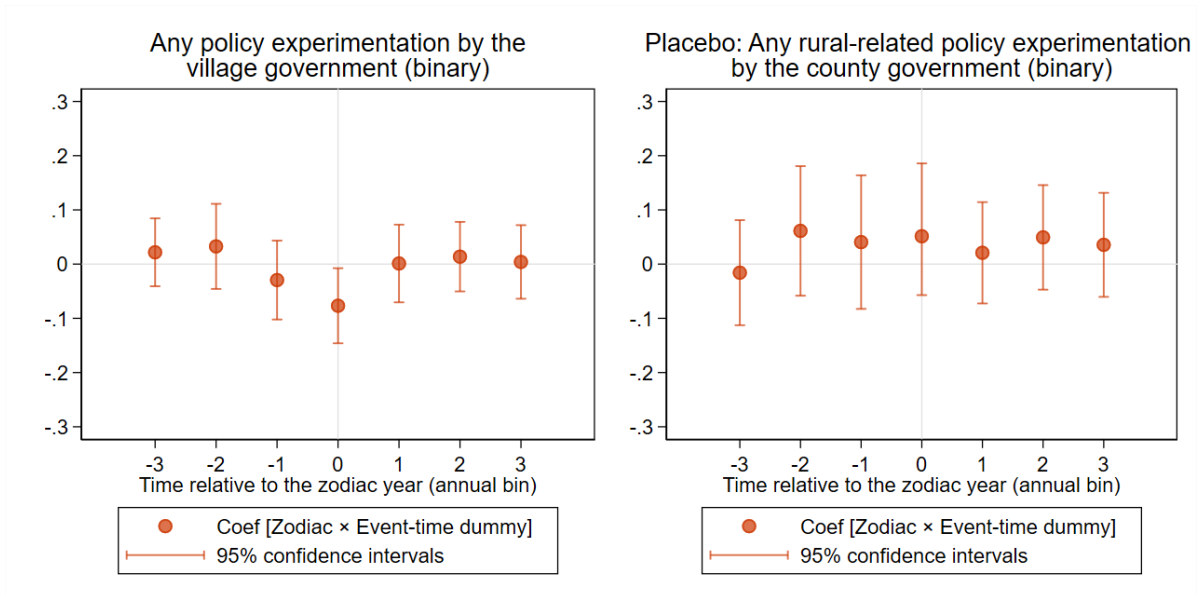
Figure 4: Event study plots – governance processes and responsiveness



Notes: The figure plots the point estimates along with their 95% confidence intervals in a  $[-3, +3]$  window relative to the zodiac year event. Each panel visualizes the estimated coefficients of an augmented regression, adopting the dynamic version of the specification (1). Unit of observation: village-year.

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Figure 5: Event study plots – policy innovation



Notes: The figure plots the point estimates along with their 95% confidence intervals in a  $[-3, +3]$  window relative to the zodiac year event. Each panel visualizes the estimated coefficients of an augmented regression, adopting the dynamic version of the specification (1). The placebo policies used in the right panel are determined by the county government and cover all villages under its administration, so individual village leaders do not have discretion over them. Unit of observation: village-year.

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# Tables

Table 1: Descriptive statistics

Variable name	Obs.	Mean	Std. dev
Zodiac: PS or VC	1296	0.13	0.34
Zodiac: PS	1294	0.08	0.28
Zodiac: VC	1292	0.08	0.27
Party Secretary (PS) age	1294	49.70	7.71
Village Chief (VC) age	1292	48.07	7.99
<i>Governance and transparency</i>			
# Party Branch Session	1,296	7.58	3.86
# VPB-VC Joint Meeting	1,296	15.67	12.79
# Villager Representative Assembly	1296	6.25	5.30
# Village General Meeting	1,296	1.88	2.80
# Village affair publicity board update	1,296	7.61	6.91
Any policy innovation	1,296	0.10	0.30
<i>Public finance</i>			
Total village expenditure (1,000 CNY)	1,296	3,768.62	54,442.03
Expenditure share (%):			
Construction and production	1,296	31.64	33.62
Welfare and redistribution	1,296	13.11	21.42
Reimbursement	1,296	10.53	17.74
Collective enterprise	1,296	6.79	17.31
Administration and other	1,296	37.95	34.48

*Notes:* Each observation is at the village-year level. “PS” and “VC” denote the Party Secretary and the Village Chief, respectively. The position of the PS or the VC may be vacant in some years for a village.

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Table 2: Lower risk-taking leaders and governance processes

	Village council and governing processes (#)				Transparency (#)	
	Policy-making and conferring		Civic meeting and council		Village affair publicity board update frequency	
	Party Branch Session (1)	VPB-VC Joint Meeting (2)	Villager Representative Assembly (3)	Village General Meeting (4)	(5)	(6)
Mean of dep. var	7.464	15.344	6.222	1.861	7.638	7.638
Zodiac	0.003 (0.423)	2.533*** (0.855)	0.696** (0.343)	0.008 (0.219)	2.308*** (0.424)	2.140*** (0.423)
Controls:						
Age and Age <sup>2</sup> # Meetings	Y	Y	Y	Y	Y	Y
Secretary-Chief FEs	Y	Y	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Observations	1,296	1,296	1,296	1,296	1,296	1,296
Adjusted R-squared	0.325	0.432	0.342	0.283	0.557	0.604

Notes: Unit of observation: village-year. "Zodiac" is a dummy that is 1 if either the Party Secretary or the Village Chief is in their zodiac year. "VPB" denotes the Village Party Branch; "VC" here denotes the Village Committee. Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 3: Lower risk-taking leaders and villager perception

	Responsiveness (1 - 4, poor - excellent)		Prestige (1 - 4, low - high)		Social proximity to villagers (1 - 4, weak - strong)	
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of dep. var	2.702	2.702	2.871	2.871	3.469	3.469
Zodiac	0.203** (0.093)	0.443** (0.189)	0.117 (0.074)	0.317 (0.213)	-0.018 (0.080)	-0.094 (0.230)
Controls: Age and Age <sup>2</sup>	Y	Y	Y	Y	Y	Y
Estimation	OLS	Ordered Probit	OLS	Ordered Probit	OLS	Ordered Probit
Secretary-Chief FEs	Y	Y	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Observations	881	881	881	881	881	881
Adjusted R-squared	0.232	-	0.305	-	0.150	-
Pseudo R-squared	-	0.358	-	0.453	-	0.232
Std. dev. of dep. var.	0.900	0.900	0.731	0.731	0.724	0.724

*Notes:* Unit of observation: village-year. "Zodiac" is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. Each outcome variable is a village-level aggregate measure based on the citizenry's perceived performance reviews of their village leaders. Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. Sample period: 2015 - 2018 (4 years). Standard errors in parentheses are clustered at the village level.



Table 4: Further results on village expenditures

	Village expenditure share by category (%)					Log.
	Welfare and redistribution (1)	Production and construction (2)	Reimbursement (3)	Cooperative enterprise (4)	Administration and other (5)	Total spending (6)
Mean of dep. var	13.577	32.246	10.325	6.816	37.048	5.067
Zodiac	4.096** (1.998)	1.102 (2.741)	1.315 (1.873)	0.315 (1.272)	-6.694** (2.580)	-0.028 (0.100)
Controls:						
Age and Age <sup>2</sup>	Y	Y	Y	Y	Y	Y
Secretary-Chief FEs	Y	Y	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Observations	1,296	1,296	1,296	1,296	1,296	1,296
Adjusted R-squared	0.223	0.235	0.071	0.230	0.254	0.578

Notes: Unit of observation: village-year. "Zodiac" is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table 5: Lower risk-taking leaders and policy innovation

	(1)	(2)	(3)	(4)
	Any policy experiment by the village government (binary)		Placebo: Any county-level rural-related policy experiment (binary)	
Mean of dep. var	0.102	0.102	0.272	0.272
Zodiac	-0.071*** (0.023)	-1.291** (0.510)	0.018 (0.044)	0.030 (0.202)
Controls:				
Age and Age <sup>2</sup>	Y	Y	Y	Y
Estimation	OLS	Probit	OLS	Probit
Secretary-Chief FEs	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Observations	1,296	1,296	1,296	1,296
Adjusted R-squared	0.221	-	0.113	-
Pseudo R-squared	-	0.152	-	0.151

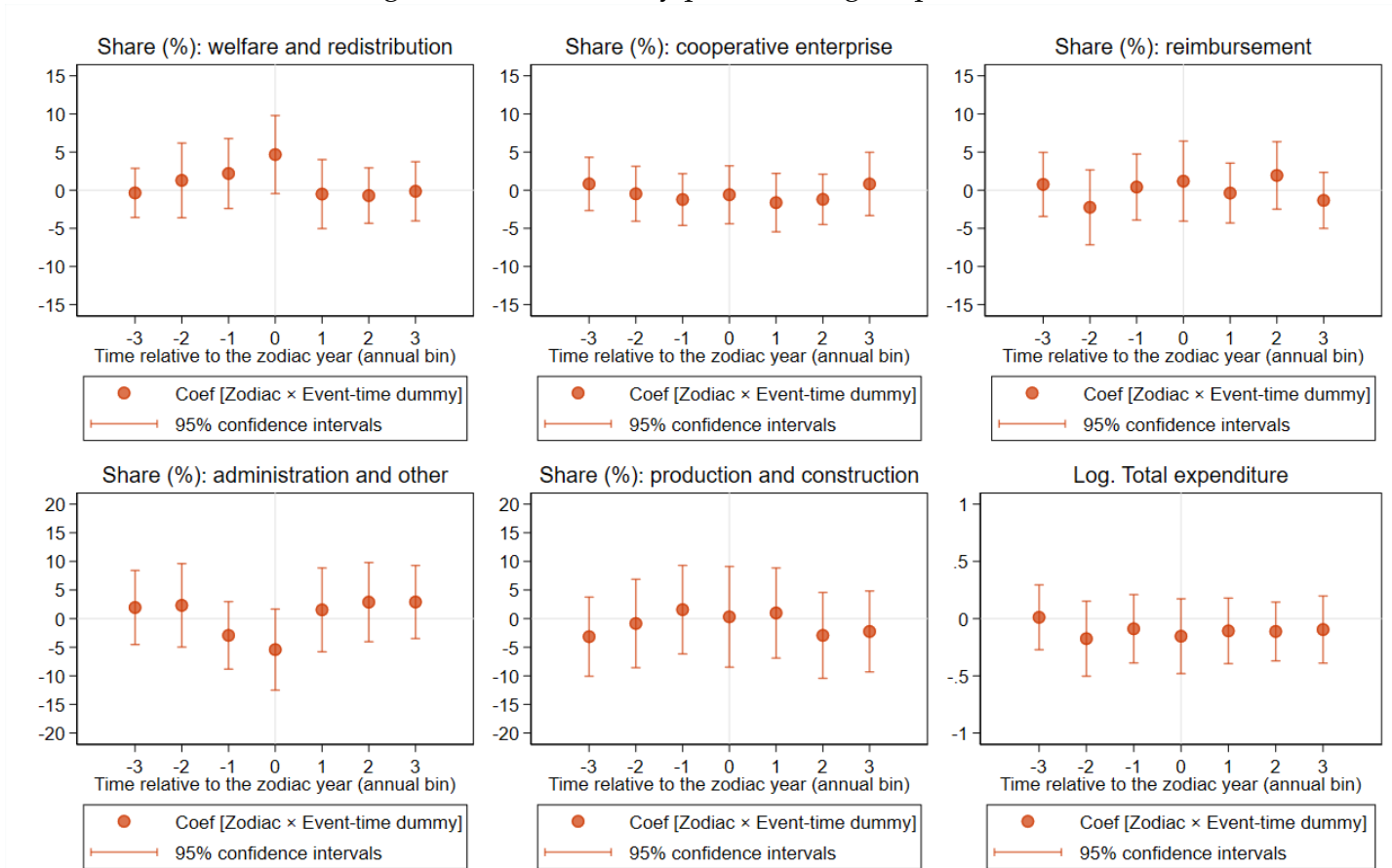
*Notes:* Unit of observation: village-year. “Zodiac” is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. The placebo policies in Columns 3 - 4 are determined by the county government and cover all villages under its administration, so individual village leaders do not have discretion over them. Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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# Appendix - Figures and Tables

Figure A1: Event study plots – village expenditures



1

Notes: The figure plots the point estimates along with their 95% confidence intervals in a  $[-3, +3]$  window relative to the zodiac year event. Each panel visualizes the estimated coefficients of an augmented regression, adopting the dynamic version of the specification (1). Unit of observation: village-year.

Table B1: Gregorian years and matched zodiac signs

Gregorian year	Zodiac sign assigned	Accurate Gregorian dates of the assigned zodiac sign
2013	Year of the Snake	Feb 10, 2013 – Jan 30, 2014
2014	Year of the Horse	Jan 31, 2014 – Feb 19, 2015
2015	Year of the Goat	Feb 20, 2015 – Feb 8, 2016
2016	Year of the Monkey	Feb 9, 2016 – Jan 27, 2017
2017	Year of the Rooster	Jan 28, 2017 – Feb 15, 2018
2018	Year of the Dog	Feb 16, 2018 – Feb 4, 2019

*Notes:* The unit of observation in this study is at the Village  $\times$  Gregorian Year level, and the table demonstrates the Gregorian years with assigned zodiac signs covered in this study. Column 3 shows the accurate Gregorian dates corresponding to the assigned zodiac sign in Column 2 if we strictly follow the lunar definition of the zodiac year. For example, Gregorian Year 2017 is considered the Year of the Rooster; but rigorously speaking, Lunar Year 2017 (featuring the accurate Year of the Rooster) spans from Gregorian Jan 28, 2017 to Gregorian Feb 16, 2018. China has been using the Gregorian calendar since 1949.

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Table B2: Balance test on village characteristics (2013 survey)

	Mean		Mean difference: (2)–(1)	
	Control group: Var( <i>Zodiac</i> ) =0	Ever-treated group: Var( <i>Zodiac</i> ) >0	Raw	Province FEs
	(1)	(2)	(3)	(4)
Population (#)	2,247.232 (1,561.406)	2,375.324 (1,635.820)	128.092 (211.871)	151.093 (186.144)
Female share	0.470 (0.047)	0.478 (0.041)	0.007 (0.006)	0.009 (0.006)
Cultivated land (arce)	3,496.660 (4,398.407)	5,465.934 (2,154.200)	1,969.274 (1,896.061)	2,173.336 (2,446.799)
CPC member (#)	57.843 (53.778)	56.528 (35.561)	-1.315 (6.713)	-0.356 (6.588)
Enterprise (#)	3.202 (9.002)	4.137 (7.523)	0.935 (1.191)	1.022 (1.306)
Public hygiene facility (#)	1.415 (0.809)	1.572 (1.388)	0.158 (0.145)	0.068 (0.153)
Well (#)	23.720 (56.725)	32.383 (123.673)	8.663 (12.603)	10.562 (16.509)
Bus station (Y/N)	0.457 (0.501)	0.399 (0.491)	-0.059 (0.066)	-0.056 (0.068)
Distance to county (km)	22.137 (18.706)	23.371 (28.917)	1.234 (3.211)	2.033 (3.112)
Tap water (#)	579.295 (411.250)	593.727 (405.732)	14.432 (54.430)	9.780 (50.785)
Household electricity (#)	382.318 (390.470)	400.373 (435.329)	18.055 (51.995)	2.069 (54.163)
Television (#)	379.270 (353.375)	389.281 (325.860)	10.012 (46.771)	27.844 (47.065)
Internet access (#)	120.284 (219.310)	113.195 (176.803)	-7.089 (27.941)	3.448 (28.166)
Temple (#)	0.726 (1.004)	0.578 (1.009)	-0.148 (0.154)	-0.083 (0.150)
Primary school (#)	0.663 (0.651)	0.695 (0.643)	0.032 (0.088)	0.042 (0.079)
Observations	95	139	234	234

Notes: Unit of observation: village. “*Zodiac*” is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year.  $Var(Zodiac)$  denotes the within-village variation in *Zodiac* throughout my sample period. Columns 3 and 4 report unconditional and conditional differences in means, respectively. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B2: Zodiac leaders and risk-taking – case study based on village minutes

	Risk-averse language frequency		Risk-loving language frequency		Placebo: ordinal number usage frequency		Meeting attendance rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean of dep. var	0.748	0.748	1.238	1.238	0.896	0.897	0.993	0.993
Zodiac	0.524*** (0.075)	0.537*** (0.078)	-0.658*** (0.091)	-0.674*** (0.102)	0.013 (0.048)	0.012 (0.047)	0.002 (0.007)	0.003 (0.007)
Controls:								
Age and Age <sup>2</sup>		Y		Y		Y		Y
Individual leader FEs	Y	Y	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y	Y	Y
Tenure FEs		Y		Y		Y	Y	Y
Observations	418	418	418	418	418	418	418	418
Adjusted R-squared	0.563	0.557	0.475	0.475	0.571	0.565	0.163	0.158
Std. dev. of dep. var.	0.491	0.491	0.623	0.623	0.316	0.316	0.039	0.039

*Notes:* Unit of observation: leader-year. “Zodiac” is a dummy that is 1 if the village leader is in their zodiac year. Each outcome variable represents the count of related expressions, normalized by dividing it with the total count of party meetings attended during that year. The placebo expression is “firstly” (as an ordinal number). Tenure FEs are dummies for each year of the term. Village FEs are absorbed by leader FEs. Sample period: 2014–2018. Data source: village meeting minutes. The sample covers 42 sampled villages in two provinces. Standard errors in parentheses are clustered at the village level; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B3: Zodiac years, risk-taking and other psychological forces

Panel A	Other psychological forces				
	Risk-taking (1, averse - 7, high) (1)	Cognitive z-score (2)	Good deeds (any donation, dummy) (3)	Importance of fairness (1, low - 5, high) (4)	Generalized trust (0, low - 10, high) (5)
Mean of dep. var	2.406	0.004	0.245	3.823	2.139
Zodiac	-0.615** (0.313)	-0.031 (0.114)	0.005 (0.078)	-0.131 (0.153)	0.009 (0.402)
Province FEs	Y	Y	Y	Y	Y
Individual controls	Y	Y	Y	Y	Y
Observations	428	428	428	427	423
Std. dev. of dep. var.	1.994	0.997	0.431	0.811	2.192
Panel B	Religious beliefs and other supernatural traditions (binary)				
	Buddhism (1)	Christianity (2)	Taoism (3)	Ghost (4)	Feng-shui (5)
Mean of dep. var	0.318	0.069	0.226	0.090	0.377
Zodiac	-0.034 (0.079)	-0.004 (0.040)	0.028 (0.073)	0.050 (0.056)	-0.069 (0.081)
Province FEs	Y	Y	Y	Y	Y
Individual controls	Y	Y	Y	Y	Y
Observations	428	427	428	427	428
Std. dev. of dep. var	0.466	0.253	0.419	0.386	0.485

Notes: Data source: China Family Panel Studies (CFPS, 2018), where a random pool of respondents are drawn to elicit their risk preferences (for consistency, all estimates are restricted to this sub-sample). Unit of observation: individual. "Zodiac" is a dummy that is 1 if the individual is in their zodiac year. Individual controls comprise the quadratic form of the respondent age, and full sets of fixed effects for gender, ethnicity, political status (whether the Communist Party member), educational attainment, rural residency, and survey time (month). The survey design to elicit risk appetite is: "Suppose that your total asset is 100,000. Now you choose one out of seven free lottery tickets. The award for each ticket is determined by flipping a coin (Head/Tail with 50%). Please read the instructions for each ticket on the screen carefully and tell us which ticket would you like to choose: (1) Head for 24000, tail for 24000; (2) Head for 30000, tail for 20000; (3) Head for 36000, tail for 16000; (4) Head for 42000, tail for 12000; (5) Head for 48000, tail for 8000; (6) Head for 52000, tail for 4000; (7) Head for 54000, tail for 0." Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B4: Village self-governance in rural China

<b>Policy-making and conferring</b>	
<b>VPB Session</b> [Village Party Branch members]	Regular sessions to deal with Party-relevant affairs, to organize elections and propaganda, and to oversee the big picture of village governance.
<b>PVB-VC Joint Meeting</b> [Party Branch & Village Committee members; sometimes also villager representatives]	To digest and implement policies issued by higher-level governments, to discuss and confer on local affairs, and to make proposals regarding fund usage and other important issues.
<b>Village council and civic meeting</b>	
<b>Villager Representative Assembly</b> [Villager representatives & Village Committee members ]	The village-level council formed by a group of villagers authorized by the VGM, with the right to review, approve or reject budgets, reports and proposals, to discuss and finalize/repeal the decisions over important village affairs, and to appraise and supervise the work of VC members.
<b>Village General Meeting</b> [All villagers]	The nominal supreme institution for village governance. In practice, it often authorizes the VRA to perform its functions. It plays a relatively important role in the nomination and election of village cadres in some regions, as the upper government may employ it to conduct democratic reviews (gathering feedback from villagers to assess performance) on local officials.
<b>Transparency</b>	
<b>Village affair publicity</b>	All village affairs affecting villager interests must be regularly publicized by the VC, commonly through the use of “village affairs publicity boards”.

*Notes:* The table summarizes key functions of village organs in Chinese rural governance. The participants are listed in brackets. Some Village Committee members are also Party members. For more details, see *Organic Law of the Villagers’ Committees of the People’s Republic of China (Standing Committee of the National People’s Congress, 2010 Revision)* and *Regulations On the Work of Grassroots Rural Organizations (CPC Central Committee, 2006)*.

Table B5: Village expenditures in rural China

Expenditure category	Detailed explanation
Production and construction	Investment in collective production (e.g., agricultural and irrigation projects) and related public goods (e.g. roads, water, electricity, gas, sewerage)
Welfare and redistribution	Expenditures on social security (e.g., pension, retirement communities), schooling subsidy, environment protection, public hygiene, and cultural activities
Reimbursement	Compensation and subsidies for villagers and cadres when they devote extra time to collective production activities and community services
Collective enterprise	Investment in collective enterprises owned by villagers
Administration and other	Payment to village cadres, regular administration fees, entertainment expenses, and other administrative expenses that are hard to categorize

*Notes:* The table demonstrates the content of each expenditure category in our data. For more details about public finance in rural China, see *Provisions for the Administration on Rural Collective Economic Organizations (2011 Revision)* by the Ministry of Agriculture and the Ministry of Supervision of the People's Republic of China.

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Table B6: Lower risk-taking leaders and responsiveness (additional results)

	(1)	(2)	(3)	(4)
	Any increased elderly care input		Any increased education-related input	
Mean of dep. var	0.648	0.648	0.579	0.579
Zodiac	0.015 (0.056)	0.017 (0.056)	0.069 (0.052)	0.058 (0.052)
× Share (%): elderly people (centered)	0.033** (0.016)	0.032** (0.016)		-0.011 (0.016)
× Share (%): School-age children (centered)		-0.004 (0.003)	0.005** (0.003)	0.005* (0.003)
Controls:				
Age and Age <sup>2</sup>	Y	Y	Y	Y
Secretary-Chief FEs	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Observations	860	860	860	860
Adjusted R-squared	0.263	0.262	0.323	0.326

Notes: Unit of observation: village-year. "Zodiac" is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. Each outcome variable is a binary that is 1 if the village government has organized any community activity to increase the input in the corresponding domain in a particular year. Sample period: 2015-2018 (relevant data not recorded before). Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B7: Risk-taking and village leadership – robustness

	Governance processes (#)			Village expenditure share (%)	Policy innovation	
	VPB-VC Meeting (1)	Villager Representative Assembly (2)	Transparency: village affair publicity board updates (3)	Welfare and redistribution (4)	Administration and other (5)	Any policy innovation (6)
Baseline specification	2.533	0.696	2.308	4.096	-6.694	-0.071
<i>Cluster SEs: Village</i>	(0.855)***	(0.343)**	(0.424)***	(1.998)**	(2.580)**	(0.023)***
<i>Cluster SEs: Leadership (PS × VC)</i>	(0.856)***	(0.352)**	(0.423)***	(1.998)**	(2.522)***	(0.023)***
<i>Cluster SEs: PSs and VCs (two-way)</i>	(0.855)***	(0.342)**	(0.426)***	(2.017)**	(2.553)***	(0.023)***
<i>FDR adjusted P-value</i>	[0.005]***	[0.016]**	[0.001]**	[0.016]**	[0.008]***	[0.002]***
Village FEs only	1.845 (1.091)*	0.425 (0.422)	1.660 (0.465)***	4.465 (1.756)**	-5.706 (2.417)***	-0.060 (0.021)***
Spline age controls	2.389 (0.825)***	0.577 (0.343)*	2.163 (0.423)***	4.369 (2.023)**	-6.559 (2.605)**	-0.075 (0.022)***
Province-Year FEs	2.485 (0.984)**	1.173 (0.410)***	2.805 (0.453)***	4.135 (2.195)*	-7.515 (2.865)***	-0.070 (0.026)***
Village-specific trends	2.860 (1.106)**	0.711 (0.452)	2.065 (0.482)***	3.590 (2.687)	-5.274 (3.651)	-0.071 (0.030)**
Balanced sample	3.189 (0.922)***	0.737 (0.357)**	2.325 (0.450)***	4.690 (2.153)**	-6.982 (2.633)***	-0.078 (0.025)***

Notes: Unit of observation: village-year. Each cell reports the estimated coefficient of “Zodiac” from a separate regression, where “Zodiac” is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. All regressions control for year FEs and tenure FEs, and all regressions except for that in the second row control for the Secretary-Chief FEs. The baseline specification controls for year FEs, Secretary-Chief FEs, tenure FEs, as well as the quadratic form of leaders’ age. The second row replaces the Secretary-Chief FEs with the village FEs. The third row replaces the quadratic age controls with B-splines using knots at each of 30, 42, 54 and 66 (at the middle points between zodiac years) for both PSs and VCs. Rows 4-5 further add the corresponding controls to the baseline specification. Unless otherwise stated, standard errors in parentheses are clustered at the village level. The sharpened q-values, following the false discovery rate procedure by Anderson (2008), are reported in brackets to account for multiple hypothesis testing. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B8: Risk-taking and village leadership – heterogeneity

	Governance processes (#)			Village expenditure share (%)		Policy innovation
	VPB-VC Meeting (1)	Villager Representative Assembly (2)	Transparency: village affair publicity board updates (3)	Welfare and redistribution (4)	Administration and other (5)	Any policy innovation (6)
<b>Panel A: Baseline specification</b>						
Zodiac (either leader)	2.533*** (0.855)	0.696** (0.343)	2.308*** (0.424)	4.096** (1.998)	-6.694** (2.580)	-0.071*** (0.023)
<b>Panel B: Leadership structure</b>						
Zodiac: PS and VC not the same person	2.369** (1.024)	0.686* (0.404)	2.173*** (0.494)	3.742 (2.316)	-5.808* (2.950)	-0.063** (0.027)
Zodiac: PS and VC the same person	3.028** (1.523)	0.828 (0.726)	2.718*** (0.836)	6.984* (3.792)	-9.375* (5.075)	-0.121*** (0.037)
<b>Panel C: Party Secretary vs. Village Chief</b>						
Zodiac: only PS	1.997* (1.109)	0.515 (0.478)	1.935*** (0.634)	3.303 (3.452)	-7.839* (4.500)	-0.074* (0.041)
Zodiac: only VC	2.567** (1.251)	0.810 (0.653)	2.445*** (0.774)	3.540 (3.165)	-5.918 (3.949)	-0.065* (0.034)
Zodiac: both PS and VC	3.167* (1.725)	0.792* (0.348)	2.620*** (0.758)	5.835* (3.276)	-9.144** (4.280)	-0.097*** (0.031)

Notes: Unit of observation: village-year. For comparison, **Panel A** presents the baseline results, where “Zodiac” is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. **Panel B** allows the effect to vary by the village leadership structure, with each column reporting two estimates from one regression. **Panel C** examines heterogeneous effects by positions, with each column reporting three estimates from one regression. “Zodiac: only PS” is a dummy that is 1 if the PS is in their zodiac year but the VC is not, “Zodiac: only VC” is a dummy that is 1 if the VC is in their zodiac year but the PS is not, and “Zodiac: both PS and VC” is a dummy that is 1 if the PS and the VC are simultaneously in their zodiac years. All regressions control for year FEs, Secretary-Chief FEs, tenure FEs, and the quadratic form of leaders’ age. Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table B9: Leaders' zodiac years and perceived civic engagement

	Overall civic activeness (1 - 5, low - high)			Civic engagement in villager meetings (1 - 5, low - high)		
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of dep. var	3.692	3.692	3.692	3.711	3.711	3.711
Zodiac	0.013 (0.120)	0.018 (0.115)	-0.057 (0.429)	-0.198 (0.238)	-0.292 (0.242)	-0.892 (0.641)
Controls:						
Age and Age <sup>2</sup>		Y	Y		Y	Y
Estimation	OLS	OLS	Ordered Probit	OLS	OLS	Ordered Probit
Secretary-Chief FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Tenure FEs		Y	Y		Y	Y
Observations	456	456	456	456	456	456
Adjusted R-squared	0.380	0.399	-	0.199	0.193	-
Pseudo R-squared	-	-	0.709	-	-	0.530
Std. dev. of dep. var.	0.756	0.756	0.756	0.807	0.807	0.807

*Notes:* Unit of observation: village-year. "Zodiac" is a dummy that is 1 if either the Party Secretary (PS) or the Village Chief (VC) is in their zodiac year. Each outcome variable is a subjective measure perceived by village committee members being interviewed. Tenure FEs are dummies for each year of the term. Village FEs are absorbed by Secretary-Chief pair FEs. Sample period: 2017 - 2018 (relevant data not recorded before). Standard errors in parentheses are clustered at the village level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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## Appendix - Short Survey Results

The survey was conducted by the college student grassroots survey teams during their visits to the sampled villages in 2023, as part of the case study. The survey has two parts: the first part asks about respondents' perceptions of village expenditure entries, while the second part asks about customs and norms associated with zodiac year superstitions. The survey was completed anonymously by a total of 89 village government members and 306 villagers from 42 sampled villages (including those participating in the China Rural Survey) in two provinces. With the exception of Question 3 in Part I, none of our questions touched on sensitive topics in rural China. Although the responses were voluntary and may not be a truly random sample of villagers, given the nature of these questions, the results here still provide useful evidence to buttress my quantitative analysis.

### C1. Village expenditures and governance

**[Question 1.]** *“Are you familiar with the main types of expenses that the village government incurs? (1, None - 4, Very well)”*

**[Question 2.]** *“From your perspective, in the past decade, which types of expenditures pose greater risks of discretionary usage or misappropriation that might be detected? (1, Problematic – 4, Clean)”*

**Table C1:** Perception of expenditure transparency – case study results

<b>Question 1: knowledge about village expenditures</b>				
	Nothing	Relatively limited	Some	Well
Share	14.68%	31.65%	24.81%	28.86%
<b>Question 2: perception of misappropriation by categories</b>				
	Problematic	Somewhat problematic	Relatively Clean	Clean
Production, construction, collective	15.95%	33.16%	40.51%	10.38%
Welfare, redistribution, social	23.29%	30.89%	26.58%	19.24%
Administration, entertainment	44.56%	31.90%	15.95%	7.59%

*Notes:* Data were collected by the college survey teams in 2023 from 42 sampled villages in two provinces. The statistics are based on the responses of 395 respondents.

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**[Question 3\*.]** *“Please share your perspective on the role of leaders versus villagers in shaping*

local policies, drawing from your own practical experience and that of others. Use a slider to select on a ten-point scale (1: Leadership willingness to act goes first – 10: Villager pressure and demand goes first).”

Because of administrative and logistical constraints, this question was only asked in one province (with 205 observations). The average score is 3.6 out of 10, suggesting that leaders’ preferences still act as a primary driver in promoting civic engagement and shaping local policies. In addition, if interviewees adjusted their responses in accordance with socially acceptable or politically correct views, the underlying statistic might be even smaller.

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## C2. “Zodiac year” norms

**[Question 1.]** “Are you familiar with the concept of ‘zodiac years’? (Yes or No)”

382 out of 395 (96.71%) respondents respond “Yes”. The result suggests that zodiac year superstitions are widely known in rural China.

**[Question 2.]** “What are the main traditions/customs associated with zodiac years for you and your family? (Check the corresponding boxes in the table)”

**Table C2:** Zodiac year traditions – case study results

	Relevant	Not relevant	Not sure
Being cautious, less risk-taking	95.55%	1.58%	2.87%
Wearing red	42.15%	22.51%	35.34%
Banquet	2.36%	87.17%	10.47%
Good deeds	10.73%	72.78%	16.49%
*Other traditions	35 out of 382: worship/no wedding		

*Notes:* Data were collected by the college survey teams in 2023 from 42 sampled villages in two provinces. The statistics are based on the responses of the 382 respondents who have answered “Yes” to the first question.

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