Culture, Risk-Taking, and Public Leadership: Evidence from Chinese Villages

Justin Jihao Hong*

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Abstract

Many societies preserve traditional culture tied to economically relevant psychological parameters. This paper shows the substantial impact of traditional culture on public leadership and governance, leveraging widely-held zodiac beliefs about risk-avoidance in rural China, which follow an exogenous 12-year cycle tied to a person's birth year. Using a representative village panel, I find that village heads in their risk-avoidant zodiac years follow governance processes more and enhance villagers' perception about responsiveness. I also observe consistent expenditure changes, with higher public good spending and a comparable decline in administration spending that is prone to misuse. However, treated leaders are also less likely to promote policy innovation. These results can be most easily reconciled with a shift in village heads' risk-taking, which may yield a potential trade-off between accountability and public entrepreneurship.

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1 Introduction

Many societies have traditional culture concerning psychological factors that are socioeconomically relevant — such as risk-taking, reciprocity, and trust (Michalopoulos and Xue, 2021; Le Rossignol, Lowes and Nunn, 2022). A growing body of evidence shows that traditional beliefs still significantly affect business decisions today (e.g., Fisman et al., 2023; Butinda et al., 2023). Yet, little is known about whether it matters for public officials' performance, which can have broader impacts on the quality of governance.

This paper fills this gap by leveraging the widely-held "zodiac year" superstitions in rural China to study their impact on village heads' performance. The "zodiac year" recurs every twelve years (at ages 12, 24, 36, 48, etc.), which will differ across individuals depending on their birth year. According to zodiac superstitions, individuals face greater volatility in luck and should be more conservative during their zodiac years (Fisman et al., 2023). As such, these traditional beliefs may yield an individual-specific, temporal shift in one's risk-taking and other related psychological forces. To identify the causal effects of zodiac beliefs, I hold location and leadership constant, and compare governance 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.[1] 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 substantial power in policy implementation and resource allocation (Wang, 2014). In practice, malfeasance and code violations remain pervasive in rural China's governance (Wang and Yao, 2007). Zodiac year culture, through its association with

[1] 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 × year (i.e., village × year) as the unit of observation, and I discuss the heterogeneity of positions in additional analyses.

risk-taking and related psychological forces, may affect village leadership in ambiguous ways. In theory, a certain degree of lower risk-taking can improve adherence to rules, when limited supervision and punishments constrain officials' accountability (Bendor, 1988; Leyden and Link, 1993; Dewatripont, Jewitt and Tirole, 1999). However, excessive risk avoidance may hinder innovation and reduce efficiency (Balla and Gormley Jr, 2017; EBRD, 1999; De Vries, Bekkers and Tummers, 2016). Additionally, zodiac beliefs might further correlate with other psychological traits, such as prosociality and goodwill, which could also shape village heads' behavior.

I begin by studying how village heads in zodiac years impact governance processes. 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 policies, as well as frequent information disclosure for transparency. 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 meetings — along with increased governance transparency.[2] 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 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 some anticipatory patterns (minor lead effects in year -1). These results suggest that traditional zodiac beliefs can significantly affect decision-making processes and the quality of governance.

The second set of results corroborates 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 accom-

[2]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).

panied 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 leaders' zodiac year shocks can change village governance, likely 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).

As the zodiac beliefs are primarily associated with risk-taking, I further complement by examining its impact on policy innovation. Both OLS and Probit estimates show 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 are consistent with the risk-avoidance nature of the zodiac year culture, and suggest that the improved responsiveness we observe may largely occur within the existing governance framework. Together, these combined results point to a potential trade-off between accountability and public entrepreneurship.

All empirical patterns remain robust to more stringent specifications and alternative inference methods. While the baseline analysis pools the zodiac treatment — defined as either the Party Secretary or the Village Chief being in their zodiac year — disaggregated results show that both leaders' zodiac years can independently affect village governance. Notably, the zodiac effects are more pronounced in the presence of centralized leadership (when a single individual holds both positions), speaking to the theories of power structure (e.g., Jones and Olken, 2005; Li, 2018).

For mechanism analysis, I present suggestive evidence that such changes are likely driven by a lower risk appetite of village heads. First, I identify the frequency of leaders' risk-taking-related language, based on manually collected meeting minute data from two provinces. The quantitative results indicate a significant increase in the usage of risk-avoidance language during leaders' zodiac years. Given the dual leadership structure, I further examine whether one leader's zodiac year shock may influence risk-taking of the other leader, which can amplify the overall policy impact. I do not find strong effects along this dimension, suggesting that the observed patterns are likely to be driven more by the treated leaders themselves. Second, I examine the role of other common psychological channels. Using manually collected data

and representative surveys, I find that zodiac year beliefs are less related to a range of prominent alternative psychological forces, such as cognitive ability, prosociality, trust, as well as other supernatural beliefs. Third, I discuss whether villagers treat governors differently during governors' zodiac years. I use civic activeness measures collected in the later years of the survey, and my analysis finds a limited role of this channel. While these combined results do not rule out the potential importance of other psychological and behavioral forces, they suggest a shift in village heads' risk-taking as a logical mechanism underpinning the observed governance changes. Lastly, I further discuss implications and limitations to be considered when extrapolating my empirical results in developing settings.

Collectively, this paper relates to three strands of literature. To my knowledge, it is among the first to show the causal effects of traditional beliefs on the quality of government — whereas previous work has largely focused on business settings.[3] My findings thus add to the broader literature on culture and development (Banfield, 1958; Guiso, Sapienza and Zingales, 2006; Alesina and Giuliano, 2015; Gorodnichenko and Roland, 2020; Nunn, 2022). The "zodiac year" tradition induces within-official variation, offering an ideal setting to isolate cultural shocks from other confounders and establish causality. Consistent with theoretical studies, my results on accountability suggest that traditional culture can, in some cases, facilitate governance in certain dimensions (Posner, 1980; Leeson, 2012; Leeson and Suarez, 2015; Gershman, 2015).

My findings also add to the study of incentives and performance in the public sector. Despite the evidence that public employees tend to have lower risk appetite 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. In line with Fisman et al. (2023)'s findings in the private sector, I show village heads' reduced risk-taking as one logical mechanism for the zodiac year effects. A suggestive lesson is that risk avoidance of public officials may serve as a utile tool to provide better incentives when the regime prioritizes

[3]For how traditional culture shape business and personal outcomes, see for example: Leeson and Coyne (2012); Nunn and Sanchez de la Sierra (2017); Halla, Liu and Liu (2019); Chen et al. (2020); Liu et al. (2021); Mocan and Yu (2020); Li et al. (2021); Le Rossignol, Lowes and Nunn (2022); Fisman et al. (2023); Wu, Zhang and Zhou (2023); Sievert (2024).

rule-bound administration and accountability, but it may also yield a trade-off when policy innovation is of significance.[4]

Finally, this study speaks to the growing literature on individual leadership (Jones and Olken, 2005). Previous studies have focused on governors' ascriptive traits and social experience.[5] While many of them are motivated by understanding attitudinal shifts arising from certain identities or experience (e.g., Levitt, 1996; Chattopadhyay and Duflo, 2004), separating a true attitudinal shift remains a challenge (Washington, 2008). I make progress by exploiting within-individual variation in psychological determinants. In addition, my focus on grassroots governors also complements the literature on front-line state workers (Tsai, 2007; Khan, Khwaja and Olken, 2019; Banerjee et al., 2021; Xu, 2021).

2 Background

2.1 "Zodiac year" culture

The "zodiac year" beliefs date 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".[6] In particular, years that have the same animal attribute as a person's zodiac sign are referred to as their "zodiac years". For instance, an individual born in the lunar year 1989 has the zodiac sign of the snake.

[4]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.

[5]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), identity (Hodler and Raschky, 2014; Bhalotra et al., 2014; Burgess et al., 2015; Nye, Rainer and Stratmann, 2015; Beach and Jones, 2017; Bhalotra, Clots-Figueras and Iyer, 2021; De Luca et al., 2018; 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).

[6]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. Zodiac signs in themselves are not particularly relevant to my identification, since the zodiac year superstition applies to individuals with any zodiac sign.

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, prompting them to exercise greater caution during their zodiac years. 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.[7]

The zodiac year context is of special interest, as it conceptually features a set of traditional beliefs regarding risk-taking (and related behavioral forces). It claims that individuals encounter greater volatility in luck during their zodiac years, featuring higher perceived uncertainty; and given greater volatility, it is generally advised to approach one's zodiac year conservatively — direct guidance promoting risk avoidance. Consequently, the superstition can likely induce a temporal shift in risk-taking and other related psychological factors, thus potentially altering individual decision-making. Since in practice it is difficult to distinguish between changes in preferences versus beliefs in my data, I use the term "risk-taking" and "risk avoidance" throughout the paper. Fisman et al. (2023) provide systematic evidence relating zodiac year superstitions to risk avoidance in the private sector — individuals and private firms tend to behave more conservatively during their zodiac years.[8] I also discuss alternative channels unrelated to risk-taking in the mechanism analysis.

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 lead-

[7]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 and https://www.chinanews.com/shipin/cns-d/2021/02-11/news880379.shtml.

[8]See also Chen et al. (2020), Li et al. (2021), Liu et al. (2021) and Wu, Zhang and Zhou (2023).

ership 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. According to the *Regulations on the Work of Grassroots Rural Organizations of China*, the typical term for a PS or VC is three years in most Chinese villages. Institutional details related to decision-making processes and village expenditures are discussed as they become relevant in empirical analyses later.

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[9]) 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). 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

[9]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).

too much (Wang, 2014). Meanwhile, compared to other government layers, villages are relatively distant from upper-level governments, making daily top-down supervision difficult. Consequently, village heads 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.[10] 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 Ministry of Civil Affairs.[11] The survey is used for internal research and governmental consulting, which combines administrative records from both upper-level 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, and measures of government (e.g., governance processes and transparency). For personnel, governance process, and public finance outcomes, the survey obtains information directly from administrative records maintained by township governments. Information on policy innovation and villagers' perceptions is collected from village leaders and villagers by the survey team. 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 basic 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

[10]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.

[11]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).

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).[12] 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 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). 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. Table B1 further complements by outlining how the survey collects and constructs the variables.

3.2 Empirical strategy

My identification exploits the feature that the "zodiac year" culture generates an individual-specific shock every 12 years, which differs across governors depending on their year of birth. The baseline specification is as follows:

$$Y_{vt} = \beta * Zodiac_{sct} + x_{st}^{'}\gamma_s + x_{ct}^{'}\gamma_c + \tau_t + \theta_{sc} + \varepsilon_{vt} \tag{1}$$

where the outcome of interest for village v in year t is a function of: $Zodiac_{sct}$, a dummy that is one if either a village's Party Secretary (s) or Village Chief (c) is in their "zodiac year" in year t; τ_t, year fixed effects; θ_{sc}, leadership pair fixed effects; $x_{st}^{'}$ and $x_{ct}^{'}$, leader specific controls (age, age^2, and tenure fixed effects). 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 in

[12] Only 28 observations in the sample need this additional survey to confirm their zodiac signs. The response rate is 100%.

the baseline specification.

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.[13] Although the Chinese lunar year does not align precisely with the Gregorian calendar, the difference between them is always about one month only. Therefore, 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 B2 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. Apart from Figure 2, Figure 3 corroborates the uniform distribution of age around the zodiac year event. These findings provide descriptive support for interpreting β as the causal effect.

As the zodiac superstition is built on exogenous astrological rules, there are few candidates threatening the identification. Importantly, I introduce θ_{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", altering their probability of political entry) and also enables clear interpretation of β. Around 54.2% of leadership pairs in the sample exhibit variation in the zodiac year treatment, ensuring rich variation for identification. Table B3 further shows 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 introduce a set of dummies for each leader's tenure (i.e., years in office) (e.g., Xi, Yao and Zhang, 2018; Chen

[13] 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).

and Zhang, 2021). To account for general age trends that may be associated with risk-taking and other psychological forces, I also include quadratic controls for each leader's age, separately for the PS and the VC (Fisman et al., 2023). 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. In robustness checks, I show that my findings are not sensitive to the choice of above controls.

Two potential limitations of my empirical strategy are worth highlighting. First, the reduced-form estimates may capture equilibrium effects — that is, beyond leader-side behavioral changes, villagers' responses may also contribute to the observed village-level outcomes. I further discuss this potential villager-side channel in the mechanism analysis section. Second, for clarity of interpretation, my baseline identification holds selection constant (by including leader pair fixed effects). Nevertheless, if zodiac-year events are significantly associated with leaders' entry into or exit from office, then the baseline estimates may not capture the full effects of zodiac-year culture on village governance — a point I revisit later as well.

4 Main Results

4.1 Governance processes and responsiveness

The self-governance in rural China intends to leverage local villagers' informational advantages to hold front-line governors 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.

Measuring governance processes. The dataset 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 (e.g., Oi and Rozelle, 2000; Niou, 2002). The governance processes (post-2010s) can generally be categorized into three perspectives.

First, within the governance bodies in each village, there are two major decision-making platforms. One, the Village Party Branch (VPB) regularly holds Party mem-

ber sessions to "exert the effect of the leading core" and manage Party-related affairs. The frequency of VPB meetings is largely fixed within a given village, depending on the volume of village affairs and established customs.[14] Two, the joint VPB-VC meeting serves as the primary mechanism for drafting proposals and discussing local affairs, involving a larger and more representative group of local members. It follows that the VPB-VC meeting plays a *de facto* central role in conferring detailed village affairs and promoting policies. The frequency of joint meetings can be more flexible.

Second, the Village General Meeting (VGM) serves as the official supreme decision-making body, as a form of direct democracy involving all villagers. Due to the high costs of convening villager-wide meetings, villages often rely on the Villager Representative Assembly (VRA), a smaller council authorized by the VGM to review budgets and proposals (Zhong, 2015). However, because villagers often lack strong political literacy and the position of representative carries few tangible benefits, the actual role and influence of the VRA may differ markedly across villages (Oi and Rozelle, 2000; Wang, 2014).

Third, transparency of village affairs ("village affair publicity") empowers villagers to better monitor governance processes. The Organic Law stipulates that village governments regularly publicize all matters affecting villager interests, most commonly through "village affairs publicity boards". Yet, enforcement varies greatly among villages in practice (Tsai, 2007).

Table B4 further outlines the key functions and participants of these institutions based on official documents.

Impacts on governance processes and responsiveness. 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, leaders' zodiac years have no significant impact on the frequency of VPB sessions (Column 1), but they increase the number of VPB-VC joint 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.

[14] See *"Regulations on the Work of Grassroots Rural Organizations (CPC Central Committee, 2006)"*.

However, substantial increases in VPB-VC joint meetings are important, since they act as the *de facto* central decision-making platforms, involving a more representative group of village members in local policy implementation and budget-making. Collectively, an increase in VPB-VC joint meetings may plausibly reflect an increased willingness of leaders to confer and gather feedback, which can reduce potential deviations from constituent interests.

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 is that, as convening VGMs is in practice demanding (the mean number of VGMs per year is only 1.86 in the sample), village 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 last 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 informal interaction between village heads and villagers (Tsai, 2007). I therefore complement the process results using leaders' responsiveness perceived by villagers. If zodiac year 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 randomly-selected respondents since 2014. Specifically, it explores three dimensions to proxy local leaders' performance: responsive-

ness, 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").[15]

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 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.[16]

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 easily reconciled with the presence of "precautionary/anticipatory motives". A plausible explanation, supported by qualitative accounts gathered by the author, is that some forward-looking leaders may consider the potential impact of meetings and proposals at the end of a year on policy outcomes in the following year. Consequently, they

[15]On average, about 15 villagers are interviewed per village. For each outcome, respondents select from a 4-point integer scale provided in the questionnaire. At the time of this study, the author does not have access to the individual-level data.

[16]This result also alleviates concerns about falsification. If villagers were intimidated by or sympathetic to their leaders, we would expect similar increases across all domains (i.e., villagers simply say good about everything).

might adjust their behavior in advance as they approach their zodiac years.[17] When such anticipatory forces are salient enough, they may in theory bias the baseline estimates toward zero, since the specification includes year "–1" in the control period.

4.2 Allocation of village funds

Next, I examine whether there exist consistent changes in village expenditures. If the observed changes in decision-making are genuine, they may in turn shift the allocation of public resources toward the needs of a broader segment of village members, which can be relevant to local development and citizen welfare.

Measuring village expenditures. 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.

In principle, major financial decisions are supposed to be both authorized by villagers and overseen by village leaders. However, in practice, effective supervision by villagers is often hindered by a lack of civic literacy and a weak rule of law (Wang, 2014). This creates room for village heads to exercise discretion in allocating public funds. Among the five categories, administration expenses are particularly prone to discretionary misuse (Wang and Yao, 2007; Wang, 2014).[18] My case study of two provinces also buttresses this notion quantitatively.[19]

[17] 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 B2).

[18] 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."

[19] The statistical results in Table C1 confirm that administration spending is perceived to be less transparent and more susceptible to misuse and embezzlement.

Table 1 provides descriptive statistics for each expenditure category. The "construction & production" and "administration & 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 long been under-provided (Zhang, 2011).

Impacts on village expenditures. Table 4 presents the estimated impacts of zodiac leaders on village expenditures. Each outcome variable represents the realized expenditure for the given year.[20] 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. Table B6 reports no significant changes in the number of village government personnel, implying that the observed decline in administrative expenses likely stems from other sources, such as entertainment expenditures or rent extraction.

Column (6) of Table 4 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 B7 provides additional indications by exploring heterogeneity based on additional survey questions conducted after 2014.

[20] 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.

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). Although more speculative, this finding suggests that changes in governance processes and fund allocation may not simply serve to appease elites (such as village committee members), or alternatively, that elites in my sample may share similar interests to ordinary villagers.

Collectively, the results above suggest that zodiac year shocks to village heads can reshape the allocation of public resources, with the changes plausibly reflecting improved accountability overall.

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). Because the core of zodiac year beliefs centers on risk-avoidance, they can potentially 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, 2025). Meanwhile, 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 officials, 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, to mitigate concerns about reporting bias and to focus on higher-quality innovations, I restrict the sample to policy experiments retrospectively recognized by upper authorities, based on local yearbooks and media coverage. Columns (3) - (4) report the results. While this outcome offers limited variation and thus yields less precise estimates, we again observe negative coefficients.

Finally, Columns (5) - (6) 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 village heads in their zodiac years tend to generate less policy innovation. Accordingly, it can be inferred that the increased responsiveness documented may be largely achieved by employing pre-existing decision-making platforms and policy instruments.

4.4 Robustness and extensions

My main specification holds the leadership pair constant and controls for years in office and the quadratic form of each leader's age. Table B8 presents robustness checks adopting various specifications and inference methods. Each cell reports the result of a separate regression.

Robustness: alternative clusters for inference. The baseline model allows the error terms to be correlated at the village level. The first part of Table B8 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 statistically significant.

Robustness: choice of controls. The second row of Table B8 presents results based on the most parsimonious covariates, including only leadership and year fixed effects. All estimates remain virtually unchanged, confirming that my results are not sensitive to the inclusion of age and tenure controls. Following Fisman et al. (2023), the third row adopts an alternative approach to controlling 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 separately. The results are largely unaffected. Since the implementation of top-down 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 robustness 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 comparable in magnitude.

Robustness: balanced samples. The sixth row of Table B8 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.

Next, I present additional analyses to further characterize the baseline findings, examining whether zodiac culture influences selection into office, and exploring the role of power structure and heterogeneity within the dual leadership system.

Selection of village heads. My central focus is to hold village heads constant and identify within-individual, temporal shifts associated with their zodiac years. Although not a threat to my baseline estimates, one may further wonder to what extent the selection margin matters, which relates to the use of leadership fixed effects.

One, I replace leadership fixed effects with village fixed effects to re-estimate the model. The results will now be a combination of both selection and incentive effects. As shown in the last row of Table B8, 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 village heads in my identification.

Two, to better understand the selection into power dynamics, I investigate whether village heads' zodiac years systematically correlate with their entry into or exit from office.[21] To do so, I include only village and year fixed effects and age controls, and allow a leader's entry and exit years to be endogenous to their zodiac-year shocks. The 2018 wave is excluded, as it does not allow observation of whether the leader remains in office afterward. Table B9 shows a moderately negative but insignificant correlation between a leader's zodiac year and their entry into office. Though speculative and statistically weak, this might possibly reflect a more conservative stance of pursuing political roles during these years. In contrast, there is no discernible correlation between zodiac years and exit from office. This is plausible, as village heads typically serve fixed three-year terms; thus, unless due to idiosyncratic circumstances, the timing of exit or re-election is largely orthogonal to individual characteristics.

Leadership structure and heterogeneity in PSs vs.VCs. There are two local leadership structures in grassroots China: single (*Yì-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

[21] Since I do not observe the full pool of potential candidates, the results presented here should be interpreted as primarily heuristic.

on everything" agenda. As power is not shared between two individuals and thus less supervision within the local leadership, the single leadership structure may be more prone to greater discretion and to shifts driven by leaders' own tendencies(Li, 2018; De Janvry et al., 2023). Panel B of Table 6 explores this angle. The empirical specification remains identical to the baseline (with leader and year fixed effects as well as age and tenure controls), except that I now allow the zodiac effect to vary by leadership structure. In line with the conjecture, the zodiac year effect is 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.

Relatedly, one may wonder if there is any heterogeneity between PSs and VCs during their zodiac years. On 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 6 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 year 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 governors (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.

5 Mechanisms and Discussion

5.1 Mechanisms

Given the more rule-based and feedback-gathering governance changes — alongside a decrease in policy innovation — a logical explanation would be a temporal shift in village heads' risk appetite, consistent with the risk-avoidant nature of zodiac beliefs. Specifically, if the risk appetite of village heads decreases, then it is more appealing for them to stick to a less risky position of following the established processes and incorporate others' opinions. Yet, it is also possible that zodiac year culture relates to other salient psychological traits that help explain parts of the observed patterns. Additionally, some of the estimated effects could potentially reflect villager-side changes.

Leaders' risk-taking shifts. 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 investigate village meeting minutes. 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.[22]

To assess the risk appetite of individual village heads, I analyze the use of risk-related language by PSs and VCs 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 identify a set of risk-avoidant expressions and a set of risk-loving expressions based on sentiment dictionaries. Table B10 provides the full list of keywords used. As a placebo, I also include the expression "firstly" as a neutral ordinal term. To construct quantitative measures, the survey team counted the frequency of these three groups of expressions used by each village head in governance meetings each year, and normalized the totals by the number of meetings held in that year.

[22]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.

This allows us to create frequency measures at the leader-year level.[23]

Table 7 presents the leader-year level 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-avoidant 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.

Moreover, the language data also allows me to examine whether leaders adjust their risk tendencies in response to having a zodiac-year partner. If strong "spillovers" exist, this would suggest that the estimated effects are partially compounded by the dual-leadership structure. Table B11 presents the results. For ease of comparing coefficients, the unit is at the village-year level, and I model a village head's risk-taking language as a function of both their own zodiac year and that of their partner. Across PSs and VCs, the estimates suggest there are no salient spillovers onto others' risk appetite, indicating that my baseline results are likely to be driven more by changes in the treated heads themselves. This finding is consistent with the aforementioned heuristic regarding heterogeneity by leadership structure.

Together, these results provide suggestive evidence that village heads exhibit lower risk-taking during their zodiac years — a conceptually prominent mechanism that can explain the observed governance changes.

Parameters other than risk-taking. My two-province survey also includes a short questionnaire for villagers, asking about their customs during their zodiac years. The survey results suggest that, in addition to lower risk-taking and wearing red, there are no other prevalent norms systematically associated with the zodiac year culture (Table C2). To better assess the role of other psychological traits, I complement by examining the association between individuals' zodiac years and various psychological factors, using the 2018 wave of the Chinese Family Panel Studies

[23]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 counting risk-related synonyms.

(CFPS).[24] 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 in Chinese society.

Table B12 presents the results. Column (1) of Panel A corroborates the significant impact on risk-taking (about 0.31 standard deviation decrease). Meanwhile, the zodiac year event does not appear to significantly affect other prominent psychological parameters commonly considered in behavioral studies, such as cognitive ability, good deeds, pro-social preferences, or generalized trust. Importantly, the magnitudes of the estimated effects on these factors are remarkably small (using the standard deviation as a benchmark), compared with the estimated effect on risk-taking. Moreover, Panel B shows that the temporal zodiac shocks do not correlate with changes in religious or other supernatural beliefs.

Finally, Table B13 investigates potential impacts on high-level personality traits. Specifically, the 2018 wave of the CFPS conduct a simplified Big 5 personality test based on self-reported questions. As a canonical psychometric tool, the Big 5 personality model categorizes personality into five broad dimensions: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. For each dimension, I construct a z-score by equally weighting the three corresponding sub-questions, each evaluated on a five-point integer scale.[25] The estimates suggest no statistically significant effect of being in zodiac years on these major personality traits.

Collectively, while these analyses do not rule out the potential importance of other psychological factors, they suggest that risk-taking may be a more substantial

[24] CFPS is one of the most commonly used survey data of Chinese individuals. See https://www.isss.pku.edu.cn/cfps/en for more details about the CFPS.

[25] See Pages 3–4 of https://www.isss.pku.edu.cn/cfps/docs/20210806194914412058.pdf for the Big 5 personality scale module in the CFPS questionnaire.

driver.

Villagers' strategic demand. 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 that a leader's zodiac year is generally common knowledge in rural China, it may be perceived by villagers as a strategic window to press for more in certain policy areas. Therefore, one may wonder to what extent the estimated effect reflects a combination of "supply" effects (shifts in leader behavior) and "demand" effects (strategic demand by villagers).[26]

While empirically challenging to separate each channel, I provide two pieces of quantitative suggestive evidence.

One, my short survey 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 first (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 activeness, and (2) civic engagement in villager meetings. Specifically, "civic overall activeness" refers to a subjective evaluation provided by a randomly selected village committee member in the annual survey, while "civic activeness in village councils" is based on aggregate outcomes from a fixed pool of villagers surveyed each year (the same source used for the "responsiveness" measure). Both measures reflect subjective evaluations, with respondents selecting from a 5-point integer scale for each outcome in the questionnaire. 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 B14 presents the results. The mean perception of civic engagement is 3.7 out of 5, suggesting that villagers generally engage in grassroots governance to

[26]Conceptually speaking, the demand changes should build up on a first-order shift in leader attitudes 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 longer-run equilibrium, rational citizens would apply the same strategy in other years as well.

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 fully rule out the coordinating device mechanism, they suggest that leaders and local governments likely remain central and relatively dominant in shaping policy outcomes in my setting.

5.2 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.

One, apart from the zodiac culture under study, a large body of cultural traditions since ancient China are associated with risk-avoidance (Sun, 2009). Why would such culture occur and persist? One rationale is that promoting conservativeness can help stabilize society, which is particularly valued for the Chinese economy and polity. Alternatively, anthropological studies suggest that it could be an implicit tool leveraged by intellectuals to constrain the tyranny of ancient rulers (Sun, 2009; Pankenier, 2013). In such scenarios, supernatural forces might serve as an deterrent for unchecked monarchs, causing them to perceive punishment risks and discipline themselves.[27] My findings on responsiveness provide some indirect support to this theory, speaking to the economic literature on the functionality of culture in weak institutions (e.g., Nunn and Sanchez de la Sierra, 2017; Chen et al., 2023).

More broadly speaking, deeply ingrained cultural traditions are common in many developing settings. There are rich qualitative discussions on how such traditional culture matter for political economic consequences today — from Africa to Latin America (Leeson and Suarez, 2015; Le Rossignol, Lowes and Nunn, 2022). In this sense, my paper joins the limited but growing empirical studies by providing rigorous causal evidence from a real-world setting.[28] It is therefore reasonable to

[27] Some cultural traditions may even attribute natural events (e.g., eclipses) to heaven's anger at ruler malfeasance (Miao, Ponticelli and Shao, 2021; Bai, 2023; Sun and Li, 2023).

[28] 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).

speculate that seemingly irrelevant traditional culture can still substantially shape modes of governance in other developing contexts.

Two, given the logical role of risk-taking as a mechanism in my setting, my findings also relate to the broader discussion on how to incentivize and regulate front-line officials. In the absence of effective monitoring (e.g., Banerjee et al., 2021; Sánchez De La Sierra et al., 2024), 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 local heads in rural China, 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 at this stage can serve as an additional form of incentive regulation for public officials. 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 significant during the process of political or economic transition.

Several limitations warrant caution when extrapolating my results.

First, in practice, it is infeasible to leverage idiosyncratic shocks like zodiac culture to shift officials' psychological traits.[29] In particular, my setting cannot disentangle whether leaders' risk avoidance stems from a preference shift or a belief shift, which can carry nuanced implications for policy design. If it primarily reflects a preference shift (i.e., risk aversion), then screening candidates not only for ability but also for risk appetite and other psychological traits may offer a more practical solution (e.g., Hanna and Wang, 2017; Ashraf et al., 2020; Callen et al., 2025; Gulzar and Khan, 2025). If it reflects more about belief changes (an increased perceived likelihood of adverse states), then it aligns more with the insight of the canonical Becker–Stigler model — officials' behavior can be shaped by strengthening their perceived probability of detection and punishment.

[29]Moreover, my empirical strategy essentially estimates an intention-to-treat effect — an average impact across all village heads in the sample. In reality, the strength of belief in zodiac years likely varies across individuals, so the group-level estimate should not be used to predict a particular head's behavior without further information.

Second, the paper remains silent on the aggregate impact on economic development and societal welfare. From a personnel perspective, the positive effect on responsiveness toward citizens may depend on whether citizens have some avenue for input, or the interests of citizens and higher-level officials (the two main constituencies) are largely aligned. In highly extractive settings where top superiors can shield village heads from bottom-up punishment, risk-avoidant heads may instead prioritize the interests of corrupt superiors in feedback-gathering, worsening extraction. Nevertheless, given the increased vertical control in post-2000s China (Martinez-Bravo et al., 2022), where space for citizen input is relatively limited, my results may still offer speculative insights for contexts in which incentives to be accountable toward the public are not sufficient, but more present than in the Chinese setting.

Relatedly, due to the absence of a direct mapping from zodiac beliefs to macro-level outcomes, combined with data limitations, an important open question is that how governors' decisions — when shaped by idiosyncratic cultural traditions — affect broader economic growth. This issue is especially relevant given that many traditional or supernatural beliefs are non-factual and often biased. There are numerous anecdotes of national leaders adhering to them and making poor decisions that impose substantial economic costs on their countries. Identifying these macro-level, real economic consequences remains a promising direction for future research.

6 Conclusion

This paper documents the significant effects of traditional culture on public leadership and governance, using the prevalent "zodiac year" beliefs about risk-avoidance in rural China. Based on a nearly representative village panel, I show that village heads in their zodiac years enhance collective governance processes and improve villagers' perceptions of responsiveness. However, these leaders also exhibit a reduced inclination toward policy innovation, suggesting a trade-off between accountability and public entrepreneurship. Mechanism analysis suggests the temporal shift in leaders' risk-taking, consistent with the nature of zodiac beliefs, as a plausible primary driver.

Although my findings are based on rural China, they offer some broader insights into how traditional culture can shape governance. Moreover, given the relevance of zodiac beliefs and risk-taking, one important speculation is that risk appetite and other related psychological traits — feasibly measurable today via psychometric methods — could be valuable for improving the allocation and incentivization of public workers. Finally, the leverage of astrological determinants of leaders' psychological tendencies, which are rare in their quasi-random nature, could also open avenues for more research in related areas.

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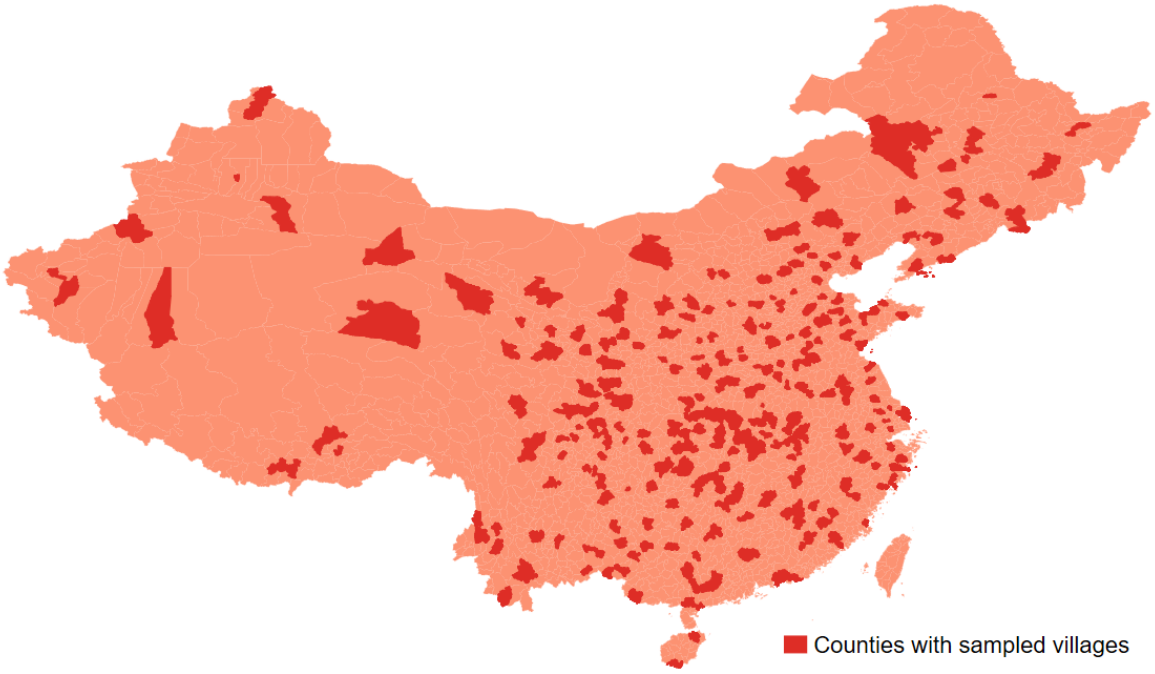
Figures

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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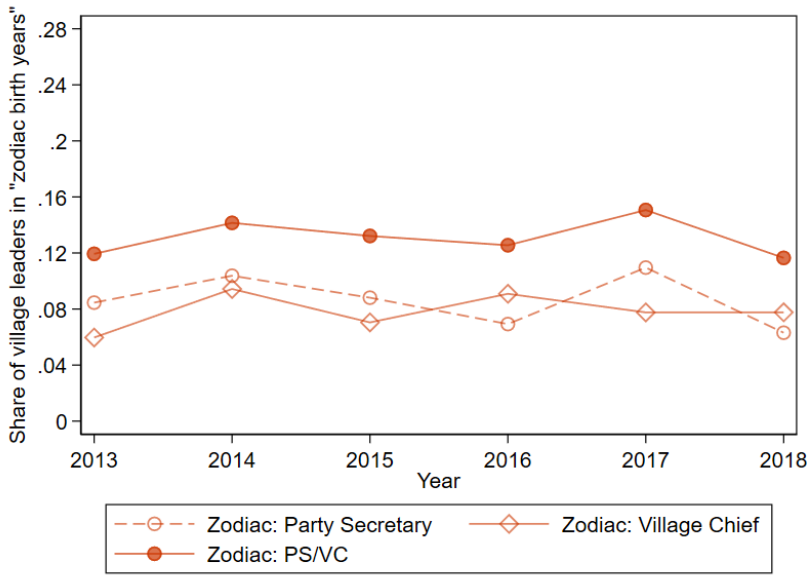
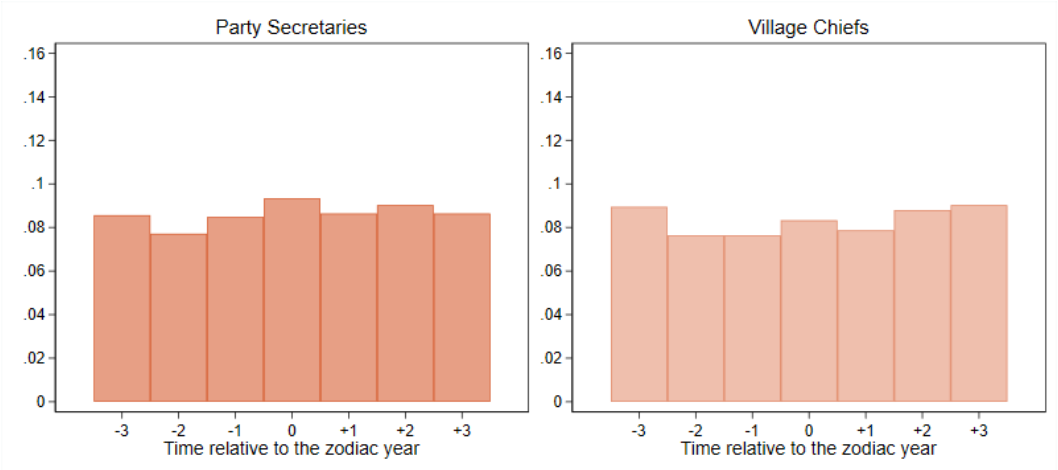
Figure 2: Share of village leaders in zodiac years



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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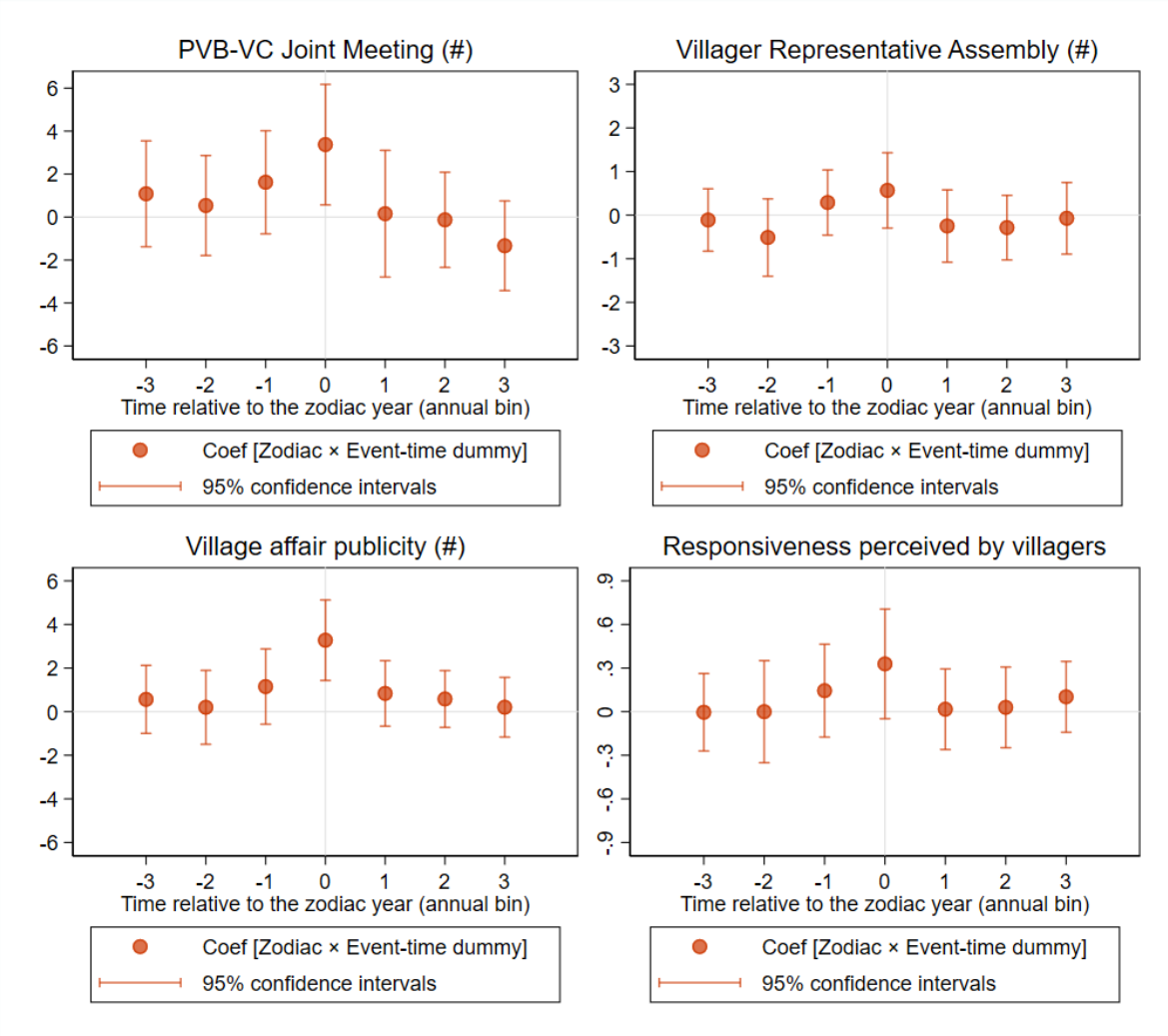
Figure 4: Event study plots – governance processes and responsiveness



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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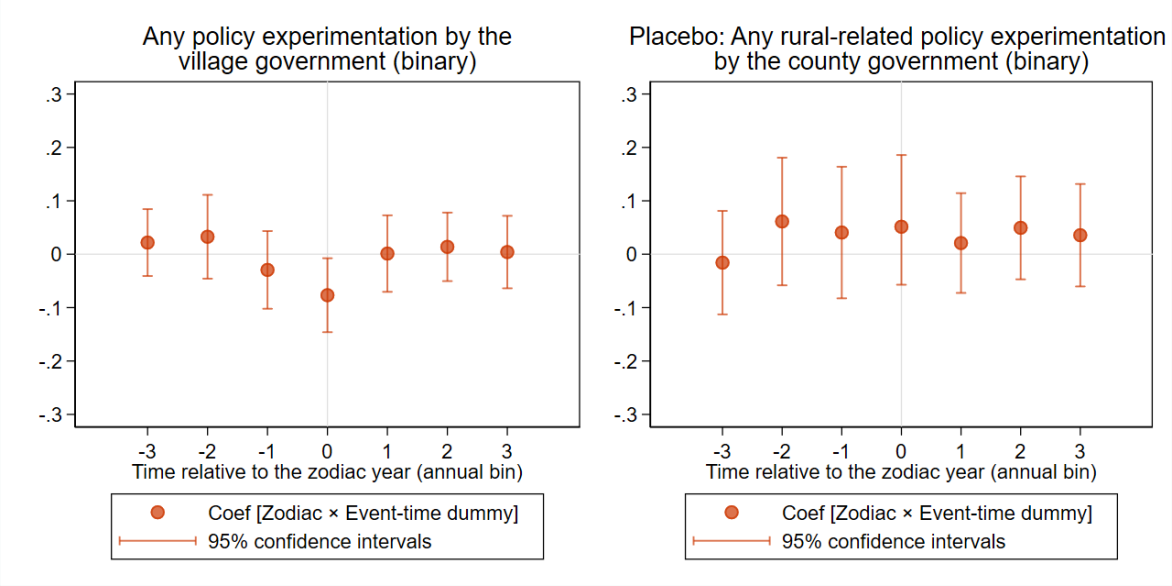
Figure 5: Event study plots – policy innovation



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
Governance and transparency			
# 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
Public finance			
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: Leaders' zodiac years and governance processes

	Village council and governing processes (#)				Transparency (#)	
	Policy-making and conferring		Civic meeting and council			
	Party Branch Session	VPB-VC Joint Meeting	Villager Representative Assembly	Village General Meeting	Village affair publicity board update frequency	
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of dep. var	7.464	15.344	6.222	1.861	7.638	7.638
Zodiac	0.003	2.533***	0.696**	0.008	2.308***	2.140***
	(0.423)	(0.855)	(0.343)	(0.219)	(0.424)	(0.423)
Controls:						
Age and Age^2	Y	Y	Y	Y	Y	Y
# Meetings						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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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Table 3: Leaders' zodiac years 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**	0.443**	0.117	0.317	-0.018	-0.094
	(0.093)	(0.189)	(0.074)	(0.213)	(0.080)	(0.230)
Controls:						
Age and Age^2	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.

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Table 4: Further results on village expenditures

	Village expenditure share by category (%)					Log.
	Welfare and redistribution	Production and construction	Reimbursement	Cooperative enterprise	Administration and other	Total spending
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of dep. var	13.577	32.246	10.325	6.816	37.048	5.067
Zodiac	4.096**	1.102	1.315	0.315	-6.694**	-0.028
	(1.998)	(2.741)	(1.873)	(1.272)	(2.580)	(0.100)
Controls:						
Age and Age^2	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: Leaders' zodiac years and policy innovation

	(1)	(2)	(3)	(4)	(5)	(6)
	Any policy experiment initiated by the village (binary)		Policy experiment commended by upper authorities (binary)		Placebo: Any county-level rural policy experiment (binary)	
Mean of dep. var	0.102	0.102	0.018	0.018	0.272	0.272
Zodiac	-0.071***	-1.291**	-0.022*	-0.624*	0.018	0.030
	(0.023)	(0.510)	(0.012)	(0.322)	(0.044)	(0.202)
Controls:						
Age and Age^2	Y	Y	Y	Y	Y	Y
Estimation	OLS	Probit	OLS	Probit	OLS	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	1,296	1,296	1,296	1,296	1,296	1,296
Adjusted R-squared	0.221	-	0.035	-	0.113	-
Pseudo R-squared	-	0.152	-	0.091	-	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. In Columns (3) - (4), we focus on policy experiments that were retrospectively recognized by upper authorities through official reports and media coverage. The placebo policies in Columns (5) - (6) 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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Table 6: Leadership structure and individual leader roles

	Governance processes (#)			Village expenditure share (%)		Policy innovation
	VPB-VC Meeting	Villager Representative Assembly	Transparency: village affair publicity board updates	Welfare and redistribution	Administration and other	Any policy innovation
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Baseline specification						
Zodiac (either leader)	2.533***	0.696**	2.308***	4.096**	-6.694**	-0.071***
	(0.855)	(0.343)	(0.424)	(1.998)	(2.580)	(0.023)
Panel B: Leadership structure						
Zodiac: PS and VC not the same person	2.369**	0.686*	2.173***	3.742	-5.808*	-0.063**
	(1.024)	(0.404)	(0.494)	(2.316)	(2.950)	(0.027)
Zodiac: PS and VC the same person	3.028**	0.828	2.718***	6.984*	-9.375*	-0.121***
	(1.523)	(0.726)	(0.836)	(3.792)	(5.075)	(0.037)
Panel C: Party Secretary vs. Village Chief						
Zodiac: only PS	1.997*	0.515	1.935***	3.303	-7.839*	-0.074*
	(1.109)	(0.478)	(0.634)	(3.452)	(4.500)	(0.041)
Zodiac: only VC	2.567**	0.810	2.445***	3.540	-5.918	-0.065*
	(1.251)	(0.653)	(0.774)	(3.165)	(3.949)	(0.034)
Zodiac: both PS and VC	3.167*	0.792*	2.620***	5.835*	-9.144**	-0.097***
	(1.725)	(0.348)	(0.758)	(3.276)	(4.280)	(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 "*Zodac: 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 7: Leaders' risk-taking languages in their zodiac years

	Risk-avoidant 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***	0.537***	-0.658***	-0.674***	0.013	0.012	0.002	0.003
	(0.075)	(0.078)	(0.091)	(0.102)	(0.048)	(0.047)	(0.007)	(0.007)
Controls:								
Age and Age^2		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. 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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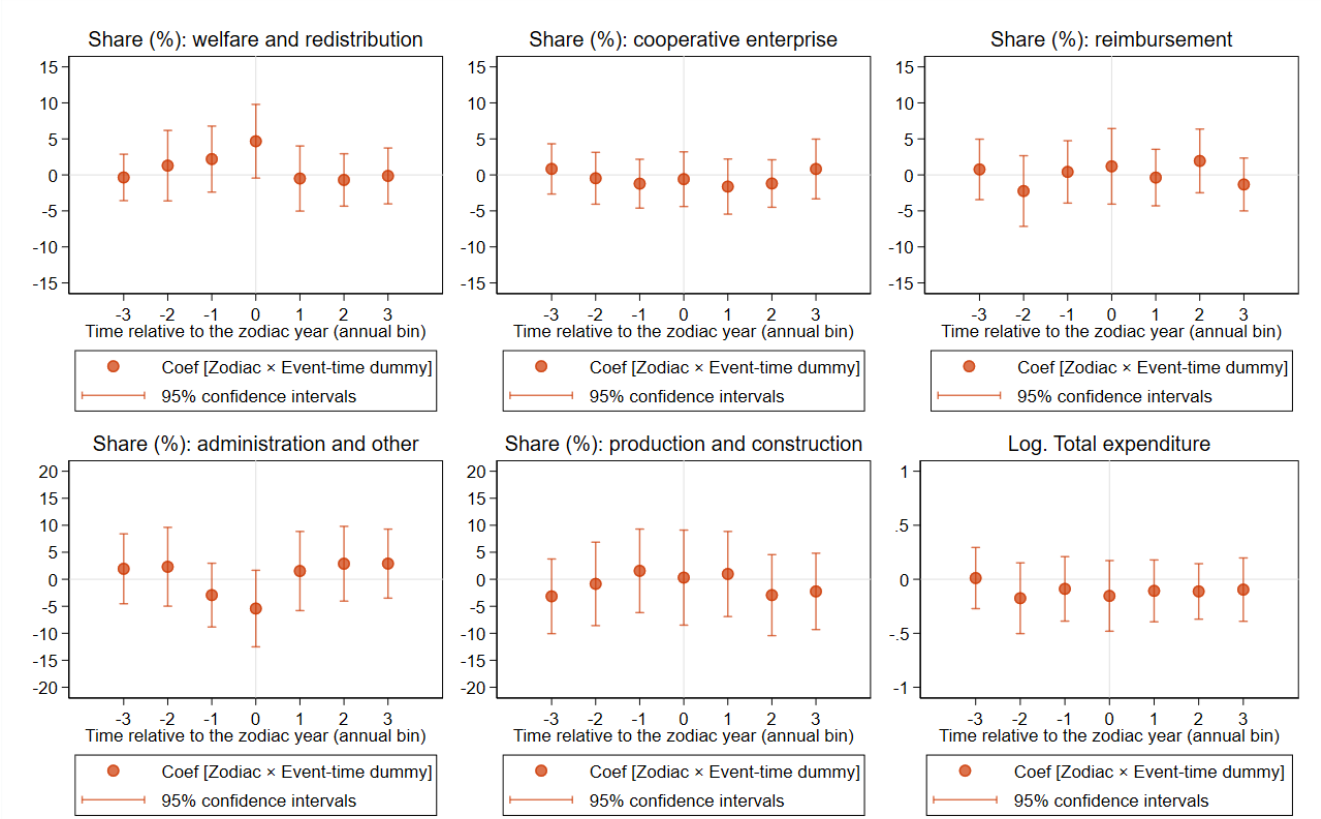
Appendix - Figures and Tables

Figure A1: Event study plots – village expenditures



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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Table B1: Survey collection of variables

Variables	Source	Respondent/provider	Notes
Village heads' name, gender, and age (birth year-month)	Administrative records and village gazetteers	Township governments	A follow-up phone survey was conducted for 28 leaders whose zodiac signs were ambiguous
Governance processes: meeting frequency and transparency	Administrative records	Township governments	—
Village expenditures	Annual financial sheets	Township governments	—
Policy innovation	Annual interview survey	Village government officials	Survey question: "Whether the village promotes any innovative policy in year ..."
Villager perceptions: leader performance and civic engagement	Annual interview survey	A fixed pool of randomly selected villagers; aggregated at the village-year level by averaging individual responses	The survey question follows the structured 5-point scale: "From 1 (poor) to 5 (high), how do you evaluate ..."

Notes: This table describes how the China Rural Survey collects and constructs the main variables (village-year level) used in this paper.

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Table B2: 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 B3: Balance test on village characteristics (2013 survey)

	Mean		Mean difference: (2)−(1)	
	Control group: $\text{Var}(Zodiac)=0$	Ever-treated group: $\text{Var}(Zodiac)>0$	Raw	Province FEs
	(1)	(2)	(3)	(4)
Age: PS	50.232	49.841	-0.391	-0.380
	(0.876)	(0.660)	(1.112)	(1.153)
Age: VC	47.507	47.508	0.001	0.267
	(0.872)	(0.742)	(1.204)	(1.147)
Population (#)	2,247.232	2,375.324	128.092	151.093
	(1,561.406)	(1,635.820)	(211.871)	(186.144)
Female share	0.470	0.478	0.007	0.009
	(0.047)	(0.041)	(0.006)	(0.006)
Cultivated land (arce)	3,496.660	5,465.934	1,969.274	2,173.336
	(4,398.407)	(2,154.200)	(1,896.061)	(2,446.799)
CPC member (#)	57.843	56.528	-1.315	-0.356
	(53.778)	(35.561)	(6.713)	(6.588)
Enterprise (#)	3.202	4.137	0.935	1.022
	(9.002)	(7.523)	(1.191)	(1.306)
Public hygiene facility (#)	1.415	1.572	0.158	0.068
	(0.809)	(1.388)	(0.145)	(0.153)
Bus station (Y/N)	0.457	0.399	-0.059	-0.056
	(0.501)	(0.491)	(0.066)	(0.068)
Distance to county (km)	22.137	23.371	1.234	2.033
	(18.706)	(28.917)	(3.211)	(3.112)
Tap water (#)	579.295	593.727	14.432	9.780
	(411.250)	(405.732)	(54.430)	(50.785)
Household electricity (#)	382.318	400.373	18.055	2.069
	(390.470)	(435.329)	(51.995)	(54.163)
Television (#)	379.270	389.281	10.012	27.844
	(353.375)	(325.860)	(46.771)	(47.065)
Internet access (#)	120.284	113.195	-7.089	3.448
	(219.310)	(176.803)	(27.941)	(28.166)
Temple (#)	0.726	0.578	-0.148	-0.083
	(1.004)	(1.009)	(0.154)	(0.150)
Primary school (#)	0.663	0.695	0.032	0.042
	(0.651)	(0.643)	(0.088)	(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. $\text{Var}(Zodiac)$ 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 B4: Village self-governance in rural China

Policy-making and conferring	
VPB Session [Village Party Branch members]	Regular sessions to deal with Party-relevant affairs and propaganda, and to oversee the big picture of village governance.
VPB-VC Joint Meeting [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. Most VPB members are also VC members.
Village council and civic meeting	
Villager Representative Assembly [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 village government members.
Village General Meeting [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.
Transparency	
Village affair publicity	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*).

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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: Leaders' zodiac years and village government size

	Village government personnel (#)	
	(1)	(2)
	All	Female
Mean of dep. var	6.736	1.352
Zodiac	0.005	-0.124
	(0.409)	(0.129)
Controls:		
Age and Age^2	Y	Y
Secretary-Chief FEs	Y	Y
Tenure FEs	Y	Y
Year FEs	Y	Y
Observations	1,296	1,296
Adjusted R-squared	0.641	0.543

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 B7: Leaders' zodiac years 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	0.017	0.069	0.058
	(0.056)	(0.056)	(0.052)	(0.052)
× Share (%): elderly people (centered)	0.033**	0.032**		-0.011
	(0.016)	(0.016)		(0.016)
× Share (%): School-age children (centered)		-0.004	0.005**	0.005*
		(0.003)	(0.003)	(0.003)
Controls:				
Age and Age^2	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 B8: Robustness checks

	Governance processes (#)			Village expenditure share (%)		Policy innovation
	VPB-VC Meeting	Villager Representative Assembly	Transparency: village affair publicity board updates	Welfare and redistribution	Administration and other	Any policy innovation
	(1)	(2)	(3)	(4)	(5)	(6)
Baseline specification	2.533	0.696	2.308	4.096	-6.694	-0.071
Cluster SEs: Village	(0.855)***	(0.343)**	(0.425)***	(1.998)**	(2.580)**	(0.023)***
Cluster SEs: Leadership (PS × VC)	(0.856)***	(0.352)**	(0.423)***	(1.998)**	(2.522)***	(0.023)***
Cluster SEs: PSs and VCs (two-way)	(0.855)***	(0.342)**	(0.426)***	(2.017)**	(2.553)***	(0.023)***
FDR adjusted P-value	[0.005]***	[0.016]**	[0.001]**	[0.016]**	[0.008]***	[0.002]***
Without age and tenure controls	2.486	0.696	2.332	4.419	-6.363	-0.082
	(0.858)***	(0.340)**	(0.424)***	(2.005)**	(2.573)**	(0.023)***
Spline age controls	2.389	0.577	2.163	4.369	-6.559	-0.075
	(0.825)***	(0.343)*	(0.423)***	(2.023)**	(2.605)**	(0.022)***
Province-Year FEs	2.485	1.173	2.805	4.135	-7.515	-0.070
	(0.984)**	(0.410)***	(0.453)***	(2.195)*	(2.865)***	(0.026)***
Village-specific trends	2.860	0.711	2.065	3.590	-5.274	-0.071
	(1.106)**	(0.452)	(0.482)***	(2.687)	(3.651)	(0.030)**
Balanced sample	3.189	0.737	2.325	4.690	-6.982	-0.078
	(0.922)***	(0.357)**	(0.450)***	(2.153)**	(2.633)***	(0.025)***
Village FEs only	1.845	0.425	1.660	4.465	-5.706	-0.060
	(1.091)*	(0.422)	(0.465)***	(1.756)**	(2.417)***	(0.021)***

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. The baseline specification controls for year FEs, Secretary-Chief FEs, tenure FEs, and the quadratic form of leaders' age. The second row removes the tenure and age controls. 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. The final row replaces the Secretary-Chief FEs with the village FEs. 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 B9: Leaders' zodiac years and selection into office

	First year in office (binary)		Last year in office (binary)	
	PS	VC	PS	VC
	(1)	(2)	(3)	(4)
Mean of dep. var	0.317	0.317	0.363	0.372
Zodiac: PS	-0.057		0.031	
	(0.054)		(0.058)	
Zodiac: VC		-0.058		-0.025
		(0.052)		(0.039)
Controls:				
Age and Age^2	Y	Y	Y	Y
Village FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Observations	1,090	1,090	1,090	1,090
Adjusted R-squared	0.108	0.096	0.107	0.100

Notes: Unit of observation: village-year. "*Zodiac*" is a dummy that is 1 if the corresponding village leader is in their zodiac year. Each outcome variable is a binary denoting whether the corresponding leader is in their first or last year in office. Sample period: 2013 – 2017 (the 2018 wave is excluded, as it does not allow observation of whether the leader remains in office afterward). Compared with the main specification, this analysis removes the leader and tenure fixed effects to allow selection to be endogenous to zodiac-year shocks. Standard errors in parentheses are clustered at the village level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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Table B10: Risk-taking related keywords

Language category	keywords
Risk-avoidant	Cautious, conservative, steady/secure, guard against, uncertain (including corresponding expressions in other word classes)
Risk-loving	Bold/brave, decisive, reckless, taking risks (including corresponding expressions in other word classes)
Placebo	Firstly (used as an ordinal term)

Notes: This table presents the risk-avoidant and risk-loving keywords used in the analysis of village meeting minutes. The selection of keywords is based on sentiment dictionaries provided by the China National Knowledge Infrastructure (CNKI), the largest knowledge-based information resource platform in China.

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Table B11: Leaders' risk-taking languages in their partners' zodiac years

	Risk-avoidant language frequency of PS (1)	Risk-avoidant language frequency of VC (2)	Risk-loving language frequency of PS (3)	Risk-loving language frequency of VC (4)
Mean of dep. var	0.801	0.684	1.269	1.219
Zodiac: PS	0.476***	-0.056	-0.711***	0.098
	(0.110)	(0.128)	(0.139)	(0.200)
Zodiac: VC	0.039	0.665***	0.142	-0.792***
	(0.091)	(0.118)	(0.179)	(0.164)
Controls:				
Age and Age^2	Y	Y	Y	Y
Secretary-Chief FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Tenure FEs	Y	Y	Y	Y
Observations	210	210	210	210
Adjusted R-squared	0.435	0.533	0.249	0.452
Std. dev. of dep. var.	0.471	0.506	0.566	0.659

Notes: Unit of observation: village-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. Tenure FEs are dummies for each year of the term. 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 B12: 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**	-0.031	0.005	-0.131	0.009
	(0.313)	(0.114)	(0.078)	(0.153)	(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	-0.004	0.028	0.050	-0.069
	(0.079)	(0.040)	(0.073)	(0.056)	(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 appetite (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 B13: Zodiac years and personality traits

	Big Five personality traits (z-scores)				
	Openness (1)	Conscientiousness (2)	Extraversion (3)	Agreeableness (4)	Neuroticism (5)
Zodiac	0.099	-0.002	0.127	0.192	-0.168
	(0.145)	(0.193)	(0.169)	(0.166)	(0.170)
Province FEs	Y	Y	Y	Y	Y
Individual controls	Y	Y	Y	Y	Y
Observations	428	428	428	428	428

Notes: This table follows the same sample used in Table B12. Data source: China Family Panel Studies (CFPS, 2018), where a random pool of respondents are drawn to elicit their risk appetite (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). Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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Table B14: Leaders' zodiac years and perceived civic engagement

	Overall civic activeness (1 - 5, low - high)			Civic activeness in villager councils (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	0.018	-0.057	-0.198	-0.292	-0.892
	(0.120)	(0.115)	(0.429)	(0.238)	(0.242)	(0.641)
Controls:						
Age and Age^2		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 members being interviewed. Specifically, "civic overall activeness" refers to a subjective evaluation provided by a randomly selected village committee member in the annual survey, while "civic activeness in village councils" is based on the average score from a fixed pool of villagers surveyed each year (the same source used for the "responsiveness" measure). 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 some 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

Question 1: Knowledge about village expenditures				
	Nothing	Relatively limited	Some	Well
Share	14.68%	31.65%	24.81%	28.86%
Question 2: Perception of misappropriation by categories				
	Problematic	Somewhat problematic	Relatively Clean	Clean
Production & construction	15.95%	33.16%	40.51%	10.38%
Welfare & 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 constraints, Question 3 was only asked in one province (with 205 observations). The average score is 3.6 out of 10, suggesting that leaders' preferences/beliefs 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 culture is 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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