Local Direct Elections and Meritocratic Selection\textsuperscript{1}

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(September 17, 2019)

Abstract

This paper studies the relationship and mechanism between local direct elections in rural China and meritocratic selection. As local direct elections empower the selection for village leaders to village residents, who naturally communicate more times with village leader candidates than township officials, the representative village resident infers candidates’ virtue and capacity of higher accuracy and precision. Our theoretical model upon Bayesian framework demonstrates that local direct elections facilitate the fulfillment of the meritocratic selection both for village leaders and for village party secretaries. Using quality of village roads, we find supportive empirical evidence for our theoretical predictions. (JEL D72, D73, D83, H41, O18)

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“When the Grand course was pursued, a public and common spirit ruled all under the sky; they chose men of talents, virtue, and ability; their words were sincere, and what they cultivated was harmony.” – Confucius (450 B.C., translated by James Legge [1885]), Li Chi: Book of Rites

“The aim of every political constitution, is or ought to be, first to obtain for rulers men who possess most wisdom to discern, and most virtue to pursue, the common good of society.” – Hamilton, Madison and Jay (1788 [2008]), The Federalist Papers

Meritocratic selection is pursued all over the world, both ancient and modern times. Dating back to around 500 B.C., Chinese politicians and philosophers raised that those who governed should be selected by merit rather than inherited status (Sienkewicz, 2003). As the concept of pursuing meritocracy spread to Europe and the U.S., it was favored by philosophers (Kazin et al., 2010) and claimed in political statements (Hamilton, Maddison and Jay, 2008).

China has evolved a series of top-down political selection schemes, of which the mechanism emphasizes the assessment, recommend and promotion for politicians upon their virtue and capacity, aiming at meritocratic selection. In around 134 B.C., the assessment & recommend system targeting noble families was established (Qian, 2012). By enlarging the enfranchisement, the civil exam system targeting scholars was developed in around 605 A.D., prevailed for over 1000 years, and has greatly influenced political selection schemes in China and other countries (Elman, 2013; Bai and Jia, 2016; Bell, 2016).

Unlike top-down schemes in China, electoral system, the bottom-up political selection scheme, was established in ancient Western regimes and prevailed
gradually. Since around 508 B.C., Athenian democracy was established; by enlarging the enfranchisement, the electoral system has evolved to modern representative democracy (Loeper, 2017). The mechanism of election emphasizes the incentives for politicians upon their behaviors, aiming at the *ex post* accountability (Laffont, 2000; Besley, 2005).

The introduction of local direct elections to Chinese top-down political selection system enables us to identify the relationship and mechanism between local direct elections and meritocratic selection. We build up a theoretical model, demonstrating that local direct elections in rural China, by providing local information on village leader candidates’ virtue and capacity, facilitate the fulfillment of meritocratic selection for village leaders. Even if the political selection scheme for village party secretaries remains top-down, local direct elections for village leaders also facilitate the fulfillment of meritocratic selection for village party secretaries. Using quality of over 500 village roads, our empirical evidence supports our theoretical predictions.

Unlike previous studies that regard elections basically as *ex post* incentives for politicians and use the game theory framework, our model uses the Bayesian framework to explain how local direct elections, by providing local information, facilitate the fulfillment of meritocratic selection for village leaders. The introduction of local direct elections empowers the selection for village leaders to village residents from township officials. Village residents naturally communicate with village leader candidates of more times than township officials, implying village residents’ advantage in local information.

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2 Our theoretical findings are empirically supported by this paper and Wong et al., (2017), which also provides motivations for this paper’s theoretical reasoning.

3 See Laffont (2000) and Besley (2006) for theoretical demonstrations, Ferraz and Finan (2011) and De Janvry et al. (2012) for empirical evidence and Bell (2016) for demonstrations in political science.
on candidates (Ghatak, 1999; Bell, 2016). Therefore, the representative village resident infers candidates’ virtue and capacity of higher accuracy and precision than the representative township official. Based on some general assumptions, our model, with the inference of higher accuracy, proves that in a representative village, the mean value of the elected village leader’s composite virtue-and-capacity, a weighted average of virtue and capacity, exceeds that of the appointed village leader’s. In addition, our model, with the inference of higher precision, proves that in a representative village, the variance of the elected village leader’s composite virtue-and-capacity exceeds that of the appointed village leader’s. These theoretical findings are in line with Hayek (1945) and Chan (2013) that assessment and decisions must be left to people with advantages in local information.

Because the mean value of elected village leaders’ composite virtue-and-capacity exceeds that of appointed ones’, our model further demonstrates that local direct elections for village leaders facilitates the fulfillment of meritocratic selection for village party secretaries. Township officials, by observing village party secretary candidates’ performance, further infer their composite virtue-and-capacity and promote the one with the highest as the village party secretary. Since village leaders are major candidates of village party secretaries (O’Brien and Li, 2000), this performance-based promotion is both the *ex post* assessment for village leaders and the *ex ante* selection for village party secretaries. Without losing generality, by assuming village party secretary candidates’ performance a strictly increasing function of their composite virtue-and-capacity⁴, our model shows that elected village leaders’ average promotion likelihood surpasses

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⁴ For micro evidence, see Yao and Zhang (2015), Bloom et al. (2015); for macro evidence, see Jones and Olken (2005), Besley et al. (2011).
appointed ones’. Therefore, the performance-based promotion for village party secretaries not only holds village leaders accountable, integrated with local direct elections, it is also endowed with meritocratic selection.

The rest of this paper is organized as follows: Section I introduces the institutional backgrounds. Section II develops the theory. Section III discusses the empirical strategies and presents the empirical results. Section IV concludes.

I. Local Governance in Rural China

The Chinese village administrative organizations consist of village committees, the de facto government entities at the village level, chaired by village leaders, and the village-leveled leadership of the Chinese Communist Party (CCP) named village party branches, chaired by village party secretaries. Village party branches supervise village committees, and thus village party secretaries are higher than village leaders in Chinese bureaucratic hierarchy, stipulated by the “Organic Law of the Village Committees (OLVC)” (National People’s Congress of China, 1998) and the “Working Regulation on the Rural Grassroots Organizations of Chinese Communist Party (WRRGOCCP)” (Central Committee of the Chinese Communist Party, 1999). Village leaders’ major responsibility is providing village public infrastructure and service, developing the local economy, and improve village residents’ income (OLVC, 1998; Martinez-Bravo et al., 2011); yet village party secretaries’ duty in developing the local economy is approving village leaders’ plans and monitoring the implementation (WRRGOCCP, 1999; Oi and Rozelle, 2000). The selection scheme for village leaders has transited from appointments by township officials to local direct elections by village residents. The introduction
of local direct elections in rural China has experienced a gradual process (Martinez-Bravo et al., 2014). Until 2010, most villages in rural China have introduced local direct elections (Padró i Miquel et al., 2015; Wong et al., 2017). Both appointments and local direct elections emphasize meritocratic selection, requiring that village leader candidates be law-abiding, of moral integrity and be intrinsically willing to serve village residents; and be of some diploma and administrative capacity (OLVC, 1998). Village leader candidates are then selected by village residents or township officials for village leaders with the likelihood of being selected positively associated with their virtue and capacity (Bell, 2016; Tang, 2016), rooted in the concept and practice of meritocratic selection in Chinese history (Zhang, 2012).

Village party secretaries are appointed by township officials, which also emphasizes meritocratic selection regarding village party secretary candidates’ virtue and capacity. WRRGOCCP (1999) and its following versions, regulated the procedures of selecting village party secretaries and stipulated the decisive role of township officials in this selection. This working regulation requires that village party secretaries be qualified in professional knowledge and

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5 In 1998, the National People’s Congress of China passed the revised “Organic Law of the Village Committees (OLVC)”, introducing local direct elections for village leaders in rural China, which brought elections for village leaders with open nomination, competitive election (O’Brien and Han, 2009). After the national legislation in 1998, each province in China, in the following years, introduced its own “Provincial Measures for Implementing the Organic Law of Village Committees” to provide further instructions on the implementation of local direct elections (O’Brien and Zhao, 2011). Counties and townships then followed suit (Wong et al., 2017).

6 Township party officials basically have the following ways to select for village party secretaries. (1) Village party secretaries are directly appointed by township party officials. (2) Village party branch committee members are firstly elected by village party members, then village party secretaries are appointed by township party officials or elected among those committee members and finally approved by township party officials. (3) Village party secretary candidates are firstly nominated by township party officials, then elected village party members to serve as village party secretaries.
working skills, be responsive to village residents’ needs and demands, and be intrinsically motivated to serve village residents. Village leaders are the major candidates for village party secretaries (O'brien and Li, 2000).

II. Theory

Our theoretical model upon Bayesian framework discusses how the introduction of local direct elections to a representative village facilitates the fulfillment of the meritocratic selection both for the village leader and for the village party secretary.  

A. Inferences with Village Leader Candidates

In this section, we use the Bayesian framework to discuss the inference of village leader candidates’ virtue and capacity in a representative village. We find that because the representative village resident naturally communicates with village leader candidates of more times than the representative township official does, the representative village resident infers village leader candidates’ virtue and capacity of higher accuracy and precision.

1. Setup: Our theory discusses a representative village, in which all adult village residents are potential village leader candidates. Each one has two personal characteristics: virtue and capacity, both are assumed to be independent and identically distributed over [0, 1] with both means of 0.5.

After the local direct election is introduced to this representative village, a pool of village leader candidates, subset of all the potential candidates, competes for being elected as the village leader by village residents. Before this

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7 According to our survey data, around 86% (1718 out of 2000) interviewed village residents replied that local direct elections were implemented law-abidingly, in which no corruption or conspiracy exists.
introduction, a pool of village leader candidates competes for being appointed as the village leader by township officials. Village leader candidates’ virtue is denoted as $\alpha_i$, with $\alpha_i \in [0, 1]$, and their capacity is denoted as $\theta_i$, with $\theta_i \in [0, 1]$ , where $i = \{1, 2, \ldots \}$. In the following analysis, we discuss the representative village resident instead of village residents, by assuming homogenous perception among village residents over village leader candidates’ virtue and capacity, as well as the representative township official instead of township officials, by assuming homogenous perception among township officials over village leader candidates’ virtue and capacity.

2. Bayesian Inferences: Neither the representative village resident nor the representative township official observes each village leader candidate’s virtue or capacity. At first, they simply hold prior perceptions over each village leader candidate’s virtue and capacity. Assumption 1 discusses the distributions of their prior perceptions on each village leader candidate’s virtue and capacity.

ASSUMPTION 1 (Prior distribution on village leader candidates’ virtue and capacity): The representative village resident’s and the representative township official’s prior perceptions on village leader candidate’s virtue are identically distributed as $N(\alpha_i^e, \sigma_{\alpha^e}^2)$, truncated at $[0, 1]$. Their prior perceptions on village leader candidate’s capacity are identically distributed as $N(\theta_i^e, \sigma_{\theta^e}^2)$, truncated at $[0, 1]$. Their prior means, and $\sigma_{\alpha^e}^2$ and $\sigma_{\theta^e}^2$, the prior variance, are known to the representative village resident and the representative township official.

To infer village leader candidates’ virtue and capacity, the representative
village resident and the representative township official, by naturally communicating with each candidate, obtains $\Omega_{it}^\alpha$, a series of observations of village leader candidate $i$’s virtue, in the times of $t = 1, ..., T^{Ele}$ and $1, ..., T^{App}$, respectively. $T^{Ele}$ represents the ultimate times of natural communication between the representative village resident and each village leader candidate, right before the representative village resident makes the decision on which candidate to elect as the village leader. $T^{App}$ represents the ultimate times of natural communication between the representative township official and each village leader candidate, right before the representative township official makes the decision on which candidate to appoint as the village leader. $\Omega_{it}^\alpha$ is specified as,

\begin{equation}
\Omega_{it}^\alpha = \alpha_i + \upsilon_{it}
\end{equation}

where $\upsilon_{it}$ is the series of random shocks in observing virtue. Similarly, the representative village resident and the representative township official, by naturally communicating with each village leader candidate, obtains $\Omega_{it}^\beta$, a series of observations of village leader candidate $i$’s capacity, in the times of $t = 1, ..., T^{Ele}$ and $1, ..., T^{App}$, respectively. $\Omega_{it}^\beta$ is specified as,

\begin{equation}
\Omega_{it}^\beta = \theta_i + \omega_{it}
\end{equation}

where $\omega_{it}$ is the series of random shocks in observing capacity.

Natural communication refers to the daily communication in work, living or other circumstances, in which communicators behaves naturally and artlessly. Since such communication happens in large number of times and in various situations, communicators can hardly, and thus be basically unwilling to, behave strategically to hide their real personally characteristics (Bell, 2016). Therefore, it is acceptable to assume that first, the times of natural communication are
sufficiently large; second, the series of observations on virtue or on capacity is normally distributed, in which the means are the real values of virtue or capacity.

ASSUMPTION 2 (Natural communication and observations on virtue and capacity): The representative village resident and the representative township official communicate with village leader candidates naturally. Therefore, $T^{ELe}$ and $T^{App}$ are both sufficiently large. In addition, the series of observations on virtue and the series of observations on capacity are both assumed to be normally distributed, truncated at $[0,1]$. Specifically, given that $v_{it} \sim N(0, \sigma^2_{v\theta})$ and $\omega_{it} \sim N(0, \sigma^2_{\omega\theta})$, $\Omega^a_{it}$ is distributed as $N(\alpha_t, \sigma^2_{v\theta})$, truncated at $[0,1]$, and $\Omega^\theta_{it}$ is distributed as $N(\theta_t, \sigma^2_{\omega\theta})$, truncated at $[0,1]$.

With natural communication, the representative village resident or township official obtain the posteriorly inferred perception of village leader candidates’ virtue. According to the Bayes’ Rule, such a posterior perception is obtained by iteration, such that the inferred perception of virtue in period $t$ is contingent on a previously inferred virtue, the inferred perception virtue in period $t - 1$, and a posteriorly updated virtue, the observation of virtue in in period $t$.

Now we introduce deriving the density kernel of the posterior distribution of village leader candidate $i$ ’s virtue. The representative village resident or township official hold identical prior perception on village leader candidate $i$ ’s virtue, of which the density kernel of her prior distribution is $\gamma(\alpha_i)$. After naturally communicating with village leader candidate $i$ for the first time, the representative village resident or township official updates the density kernel of the posterior distribution of her virtue as,
\[ p(\alpha_i | \Omega^\alpha_{i1}) = \gamma(\alpha_i) \cdot L(\alpha_i ; \Omega^\alpha_{i1}) \]

This posterior distribution in period \( t = 1 \) is also the previous distribution in period \( t = 2 \). After the natural communication in period \( t = 2 \), the updated density kernel of posterior distribution is

\[ p(\alpha_i | \Omega^\alpha_{i1}, \Omega^\alpha_{i2}) = [\gamma(\alpha_i) \cdot L(\alpha_i ; \Omega^\alpha_{i1})] \cdot L(\alpha_i ; \Omega^\alpha_{i2}) \]

\[ = \gamma(\alpha_i) [L(\alpha_i ; \Omega^\alpha_{i1}) \cdot L(\alpha_i ; \Omega^\alpha_{i2})] \]

Repeating this iteration, after \( t \) times of natural communication between the representative village resident or the representative township official and village leader candidate \( i \), the density kernel of posterior distribution of village leader candidate \( i \)'s virtue (See Appendix A) becomes

\[ p(\alpha_i | \Omega^\alpha_{i1}, \ldots, \Omega^\alpha_{it}) = \gamma(\alpha_i) \cdot [L(\alpha_i ; \Omega^\alpha_{i1}) \ldots L(\alpha_i ; \Omega^\alpha_{it})] \]

\[ \propto \exp \left\{ -\frac{1}{2} \left[ \frac{1}{\Sigma(\alpha_i)} (\alpha_i - S(\alpha_i))^2 \right] \right\} \]

where the posterior mean of village leader candidate \( i \)'s virtue is,

\[ S(\alpha_i) = \frac{\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2} \alpha_i^e + \frac{t\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2} \alpha_i \]

and the posterior variance of village leader candidate \( i \)'s virtue is,

\[ \Sigma(\alpha_i) = \frac{\sigma_{\alpha_i}^2\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2} \]

Given different ultimate times of natural communication, the representative village resident in election or the representative township official in appointment obtains the posterior mean of village leader candidate \( i \)'s virtue as,

\[ S^{Ele \ (App)}(\alpha_i) = \frac{\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2} \alpha_i^e + \frac{t\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2} \alpha_i, \text{ where } t = T^{Ele} \text{ or } T^{App} \]

and obtains the posterior variance of village leader candidate \( i \)'s virtue as,

\[ \Sigma^{Ele \ (App)}(\alpha_i) = \frac{\sigma_{\alpha_i}^2\sigma_{\alpha_i}^2}{\sigma_{\alpha_i}^2 + t\sigma_{\alpha_i}^2}, \text{ where } t = T^{Ele} \text{ or } T^{App} \]
Following similar Bayesian inference as for virtue above, the density kernel of posterior distribution of village leader candidate $i$’s capacity is (See Appendix A)

$\begin{align*}
\text{10) } & \quad p\left(\theta_i | \Omega_{i1}^\theta \ldots \Omega_{it}^\theta \right) = \gamma(\theta_i) \cdot \left[ L\left(\theta_i; \Omega_{i1}^\theta \right) \ldots L\left(\theta_i; \Omega_{it}^\theta \right) \right] \\
& \quad \propto \exp\left\{-\frac{1}{2} \left[ \sum_{i} L(\theta) \left( \theta - S(\theta) \right)^2 \right]\right\}
\end{align*}$

where the posterior mean of village leader candidate $i$’s capacity is,

$\begin{align*}
\text{11) } & \quad S(\theta_i) = \frac{\sigma^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}} \theta_i^e + \frac{\tau^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}} \theta_i
\end{align*}$

and the posterior variance of village leader candidate $i$’s capacity is,

$\begin{align*}
\text{12) } & \quad \Sigma(\theta_i) = \frac{\sigma^2_{\omega \theta} \sigma^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}}
\end{align*}$

Therefore, the representative village resident or township official’s posterior mean of village leader candidate $i$’s capacity is,

$\begin{align*}
\text{13) } & \quad S^{Ele\ (App)}(\theta_i) = \frac{\sigma^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}} \theta_i^e + \frac{\tau^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}} \theta_i \quad \text{where } t = T^{Ele}, T^{App}
\end{align*}$

Therefore, the representative village resident or township official’s posterior variance of village leader candidate $i$’s capacity is,

$\begin{align*}
\text{14) } & \quad \Sigma^{Ele\ (App)}(\theta_i) = \frac{\sigma^2_{\omega \theta} \sigma^2_{\omega \theta}}{\sigma^2_{\omega \theta} + \tau^2_{\omega \theta}} \quad \text{where } t = T^{Ele}, T^{App}
\end{align*}$

Proposition 1 discusses how accumulating times of natural communication improve the inference of village leader candidates’ virtue and capacity.

PROPOSITION 1: As the times of the representative village resident or township official’s natural communication with village leader candidates accumulate, the inference of each village leader candidate’s virtue and capacity is improve in the following aspects:
(a) The Inference Precision increases with the times of natural communication, shown by the deceasing posterior variance of virtue (or capacity) with the times of natural communication.

(b) The Inference Accuracy increases with the times of natural communication, shown by the decreasing scaled ratio of the difference between the posterior mean of virtue (or capacity) and the real value of virtue (or capacity) over the difference between the prior mean of virtue (or capacity) and the real value of virtue (or capacity) with the times of natural communication.

(c) The Marginal Inference Accuracy decreases with the times of natural communication, shown by the increasing marginal scaled ratio of the difference between the posterior mean of virtue (or capacity) and the real value of virtue (or capacity) over the difference between the prior mean of virtue (or capacity) and the real value of virtue (or capacity) with the times of natural communication.

Proof: (a) The first-order derivative of $\Sigma(\alpha_i)$ with respect to $t$ is

$$
\frac{\partial \Sigma(\alpha_i)}{\partial t} = \frac{-\sigma^4_{\alpha} \sigma^2_{\alpha} \sigma^2_{\theta}}{(\sigma^2_{\alpha} + t \sigma^2_{\theta})^2} < 0
$$

Similarly, the first-order derivative of $\Sigma(\theta_i)$ with respect to $t$ is

$$
\frac{\partial \Sigma(\theta_i)}{\partial t} = \frac{-\sigma^4_{\theta} \sigma^2_{\theta} \sigma^2_{\theta}}{(\sigma^2_{\theta} + t \sigma^2_{\theta})^2} < 0
$$

(b) The scaled ratio of the difference between the posterior mean of virtue and the real value of virtue over the difference between the prior mean of virtue and the real value of virtue is

$$
\frac{\Sigma(\alpha_i) - \alpha_i}{(\alpha_i - \alpha_i)} = \frac{\sigma^2_{\alpha}}{\sigma^2_{\alpha} + t \sigma^2_{\theta}} = \frac{\Sigma(\alpha_i)}{\sigma^2_{\theta}}
$$
Therefore, we have

\[
\frac{\partial \frac{Z(\alpha_i)-\alpha_i}{(\alpha_i^2-\alpha_i)}}{\partial t} = \frac{1}{\sigma^2_{\alpha e}} \frac{\partial \Sigma(\alpha_i)}{\partial t} < 0
\]

(18)

Similarly, the scaled ratio of the difference between the posterior mean of capacity and the real value of capacity over the difference between the prior mean of capacity and the real value of capacity is

\[
\frac{S(\theta_i)-\theta_i}{(\theta_i^2-\theta_i)} = \frac{\sigma^2_{\alpha \theta}}{\sigma^2_{\alpha \theta} + \alpha^2_{\theta e}} = \frac{\Sigma(\theta_i)}{\sigma^2_{\theta e}}
\]

(19)

Therefore, we have

\[
\frac{\partial \frac{Z(\alpha_i)-\alpha_i}{(\alpha_i^2-\alpha_i)}}{\partial t} = \frac{1}{\sigma^2_{\theta e}} \frac{\partial \Sigma(\theta_i)}{\partial t} < 0
\]

(20)

(c) The second-order derivative of \( \Sigma(\alpha_i) \) with respect to \( t \) is

\[
\frac{\partial^2 \Sigma(\alpha_i)}{\partial t^2} = \frac{2\sigma^6_{\alpha e}\sigma^2_{\alpha \theta}}{(\sigma^2_{\alpha \theta} + \alpha^2_{\theta e})^3} > 0
\]

(21)

Therefore, the second-order derivative of \( \frac{S(\alpha_i)-\alpha_i}{(\alpha_i^2-\alpha_i)} \) with respect to \( t \), which is the marginal scaled ratio of the difference between the posterior mean of virtue and the real value of virtue over the difference between the prior mean of virtue and the real value of virtue, is

\[
\frac{\partial^2 \frac{S(\alpha_i)-\alpha_i}{(\alpha_i^2-\alpha_i)}}{\partial t^2} = \frac{1}{\sigma^2_{\alpha e}} \frac{\partial^2 \Sigma(\alpha_i)}{\partial t^2} > 0
\]

(22)

Similarly, the second-order derivative of \( \Sigma(\theta_i) \) with respect to \( t \) is

\[
\frac{\partial^2 \Sigma(\theta_i)}{\partial t^2} = \frac{2\sigma^6_{\theta \theta}\sigma^2_{\alpha \theta}}{(\sigma^2_{\alpha \theta} + \alpha^2_{\theta e})^3} > 0
\]

(23)

Therefore, the second-order derivative of \( \frac{S(\theta_i)-\theta_i}{(\theta_i^2-\theta_i)} \) with respect to \( t \), which is the marginal scaled ratio of the difference between the posterior mean of
capacity and the real value of capacity over the difference between the prior mean of capacity and the real value of capacity, is

\[
\frac{\partial^2 \frac{s(\theta_i)-\theta_i}{(\theta_i^*-\theta_0)}}{\partial t^2} = \frac{1}{\sigma_{\theta}^2} \frac{\partial^2 \Sigma(\theta_i)}{\partial t^2} > 0 \tag{24}
\]

Figure 1 and 2 show that as the times of the representative village resident or township official’s natural communication with village leader candidates accumulate, (a) the band widths for the posterior variances decease, reflecting the increasing inference precision; (b) the difference between the posterior mean of virtue (or capacity) and the real value of virtue (or capacity) decreases, reflecting the increasing inference accuracy; and (c) the curves of the posterior means are concave in ascending updates and convex in descending updates, reflecting the decreasing marginal inference accuracy.

The implication of the improved inference precision and accuracy is that each time of natural communication brings local information on village leader candidates’ virtue and capacity, and such local information improves the inference of village leader candidates’ virtue and capacity on precision and accuracy. For the marginal inference accuracy, the implication is that as the times of natural communication accumulate, the increment of local information for inferring village leader candidates’ virtue and capacity diminishes.

3. **Institutional Comparison:** To compare the inference precision and accuracy after and before introducing local direct elections, we have an assumption regarding $T^E_{le}$ and $T^{App}$, the representative village resident’s and the representative township official’s ultimate times of natural communication with each village leader candidate.
Assumption 3 indicates that the representative village resident naturally communicates with village leader candidates of more times than the representative township official. The reason is that village leader candidates are also residents in this representative village, who have long-time and frequent natural communication with other village residents in various situations (Bell, 2016). For instance, village leader candidates and other village residents usually know each other since they were very young. As they grow up and live in the village, they have long-term and frequent communication at school, in production or commercial activities, and in everyday lives. On the contrary, village leader candidates have less chances of natural communication with township officials. The reasons could be that village leader candidates usually communicate with township officials when dealing with village public affairs or their private affairs involved with township administration; in addition, township officials are often post among different towns (Luo et al., 2007).

Given that $T_{Ele} > T_{App}$, we compare the inference precision and the inference accuracy of each village leader candidate’s virtue and capacity after and before introducing local direct elections:

(a) The representative village resident infers village leader candidates’ virtue and capacity of higher precision before electing one of them as the village leader, compared to the representative township official does before appointing one of them as the village leader.

(b) The representative village resident infers village leader candidates’ virtue and capacity of higher accuracy before electing one of them as the village leader, compared to the representative township official does before appointing one of them as the village leader.
them as the village leader.

As is shown in Figure 1 and 2, the band width representing the posterior variance of village leader candidates’ virtue or capacity in election is smaller than that in appointment, implying the representative village resident’ higher inference precision. The difference between the posterior mean of village leader candidates’ virtue or capacity and its real value in election is smaller than that in appointment, implying the implying the representative village resident’ higher inference accuracy.

To sum up, the representative village resident, due to her more times of natural communication with village leader candidates, have more local information on village leader candidates’ virtue and capacity than the representative township official. Therefore, as local direct elections empower the selection for the village leader to the representative village resident from the representative township official, village leader candidates’ virtue and capacity are both inferred of higher precision and accuracy.

B. Selection for Village Leaders

This section discusses how local direct elections facilitate the fulfillment of meritocratic selection for village leaders. Local direct elections, by providing the inference of higher accuracy on village leader candidates’ virtue and capacity, improve the mean value of the village leader’s composite virtue-and-capacity in a representative village. In addition, by providing the inference of higher precision on village leader candidates’ virtue and capacity, local direct elections also reduce the variance of the village leader’s composite virtue-and-capacity in a representative village.

1. Setup: The representative village resident and township official both
would select the village leader candidate with the highest composite virtue-and-capacity as the village leader. Our theory defines composite virtue-and-capacity as a weighted average of virtue and capacity, such that $\mu \alpha_i + (1 - \mu) \theta_i$, of village leader candidate $i$, where $\mu$ represents the weight that the representative village resident and township official put on village leader candidates’ virtue, in other words, the preference spectrum over virtue and capacity, and $\mu \in [0, 1]$.

*Mean Value of Composite Virtue-and-Capacity* To obtain the composite virtue-and-capacity of the elected (or appointed) village leader in a representative village, we calculate the mean value of composite virtue-and-capacity of all village leader candidates in a representative village that has already (or has not) introduced the local direct election. To calculate the mean value of composite virtue-and-capacity of all village leader candidates, we calculate a weighted average of all village leader candidates’ composite virtue-and-capacity with weight $A_i$, the likelihood that village leader candidate $i$ is elected or appointed. $A_i$ has the following properties:

(a) $A_i$ is contingent on village leader candidate $i$’s composite virtue-and-capacity.

(b) $A_i \in [0, 1]$, thus its value represents the likelihood of electing or appointing village leader candidate $i$ as the village leader.

(c) $A_i$ is positively associated with village leader candidate $i$’s virtue and her capacity, which reflects *positive screening* of the election and appointment for village leaders (Dal Bó et al., 2017) upon candidates’ virtue and their capacity.

Specifically, $\frac{\partial A_i}{\partial \alpha_i} > 0$ and $\frac{\partial A_i}{\partial \theta_i} > 0$.

To satisfy these three properties, for simplicity and without losing generality, we use a weighted average of village leader candidate $i$’s posterior mean of
virtue and her posterior mean of capacity as her likelihood to be elected or appointed as the village leader, with weight \( \mu \), the preference spectrum over virtue and capacity. In the light of Alesina and Tabellini (2007), village leader candidate \( i \)’s likelihood to be elected or appointed that we use here can be regarded as a performance-based reward. This reward is a product of the village leader’s constant payoff standardized to 1 with village leader candidate \( i \)’s likelihood to be elected or appointed.

Therefore, the likelihood that village leader candidate \( i \) is elected or appointed takes the form that

\[
A_i = \mu S(\alpha_i) + (1 - \mu) S(\theta_i)
\]

\[
= \mu \left[ \frac{\Sigma(\alpha_i)}{\sigma_{\alpha e}} \alpha_i^e + \left(1 - \frac{\Sigma(\alpha_i)}{\sigma_{\alpha e}}\right) \alpha_i \right] + (1 - \mu) \left[ \frac{\Sigma(\theta_i)}{\sigma_{\theta e}} \theta_i^e + \left(1 - \frac{\Sigma(\theta_i)}{\sigma_{\theta e}}\right) \theta_i \right]
\]

where \( \Sigma(\alpha_i) \equiv \frac{\sigma_{\beta e}^2 \sigma_{\alpha e}^2}{\sigma_{\alpha e}^2 + t \sigma_{\beta e}^2}, \quad \Sigma(\theta_i) \equiv \frac{\sigma_{\beta e}^2 \sigma_{\theta e}^2}{\sigma_{\theta e}^2 + t \sigma_{\beta e}^2}. \)

As is discussed in Section II.A., \( \Sigma(\alpha_i) \) and \( \Sigma(\theta_i) \) measure the inference accuracy and precision. As the times of natural communication rise, \( \Sigma(\alpha_i) \) and \( \Sigma(\theta_i) \) decreases and thus \( A_i \) tends to be the composite virtue-and-capacity. Therefore, when \( t = T^{Ele} \), \( \Sigma(\alpha_i) = \Sigma^{Ele}(\alpha_i) \) and \( \Sigma(\theta_i) = \Sigma^{Ele}(\theta_i) \), then we have \( A_i = A_i^{Ele} \), the likelihood that village leader candidate \( i \) is elected; when \( t = T^{App} \), \( \Sigma(\alpha_i) = \Sigma^{App}(\alpha_i) \) and \( \Sigma(\theta_i) = \Sigma^{App}(\theta_i) \), then we have \( A_i = A_i^{App} \), the likelihood that village leader candidate \( i \) is appointed.

To calculate the weighted average of all village leader candidates’ composite virtue-and-capacity with weight \( A_i \), since \( \int_0^1 \int_0^1 A_i d\alpha_i d\theta_i < 1 \), that is, the sum of weights are smaller than 1, we should have \( \int_0^1 \int_0^1 \left[ \mu \alpha_i + (1 - \mu) \theta_i \right] A_i d\alpha_i d\theta_i \), the weighted average of all village leader candidates’ composite virtue-and-capacity, divided by \( \int_0^1 \int_0^1 A_i d\alpha_i d\theta_i \), in order to
standardize the weights. As a result, the mean value of the composite virtue-and-capacity of an elected or appointed village leaders is,

\[
\mathbb{E}^{ELE (App)}(\mu \alpha_i + (1 - \mu) \theta_i) = \int_0^1 \int_0^1 \frac{\mu \alpha_i + (1 - \mu) \theta_i}{\int_0^1 \int_0^1 A_i^{ELE (App)} d\alpha d\theta_i} d\alpha_i d\theta_i
\]

where the likelihood that village leader candidate \( i \) is elected, or appointed, is

\[
A_i^{ELE (App)} = \mu \Sigma^{ELE (App)}(\alpha_i) + (1 - \mu) \Sigma^{ELE (App)}(\theta_i)
\]

\[
= \mu \left[ \frac{\Sigma^{ELE (App)}(\alpha_i)}{\sigma_{\alpha}^2} \alpha_i^\alpha + \left( 1 - \frac{\Sigma^{ELE (App)}(\alpha_i)}{\sigma_{\alpha}^2} \right) \alpha_i \right]
\]

\[
+ (1 - \mu) \left[ \frac{\Sigma^{ELE (App)}(\theta_i)}{\sigma_{\theta}^2} \theta_i^\theta + \left( 1 - \frac{\Sigma^{ELE (App)}(\theta_i)}{\sigma_{\theta}^2} \right) \theta_i \right]
\]

where \( \Sigma^{ELE (App)}(\alpha_i) \equiv \frac{\sigma_{\alpha}^2 \sigma_{\alpha}^2}{\sigma_{\alpha}^2 + \Sigma^{ELE (App)}(\alpha_i)} \), \( \Sigma^{ELE (App)}(\theta_i) \equiv \frac{\sigma_{\theta}^2 \sigma_{\theta}^2}{\sigma_{\theta}^2 + \Sigma^{ELE (App)}(\theta_i)} \).

Therefore, it shows that what distinguishes the elected village leader’s and the appointed village leader’s mean values of the composite virtue-and-capacity in a representative village is the representative village resident’s and the representative township official’s different times of natural communication with village leader candidates.

Village leader candidates’ likelihood to be elected or appointed in this paper takes a different functional form from previous ones. In previous studies, the likelihood to be elected or appointed usually take the functional form of \( P = \Pr(U \geq U) \), in which \( P \) represents the the likelihood to be elected or appointed, \( U \) represents voters or upper officials’ utility that is influenced by political candidates’ policies. \( U \) represents voters or upper officials’ threshold utility. On the contrary, such a functional form in our paper does not depend on the representative village resident or the representative township official’s utility but on their inferences. Besides, that previous functional form depends voters or upper officials’ threshold utility, implying that political candidates are not
eligible unless their policies bring about voters or upper officials’ utility above some bottom line; while our functional form does not depend on that.

Variance of Composite Virtue-and-Capacity We could also obtain the variance of composite virtue-and-capacity of the elected (or appointed) village leader in a representative village, by calculating the variance of composite virtue-and-capacity of all village leader candidates in a representative village that has already (or has not) introduced the local direct election. By the definition of variance, the variance of composite virtue-and-capacity of all village leader candidates in a representative village is,

\[ Var^{Ele}(App)(\mu a_i + (1 - \mu)\theta_i) \]

\[ = E^{Ele}(App)[(\mu a_i + (1 - \mu)\theta_i)^2] - E^{Ele}(App)^2[(\mu a_i + (1 - \mu)\theta_i)] \]

This measures to what extent the elected (or appointed) village leader’s composite virtue-and-capacity varies. Similar to the mean value, it shows that what distinguishes the elected village leader’s and the appointed village leader’s variances of the composite virtue-and-capacity in a representative village is also the representative village resident’s and township official’s different times of natural communication with village leader candidates.

2. Institutional Comparison: Proposition 2.1 and 2.2 compare, in a representative village, the mean value of the elected village leader’s composite virtue-and-capacity with that of the appointed village leader. Proposition 3 compares, in a representative village, the variance of the elected village leader’s composite virtue-and-capacity with that of the appointed village leader.

PROPOSITION 2.1: If the representative village resident or township official only considers village leader candidates’ virtue or capacity, the elected village leader’s virtue or capacity exceeds the appointed village leader’s in a
representative village. Followed are specific cases:

Case 1: when \( \mu = 1 \), that is, the representative village resident or township official only considers village leader candidates’ virtue, the elected or appointed village leader’s composite virtue-and-capacity becomes

\[
E^{Ele} (\alpha_i) = \int_0^1 \int_0^1 s^{Ele} (\alpha_i) d\alpha_i d\theta_i
\]

then we have

\[
E^{Ele} (\alpha_i) > E^{App} (\alpha_i)
\]

When \( \mu = 0 \), that is, the representative village resident or township official only considers village leader candidates’ capacity, the elected or appointed village leader’s composite virtue-and-capacity becomes

\[
E^{Ele} (\theta_i) = \int_0^1 \int_0^1 s^{Ele} (\theta_i) d\theta_i d\alpha_i
\]

then we have

\[
E^{Ele} (\theta_i) > E^{App} (\theta_i)
\]

Proof: See Appendix B. \( \Box \)

PROPOSITION 2.2: If the representative village resident or township official considers both village leader candidates’ virtue and their capacity, the mean value of the elected village leader’s composite virtue-and-capacity exceeds the mean value of the appointed village leader’s in a representative village. Specifically, we have

\[
E^{Ele} (\mu \alpha_i + (1 - \mu) \theta_i) > E^{App} (\mu \alpha_i + (1 - \mu) \theta_i)
\]

Followed are specific cases:

Case 3: When \( \mu = \frac{1}{2} \), that is, the representative village resident or township official considers village leader candidates’ virtue and capacity with equal weights, the elected village leader’s composite virtue-and-capacity exceeds the
appointed village leader’s in a representative village.

Case 4: When $\mu \in \left[\frac{1}{2}, 1\right]$, that is, the representative village resident or township official emphasizes more on virtue, the elected village leader’s composite virtue-and-capacity exceeds the appointed village leader’s in a representative village. This is contingent on $\theta_i^c \in [0.5, 1]$, that is, the prior mean of each village leader candidate’s capacity is above the mean of the real values of all potential village leader candidates’ capacity.

Case 5: When $\mu \in \left(0, \frac{1}{2}\right]$, that is, the representative village resident or township emphasizes more on capacity, the elected village leader’s composite virtue-and-capacity exceeds the appointed village leader’s in a representative village. This is contingent on $\alpha_i^v \in [0.5, 1]$, that is, the prior mean of each village leader candidate’s virtue is above the mean of the real values of all potential village leader candidates’ capacity.

Proof: See Appendix B. ■

The assumption that Case 4 is contingent on is from requirements by OLVC that village leader candidates satisfy a series of personal characteristics regarding capacity, such as some diploma or management experience, thus the mean of the representative village resident’s or township official’s prior perceptions for village leader candidates’ capacity is larger than or equal to 0.5, the mean of all village residents’ capacity.

Similarly, the implication assumption that Case 5 is contingent on is from requirements by OLVC that village leader candidates satisfy a series of personal characteristics regarding virtue, such as no criminal record or some affiliation to the CPC, thus the mean of the representative village resident’s or township official’s prior perceptions for village leader candidates’ virtue is larger than or
equal to 0.5, the mean of all village residents’ virtue.

**PROPOSITION 3:** The variance of the elected village leader’s composite virtue-and-capacity is smaller than the variance of the appointed village leader’s in a representative village. Specifically, we have

\[ \text{Var}^{\text{Elec}} (\mu \alpha_i + (1 - \mu) \theta_i) < \text{Var}^{\text{App}} (\mu \alpha_i + (1 - \mu) \theta_i) \]

Proof: See Appendix B.

In sum, after introducing the local direct election to a representative village, the village leader’s composite virtue-and-capacity’s mean value increases while its variance decreases. This implies the meritocratic selection for village leaders facilitated by local direct elections.

**C. Inferences and Selection for Village Party Secretaries**

This section demonstrates that local direct elections facilitates the fulfillment of meritocratic selection for village party secretaries. Because local direct elections raise village leaders’ mean value of composite virtue-and-capacity, elected village leaders, under performance-based promotion scheme, are more likely to be promoted as village party secretaries than appointed village leaders.

1. **The Selection for the Village Party Secretary:** The selection for the village party secretary in a representative village is contingent on village party secretary candidates’ composite virtue-and-capacity. By observing candidates’ performance, the representative township official infers their composite virtue-and-capacity appoints the one with the highest as the village party secretary.

Village party secretary candidates are usually members of the village party committee, and their performance in village affairs is assumed to be upon
village party secretary candidate $j$’s composite virtue-and-capacity. Without losing generality, it is assumed that village party secretary candidates’ performance is a strictly increasing function of their composite virtue-and-capacity, in the lights of Jones and Olken (2005), Besley et al. (2011), Yao and Zhang (2015) and Bloom et al. (2015). Specifically,

\[
P_j = F[\mu \alpha_j + (1 - \mu)\theta_j] + \varepsilon_j
\]

where $P_j$ represents village party secretary candidate $j$’s performance, $\mu \alpha_j + (1 - \mu)\theta_j$ represents her composite virtue-and-capacity, and $\varepsilon_j$ represents the random error, where $\varepsilon_j \sim N(0, \sigma^2_\varepsilon)$. $F[\cdot]$ is monotone and strictly increasing in $\mu \alpha_j + (1 - \mu)\theta_j$.

The likelihood to appoint village party secretary candidate $j$ as the village party secretary is specified as

\[
R = E[(\mu \alpha_j + (1 - \mu)\theta_j|P_j)]
\]

which is, similar to our discussion in Section II.B., the posterior mean of composite virtue-and-capacity of village party secretary candidate $j$.

Similar to what we discussed in Section II.A., we assume the representative township official’s prior perception on the village leader’s, either elected or appointed, composite virtue-and-capacity distributed as

ASSUMPTION 4 (Prior distribution on village party secretary candidates’ virtue and capacity): The representative township official’s prior perceptions on village party secretary candidate $j$’s virtue is distributed as $N(\alpha_j^u, \sigma^2_{\alpha_j^u})$, truncated at $[0,1]$, where $\alpha_j^u \in [0,1]$. Her prior perceptions on village party secretary candidate $j$’s capacity is distributed as $N(\theta_j^u, \sigma^2_{\theta_j^u})$, truncated at
where \( \theta_j^u \in [0, 1] \). \( \alpha_j^u \) and \( \theta_j^u \), the prior means, and \( \sigma_{\alpha j^u}^2 \) and \( \sigma_{\theta j^u}^2 \), the prior variances, are known to the representative township official.

The prior distribution of village party secretary candidate \( j \)'s composite virtue-and-capacity is thus \( N(\mu^2\alpha_j^u + (1 - \mu)^2\theta_j^u, \sigma_{\alpha j^u}^2 + \sigma_{\theta j^u}^2) \). Using the similar Bayesian framework as in Section II.A., the posterior mean of the composite virtue-and-capacity of village party secretary \( j \) is (See Appendix C),

\[
E[(\mu\alpha_j + (1 - \mu)\theta_j_j | P)] = (1 - \phi)[\mu^2\alpha_j^u + (1 - \mu)^2\theta_j^u] + \varphi F^{-1}[\mu\alpha_j + (1 - \mu)\theta_j]
\]

where \( \mu \in (0,1), \varphi \equiv \frac{\sigma_{\alpha j^u}^2 + \sigma_{\theta j^u}^2}{\sigma_{\alpha j^u}^2 + \sigma_{\theta j^u}^2 + F^{-1}[\sigma_{\epsilon^2}^2]} \).

2. The Performance-based Promotion: The village leader, also a member of the village party committee, is the major candidate of village party secretary (O'brien and Li, 2000). By observing the village leader’s performance, the representative township official infers the village leader’s composite virtue-and-capacity and is likely to promote her as the village party secretary (WRRGOCCP, 1999). Specifically, the village leader’s performance is

\[
P = F[\mu\alpha + (1 - \mu)\theta] + \varepsilon
\]

where \( P \) represents the village leader’s performance, \( \mu\alpha + (1 - \mu)\theta \) represents her composite virtue-and-capacity, and \( \varepsilon \) represents the random error, where \( \varepsilon \sim N(0, \sigma_{\epsilon^2}^2) \). \( F[\cdot] \) is strictly increasing in \( \mu\alpha + (1 - \mu)\theta \).

Similar to what we derived above, we have the village leader’s likelihood to be promoted as the village party secretary, such that

\[
E[(\mu\alpha + (1 - \mu)\theta | P)] = (1 - \varphi)[\mu^2\alpha_j^u + (1 - \mu)^2\theta_j^u] + \varphi F^{-1}[\mu\alpha + (1 - \mu)\theta]
\]
where $\mu \in (0,1)$, $\varphi \equiv \frac{\sigma^2_{\mu} + \sigma^2_{\theta}}{\sigma^2_{\mu} + \sigma^2_{\theta} + F^{-1}[\sigma^2]}$.

3. Institutional Comparison: In this part we compare the elected village leader’s and the appointed village leader’s likelihood to be promoted as the village party secretary, in a representative village. In addition to the likelihood to be promoted as the village party secretary in a performance-based promotion that we derived in the last part, we need another assumption:

ASSUMPTION 5: The introduction of local direct elections only influences village leaders’ composite virtue-and-capacity, not other village party secretary candidates’ composite virtue-and-capacity.

With Assumption 5, we have the following proposition:

PROPOSITION 4: (Meritocratic selection for village party secretaries): In a representative village, by observing village leaders’ performance, the elected village leader has higher likelihood to be promoted as the village party secretary than the appointed village leader.

Proof: Section II.B. has shown that in a representative village, the elected village leader’s composite virtue-and-capacity exceeds the appointed village leader’s, such that

$$E^{Ele}(\mu \alpha + (1 - \mu) \theta) > E^{App}(\mu \alpha + (1 - \mu) \theta)$$

Based on (42), we know that

$$F[E^{Ele}(\mu \alpha + (1 - \mu) \theta)] + \varepsilon > F[E^{App}(\mu \alpha + (1 - \mu) \theta)] + \varepsilon$$

In other words, $p^{Ele} > p^{App}$.

Following (39), the likelihood of the elected (or appointed) village leader to
be promoted as the village party secretary is specified as

\[ R^{Ele}(App) = E \left[ (\mu \alpha + (1 - \mu)\theta | P^{Ele}(App)) \right] \]

\[ = (1 - \varphi) [\mu^2 \alpha^u + (1 - \mu)^2 \theta^u] + \varphi F^{-1} [E^{Ele}(App)(\mu \alpha + (1 - \mu)\theta)] \]

where \( \mu \in (0,1) \), \( \varphi \equiv \frac{\sigma_{\alpha^u}^2 + \sigma_{\theta^u}^2}{\sigma_{\alpha^u}^2 + \sigma_{\theta^u}^2 + F^{-1}[\sigma_\theta^2]} \).

According to (42), we know that \( R^{Ele} > R^{App} \). □

Proposition 4 shows that because what underlies the village leader’s promotion is her composite virtue-and-capacity revealed through her performance, and elected village leaders’ average composite virtue-and-capacity exceeds appointed ones’, thus elected village leaders’ average promotion likelihood surpasses appointed ones’.

By comparing, in a representative village, the elected and appointed village leader’s promotion likelihood, we have

\[ R^{Ele}(App) = \varphi (F^{-1}[E^{Ele}(\mu \alpha + (1 - \mu)\theta)] - F^{-1}[E^{App}(\mu \alpha + (1 - \mu)\theta)]) \cdot I + \varphi F^{-1} [E^{App}(\mu \alpha + (1 - \mu)\theta)] + (1 - \varphi) [\mu^2 \alpha^u + (1 - \mu)^2 \theta^u] \]

where \( I \equiv I(= 1, \text{if elected}; = 0, \text{if appointed}) \) is the indicator, \( \varphi \equiv \frac{\sigma_{\alpha^u}^2 + \sigma_{\theta^u}^2}{\sigma_{\alpha^u}^2 + \sigma_{\theta^u}^2 + F^{-1}[\sigma_\theta^2]} \).

According to (42), and that \( F^{-1} [\cdot] \) is monotone and strictly increasing in composite virtue-and-capacity, we have \( \varphi (F^{-1}[E^{Ele}(\mu \alpha + (1 - \mu)\theta)] - F^{-1}[E^{App}(\mu \alpha + (1 - \mu)\theta)]) \cdot I > 0 \). This implies that elected village leaders, given the same performance, has larger promotion likelihood than appointed village leaders, due to their higher average composite virtue-and-capacity.

The performance-based promotion is both the \textit{ex post} assessment for the village leader and the \textit{ex ante} selection for the village party secretary. Our specified promotion likelihood is similar to what are derived in Dewatripont et
al. (1999) and Alesina and Tabellini (2007). They discuss the *ex post* assessment for bureaucrats’ performance, and upon which infer their capacity or efforts and promote them as the incentive; while our study, in addition to the *ex post* assessment, also shows how the inference of village leaders’ composite virtue-and-capacity upon their performance facilitates the meritocratic selection for village party secretaries, the bureaucrats of higher hierarchy than village leaders.

Our model shows that the promotion likelihood is positively associated with the village leader’s performance, thus the performance-based promotion for village party secretaries holds village leaders accountable. In addition, it also shows that integrated with local direct elections, the performance-based promotion for village party secretaries is endowed with meritocratic selection.

### III. Empirical Evidence

In this section, we first introduce the sampling method and data. Then we introduce the empirical evidence supporting the meritocratic selection for village leaders in rural China. Finally, we introduce the empirical evidence supporting the meritocratic selection for village party secretaries in rural China.

#### A. Sampling and Data

The sampling and data used in this paper are the same as used in Wong et al. (2017). The 101 sampled villages representing five major agro-ecological zones in China were surveyed three times (in 2005, 2008 and 2012). We obtain detailed information in these 101 villages on village public goods, local governance and local socio-economic conditions, which ranges from 1995 to 2012 and contains five office terms (approximately three years per term).

In these 101 villages, we obtain reliable and comprehensive project quality measures of 563 village roads in total. To ensure the measure precision, the field
team worked with professional civil engineers and the transportation departments of local governments, before field surveys, to develop a standard and scientific village road quality evaluating scheme. A series of measures was also taken to avoid enumerator-specific subjectiveness on village road projects⁸. By adding up all partial quality scores, the comprehensive village road quality score (0-100 points) for these 563 village roads is obtained.

We consider project quality of village roads influenced both by village leaders’ virtue and by their capacity; therefore, it reflects village leaders’ composite virtue-and-capacity. The reason is that it is village leaders’ capacity that influences the investment of village public road projects (Martinez-Bravo et al., 2011); yet making good use of the investment and transforming it to the quality require village leaders’ virtue, including, but not limited to, responsibility and intrinsic motives to serve local people (Liu et al., 2009).

Since partial village leaders hold the position for more than one term, in each village, we regard the village leader’s whole tenure (one or more terms) as one observation. Therefore, a village-tenure panel data set is obtained, where the tenure is marked with the village leader’s tenure-ending year. On average, there are 4-5 village leaders in each of the 101 villages from 1995 to 2012. Therefore, our village-tenure panel data set contains 455 observations, in which the average project quality of village roads in each village leader’s tenure is also calculated.

B. Evidence of the Meritocratic Selection for Village Leaders

Figure 3 shows histograms of village road quality built by either elected or appointed village leader, and demonstrates that (1) the mean value of village road quality built by elected village leaders is higher than that by appointed

⁸ For details on avoiding measurement errors in project quality of village roads, see Wong et al. (2017).
village leader, implying elected village leaders’ higher mean value of composite virtue-and-capacity than appointed village leaders’; (2) the variance of village road quality built by elected village leaders is lower than that by appointed village leader, implying elected village leaders’ lower variance of composite virtue-and-capacity than appointed village leaders’. In a word, local direct elections facilitate the fulfillment of meritocratic selection for village leaders.

Wong et al. (2017) also provides econometric estimation results as evidence for elected village leaders’ higher mean value of composite virtue-and-capacity than appointed village leaders’. The econometric specification is

\[ Qltvrs = \beta_0 + \beta_1 Ele_{vs} + +Z_{vrs}\lambda + \rho_v + \kappa_s + \xi_{vt} \]

where \( Qltvrs \) represents the project quality of village road \( r \) built starting in year of \( s \) in village \( v \). \( Ele_{vs} \) is a dummy variable representing whether the village leader who built the road starting in year of \( s \) in village \( v \) was elected directly by local village residents. \( Z_{vrs} \) represents controlling variables, \( \rho_v \) represents the village dummy and \( \kappa_s \) represents the road project starting year dummy. \( \xi_{vt} \) is the random error.

The estimation results in Wong et al. (2017), show that after introducing local direct elections, the village road quality is increased on average. Since village leaders’ composite virtue-and-capacity underlies the village road quality, these estimation results imply elected village leaders’ higher mean value of composite virtue-and-capacity than appointed village leaders’.

**C. Evidence of the Meritocratic Selection for Village Party Secretaries**

The meritocratic selection for village party secretaries can be empirically testified, according to Section II.C., by comparing, in a representative village, the association between the elected village leader’s performance with her
likelihood to be promoted as the village party secretary, with that association of the appointed village leader’s. Based on (43), the specification is

\[ R_{vt} = \beta_0 + \beta_1 Ele_{vt} + \beta_2 AQlty_{vt} + \beta_3 Ele_{vt} \cdot AQlty_{vt} + X_{vt}\delta + \rho_v + \tau_t + \eta_{vt} \]

where \( R_{vt} \) is a dummy variable representing whether the village leader is promoted as the village party secretary as her tenure ends. In village \( v \), if the village leader would be promoted as the village party secretary as her village leader tenure ends in year \( t \), the value of \( R_{vt} \) of this observation is 1; otherwise it is 0. \( Ele_{vt} \) is a dummy variable representing whether the village leader in village \( v \), with her tenure ending in year \( t \), was elected directly by local village residents. If the village leader was directly elected, in other words, if she gets in office after the introduction of local direct election in village \( v \), the value of \( Ele_{vt} \) of this observation is 1; otherwise it is 0. \( AQlty_{vt} \) represents the average project quality of village roads in the village leader’s tenure in village \( v \) and with her tenure ending in year \( t \).

In addition, \( X_{vt} \) represents the controlling variables, the characteristics of village \( v \), the village leader, and the party secretary incumbent in the village leader’s tenure-ending year \( t \). We control for population and per capita income in the village, village leaders’ age and years of schooling, and party secretary incumbents’ age. In addition, \( \rho_v \) and \( \tau_t \) represents the village fixed effects and the tenure-ending year fixed effects, respectively. \( \eta_{vt} \) is the random error.

Table 1 presents the summary statistics of variables used in our study. Table 2 presents the estimation results of our specifications. Column 1 shows a positive association between the project quality and village leaders’ promotion likelihood, that is, \( \beta_1 \) is significantly positive. This result is consistent with our theoretical prediction that elected village leaders receive higher average
promotion likelihood, as \( \varphi \{ F^{-1}[\mathbb{E}^{E}(\mu \alpha + (1 - \mu)\theta)] - F^{-1}[\mathbb{E}^{A}(\mu \alpha + (1 - \mu)\theta)] \} \cdot I \) in the characterized promotion likelihood is positive.

The result in Column 2 of Table 2 shows that \( \beta_2 \) is significantly positive, in other words, the average project quality of village roads, which is observed by township officials, has statistical evidence to contribute to appointed village leaders’ average promotion likelihood. Since the promotion likelihood is characterized as the inferred composite virtue-and-capacity by observing the average project quality of village roads in the village leader’s tenure, township officials infer appointed village leaders’ composite virtue-and-capacity as \( \varphi F^{-1}[\mathbb{E}^{A}(\mu \alpha + (1 - \mu)\theta)] \). This result is consistent with our theoretical prediction that village leaders’ performance contributes to their promotion likelihood, implying that the performance-based promotion exists before introducing local direct elections.

The result in Column 2 of Table 2 also shows that \( \beta_3 \) is significantly positive, that is, the average project quality of village roads contributes, statistically, to elected village leaders’ average promotion likelihood to a larger extent than to appointed village leaders’. Township officials have inferred elected village leaders’ composite virtue-and-capacity as \( \varphi F^{-1}[\mathbb{E}^{E}(\mu \alpha + (1 - \mu)\theta)] \) by observing their performance, which is greater than \( \varphi F^{-1}[\mathbb{E}^{A}(\mu \alpha + (1 - \mu)\theta)] \), appointed village leaders’ composite virtue-and-capacity inferred by township officials. This result is consistent with our theoretical prediction that elected village leaders, given the same performance, has larger promotion likelihood than appointed village leaders, due to their higher average composite virtue-and-capacity. Therefore, besides the existence of the performance-based promotion, it also implies that local direct elections also fulfill the meritocratic selection for village party secretaries.
IV. Concluding Remarks

Two major issues in political economy, both concerns information asymmetry, are political selection that may suffer from adverse selection and political incentive that could suffer from moral hazards. In addressing moral hazards, accumulating studies have been conducted, either by deciphering existing schemes or by designing new mechanisms, to discuss the fulfillment of accountability of politicians (Laffont, 2000; Besley, 2006). Addressing adverse selection, however, appears commonly in literature regarding, for instance, job market signaling (Spence, 1973) and product advertisement (Milgrom and Roberts, 1986), yet seldom in political selection literature. Both types of issues, in present studies, are basically discussed under the game theory framework.

In the lights of local information (Hayek, 1945), we discover new ways to address adverse selection in political selection with the Bayesian framework. We demonstrate that local direct elections, by providing local information of village leader candidates’ virtue and capacity, facilitates the fulfillment of meritocratic selection for village leaders. This local information is from village residents as local, who naturally communicate with village leader candidates of more times than township officials. The facilitation of fulfilling meritocratic selection entails elected village leaders’ higher mean value, and lower variance, of the composite virtue-and-capacity than appointed ones’. This demonstration is empirically supported\(^9\). With the preference spectrum of voters or superiors over virtue and capacity, weights between virtue and capacity, our theoretical

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\(^9\) Given the previously discussed assumption that politicians’ performance is an increasing function of their composite virtue-and-capacity, our demonstration is empirically supported by studies regarding the impacts of local direct elections on village public investment (Luo et al., 2007; Martínez-Bravo et al., 2014), and studies regarding that on quality of village public infrastructure (Wong et al. 2017).
predictions apply for a continuum of scenarios from the purely virtue-oriented selection for leaders to the purely capacity-oriented selection for leaders.

We further demonstrate that integrating local information with *ex post* incentives facilitates addressing adverse selection and moral hazards in political selection, endowing the performance-based promotion with meritocratic selection. This demonstration is empirically supported in this paper. The top-down promotion for village party secretaries, by assessing village leaders’ performance and promoting them, holds village leaders accountable and solve moral hazards. Since local direct elections raise village leaders’ mean value of composite virtue-and-capacity, those elected village leaders, under such a performance-based promotion scheme, are more likely to be promoted as village party secretaries than appointed village leaders.

Several limitations and extensions are important to note. First, although assumption in our model that political selections in rural China law-abiding could partially deviate from facts, our theoretical predictions on meritocratic selection for village leaders and for village party secretaries are supported empirically. Second, it’s a strong assumption that the election or appointment likelihood for village leaders equal to village leader a weighted average of village leader candidates’ posterior virtue and posterior capacity, and some further discussion is in need to relax this assumption. Third, although it is interesting to discuss whether the meritocratic selection for village leaders facilitates by local direct elections leads to an equilibrium in which village leaders, village residents and township officials all obtain optimized payoffs, due to limited spaces, it is not discussed in this paper.
REFERENCES


Elman, Benjamin A. *Civil Examinations and Meritocracy in Late Imperial China*. Harvard University Press, 2013.


FIGURE 1: POSTERIOR MEANS OF VIRTUE AND NATURAL COMMUNICATION TIMES
Panel A: Ascending Updates

Panel B: Descending Updates

FIGURE 2: POSTERIOR MEANS OF CAPACITY AND NATURAL COMMUNICATION TIMES
FIGURE 3: HISTOGRAM OF ROAD QUALITY BY ELECTION OR APPOINTMENT
Table 1: Summary statistics of sample village road projects and sample villages

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<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explained variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village leader promoted as party secretary as her tenure ends (Y=1; N=0)</td>
<td>455</td>
<td>0.248</td>
<td>0.433</td>
<td>0</td>
<td>1</td>
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<td><strong>Main explanatory variable</strong></td>
<td></td>
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<tr>
<td>Village leader elected (Y=1; N=0)</td>
<td>455</td>
<td>0.547</td>
<td>0.498</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Average comprehensive road quality scores of all village road projects in the village leader’s tenure</td>
<td>226</td>
<td>71.353</td>
<td>16.123</td>
<td>26.75</td>
<td>98.9</td>
</tr>
<tr>
<td><strong>Village leader characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>455</td>
<td>50.147</td>
<td>4.775</td>
<td>36</td>
<td>63</td>
</tr>
<tr>
<td>Years of Schooling</td>
<td>455</td>
<td>9.435</td>
<td>2.459</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td><strong>Party secretary incumbent characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>455</td>
<td>53.668</td>
<td>5.642</td>
<td>41</td>
<td>68</td>
</tr>
<tr>
<td><strong>Village characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village population (in 1,000 persons)</td>
<td>455</td>
<td>1.912</td>
<td>1.387</td>
<td>0.16</td>
<td>6.60</td>
</tr>
<tr>
<td>Village per capita income (in 1,000 yuan)</td>
<td>455</td>
<td>3.455</td>
<td>1.887</td>
<td>0.30</td>
<td>10.15</td>
</tr>
</tbody>
</table>

Data source: Authors’ survey
Table 2: FE estimates of the impacts of village election and village road project quality on village leaders’ promotion likelihood as village party secretaries

<table>
<thead>
<tr>
<th>Explained variable: Village leader promoted as village party secretary (Y=1; N=0)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Village leader elected (Y=1; N=0)</td>
<td>0.160***</td>
<td>-0.034</td>
</tr>
<tr>
<td>Average comprehensive road quality scores of all village road projects in the village leader’s tenure (0-100)</td>
<td>0.0019**</td>
<td></td>
</tr>
<tr>
<td>Village leader elected × Average comprehensive road quality scores of all village road projects in the village leader’s tenure (0-100)</td>
<td>0.0030**</td>
<td></td>
</tr>
<tr>
<td>Village characteristics</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Village leader characteristics</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Party secretary incumbent characteristics</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Village FE &amp; Tenure-ending year FE</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td>455</td>
<td>455</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.06</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Data source: Authors’ survey

Note: All models control for characteristics of villages, village leaders and party secretary incumbents, and village fixed effects and tenure-ending year fixed effects. Village characteristics include village population and village per capita income. Village leaders’ characteristics include age and years of schooling. Party secretary incumbents’ characteristics include age. Linear probability models are used in this table. Robust standard errors, clustered at the village level, are reported in parentheses. ***, **, and * indicate statistical significance from zero at the 1, 5, and 10 percent levels.
Online Appendix for Local Direct Elections and Meritocratic Selection

A. Posterior Distribution of Virtue and Capacity
Pending

B. Comparing Elected and Appointed Village Leaders’ Mean Value of Composite Virtue-and-Capacity
Pending

C. Promotion Likelihood as the Village Party Secretary
Pending