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Data Availability Statement

The data that support the findings of this study are openly available in Zenodo at https://doi.org/10.5281/zenodo.18901662.

Abstract: Based on provincial panel data from China spanning 1998 to 2020, this paper develops a theoretical model to examine the complex relationships between corruption, the share of public employment, and the quality of the rule of law. We systematically test four core hypotheses using a two-way fixed effects model and an instrumental variable (IV) approach. The findings are as follows: (1) The level of corruption has a robust positive effect on the share of public employment, supporting the "attraction effect" hypothesis that a corrupt environment attracts more labor to the public sector. However, the potential exacerbating effect of public sector expansion on corruption is not consistently supported in robustness checks, leaving this causal link for further investigation. (2) Improvements in the rule of law significantly suppress both the share of public employment and the level of corruption, indicating that legal system development is key to disrupting the corruption-public employment nexus. These conclusions are supported by IV regressions and a series of robustness tests. This study provides new evidence for understanding the interactive relationship between corruption and the scale of the public sector in the Chinese context, with important implications for advancing the modernization of national governance.
Keywords: Corruption; Public Employment; Rule of Law; Two-Way Causality; Instrumental Variables

1. Introduction, Literature Review, and Hypothesis Development

The phrase "a thousand troops and ten thousand horses crossing a single log bridge" has long served as a fitting metaphor for the intense competition in China's National Civil Service Examination, highlighting the enduring allure of public sector employment. In 2025, the number of applicants for the exam reached a new high of 3.41 million, a dramatic 75% increase from 1.94 million in 2023. This persistent "civil service exam fever" is not merely a reflection of labor market imbalances but, more significantly, signals a sustained trend of labor concentration within the public sector. However, the excessive clustering of human capital in this sector raises growing concerns for economic and social development.

From the perspective of efficient labor allocation, the optimal distribution of the workforce should align with the industrial structure and the demands of economic growth, channeling labor towards more productive sectors. A disproportionate influx into the public sector may lead to a talent shortage in the private sector—particularly in emerging industries and the real economy—thereby constraining the endogenous drivers of economic expansion. After all, while the core function of the public sector is to provide public goods and services (an indirect contributor to growth), it is the innovation and dynamism of the private sector that serve as the direct engine of economic progress. This imbalance in labor allocation risks not only reducing overall economic productivity but also exacerbating structural rigidities within the economy, hindering its necessary transformation and upgrading.

This naturally leads us to ask: what factors have caused the over-allocation of labor to the public sector? Baumol (1990) incisively pointed out that a key factor influencing talent allocation is the reward structure determined by social institutions. Evidently, as rational actors, individuals will naturally choose to work in sectors that offer them higher returns. These returns can be further broken down into wage income and non-wage income. However, regarding wage income, existing empirical studies have not reached a consensus on whether public or private sector wages are higher; some research has even found contradictory evidence. For example, Liu Chong and Zhang Hong (2020), using quantile regression based on CFPS 2010 data, found that wages in

public institutions, state-owned enterprises, and private enterprises were all higher than those in the narrow public sector (i.e., government departments) across all quantiles. Yao Dongmin et al. (2016), using CHIP 2008 data and applying the Oaxaca-Blinder decomposition method, found that the wage return rate was significantly higher in the private sector. However, regarding total income, the income return rate in the public sector was higher than in the private sector when regional disparities were considered, but lower when they were not. This controversy directs our attention to the often-overlooked yet crucial component of non-wage income. Among the non-wage benefits in the public sector, besides job stability and social status, the potential for rent-seeking (corruption) benefits is a significant and distinctly different factor that cannot be ignored. A natural hypothesis thus emerges: do the rent-seeking opportunities and potential for corruption inherent in public sector positions constitute a "special attraction" for the labor force? In other words, is it corruption itself that is driving the distortion in labor allocation?

On the other hand, the expansion of public sector employment may also influence the regional level of corruption. An increase in the size of the public sector entails a greater concentration of control over public resources and personnel authority within the government. Links in the chain of public goods provision—such as project approval, fund allocation, and service regulation—inherently contain scope for rent-seeking. In an environment where institutional oversight is inadequate and the exercise of power lacks transparency, this authority can easily be diverted for the private gain of the few.

While rent-seeking and human capital allocation have each been the subject of extensive academic research, there remains a notable lack of integrated studies that examine them within a unified framework. This deficiency is prominently manifested in the following two dimensions of theoretical disjunction:

First, the prevailing tendency to focus on unidirectional causality requires a breakthrough. Existing literature predominantly concentrates on verifying one-way causal relationships. On the one hand, a consensus has been formed regarding the pulling effect of corruption on labor allocation. For instance, Lu Xianxiang and Liang Yu (2009) revealed the driving mechanism of rent-seeking motives behind the "civil service fever," and Li Xiang (2012) demonstrated how the expectation of rent-seeking returns reinforces career choices. On the other hand, findings regarding the impact of public sector size on corruption are divergent. Based on panel data from 21 prefecture-level cities in Guangdong Province (2006-2010), Ni and Yuan (2014) empirically identified a positive correlation between the scale of government personnel and the level of corruption. Conversely, an analysis of data from 15 sub-provincial Chinese cities (2000-2010) by Ni and Chen (2013) revealed an inverted U-shaped relationship between government size and corruption levels. In more recent research, Han and Zheng (2021), applying fuzzy-set Qualitative Comparative Analysis (fsQCA) to 2016 data from 31 Chinese provinces, concluded that no single factor constitutes a necessary condition for high corruption, characterizing it as a complex systemic issue requiring multiple concurrent causal conditions. Nevertheless, within the three configurational paths associated with low corruption identified in their study, an expanded government workforce consistently played a significant role.

Second, a research framework that accounts for endogeneity is urgently needed. Much of the existing literature treats the level of corruption and the sectoral allocation of labor as exogenous variables, lacking a dynamic investigation of their interactive mechanisms. In reality, the sectoral distribution of labor is both a consequence of corruption (e.g., workers flowing into

the public sector seeking rent-seeking returns) and a potential cause of corruption by altering the effectiveness of power supervision. This two-way feedback mechanism has not been sufficiently revealed in prior studies.

To address the aforementioned theoretical disjunctions, this study posits and empirically tests the following four core hypotheses regarding the relationships between corruption, public employment, and the quality of the rule of law:

H1 (The Attraction Effect): A higher regional level of corruption increases the share of public sector employment, as individuals are attracted by potential rent-seeking opportunities.

H2 (The Opportunity Effect): A larger share of public employment intensifies the regional level of corruption by expanding the scope for rent-seeking and diluting oversight.

H3 (The Rule of Law and Employment): An improvement in the quality of the rule of law reduces the share of public employment by diminishing its corrupt rent premium.

H4 (The Rule of Law and Corruption): An improvement in the quality of the rule of law directly suppresses the regional level of corruption.

To formally derive and test these hypotheses, this paper constructs a "corruption-labor allocation" two-way causality model to uncover their interaction mechanism. This not only provides a novel institutional-level explanation for understanding China's labor misallocation problem but also elucidates, from a micro-foundational perspective, the motivational mechanisms behind the persistence of corruption. The conclusions of this study can offer insights for optimizing the sectoral allocation of labor and for building long-term anti-corruption institutions.

The structure of the paper is as follows: Part 2 develops the theoretical model to provide a formal derivation and micro-foundation for the hypotheses; Part 3 introduces the data and econometric models; Part 4 presents the empirical results and related tests; finally, the research conclusions are summarized and policy implications are discussed.

2. Theoretical Model: Formal Derivation of the Hypotheses

This section develops a theoretical model to clarify the intrinsic relationships between the level of corruption, the share of public employment, and institutional quality, thereby providing a formal derivation and micro-foundation for the hypotheses (H1-H4) proposed above. The model is grounded in the optimizing behavior of micro-level individuals regarding their sectoral choice and decision to engage in corruption, and solves for the equilibrium relationships through general equilibrium analysis.

2.1 Basic Model Setup

The model aims to formalize the micro-foundations of the hypotheses (H1-H4). Individuals choose between the public and private sectors based on expected income. The public sector offers a wage and the opportunity for corrupt gains, which is tempered by the risk of detection and punishment. The detection risk itself is shaped by the overall institutional environment and the prevalence of corruption.

Consider an economy with a total labor force normalized to 1, consisting of homogeneous individuals. Each individual faces a binary employment choice: either the private sector, which offers a competitively determined wage $w_{pri} > 0$, or the public sector, which offers a fixed wage w_{pub}. Let s denote the share of public employment; consequently, the share of private employment is 1 - s.

Within the public sector, employees have the opportunity to engage in corruption for

personal gain. If an individual chooses to be corrupt, they obtain a benefit b. We assume this corruption benefit b is uniformly distributed over the interval $[0, \beta s]$, where $\beta > 0$. Corrupt acts are detected with probability p and, upon detection, incur a fixed penalty f>0. The detection probability p is endogenously determined by the quality of the rule of law and the prevailing level of corruption, specified as $p = Q * c$. Here, Q>0 represents the exogenous quality of the rule of law, where a higher value indicates stronger legal institutions, and c denotes the societal level of corruption. This functional form implies that the rule of law is the foundation of anti-corruption efforts, while widespread corruption may trigger greater societal scrutiny and intensify enforcement.

Given the detection probability and penalty, a public employee with a corruption benefit b will engage in corruption only if the expected net gain is positive (i.e., $b > pf = Qcf$). Therefore, the participation rate in corruption within the public sector is:

$$\pi = Pr(b > Qcf) = 1 - \frac{Qcf}{\beta s}, \text{ Assume } Qcf \leq \beta s \quad (1)$$

This equation captures a public official's decision: corruption occurs only when the private benefit (b) exceeds the expected cost, which is the detection probability (p=Q*c) multiplied by the penalty (f). A stronger rule of law (higher Q) or a higher societal corruption level (c, which may invite more scrutiny) raises the expected cost, reducing the corruption participation rate π.

The number of corruption cases, c, equals the number of corrupt officials multiplied by the detection probability:

$$c = s * \pi * p = s(1 - \frac{Qcf}{\beta s})Qc \quad (2)$$

Labor is freely mobile, and in equilibrium, individuals are indifferent between sectors in terms of expected income. Before entering the public sector, an individual does not know their specific corruption benefit b but knows its distribution. Therefore, the ex-ante expected utility from public sector employment equals the sum of the fixed wage and the expected net gain from corruption:

$$U_{pub} = w_{pub} + \int_{Qcf}^{\beta s}(b - Qcf)\frac{1}{\beta s}db = w_{pub} + \frac{(\beta s - Qcf)^2}{2\beta s} \quad (3)$$

The income indifference condition is:

$$w_{pub} + \frac{(\beta s - Qcf)^2}{2\beta s} = w_{pri} \quad (4)$$

2.2 Equilibrium Solution and Comparative Static Analysis

From Equation (2), the relationship between the public employment share s and the corruption level c can be derived as:

$$1 = Qs(1 - \frac{Qcf}{\beta s}) \Longrightarrow s = \frac{1}{Q} + \frac{Qf}{\beta}c \quad (5)$$

Equation (5) is pivotal. It shows a positive two-way relationship between the public employment share (s) and the corruption level (c), providing the theoretical basis for H1 and H2. The term (Q*f)/β indicates that the strength of this relationship is moderated by the quality of the rule of law (Q).

Substituting (5) into Equation (4) and utilizing the relation $\beta s - Qcf = \beta/Q$, the equilibrium public employment share can be solved as:

$$s^* = \frac{\beta}{2Q^2(w_{pri} - w_{pub})} \quad (6)$$

Substituting (6) back into (5) yields the equilibrium corruption level:

$$c^* = \frac{\beta}{Qf}(s^* - \frac{1}{Q}) = \frac{\beta^2}{2fQ^3(w_{pri} - w_{pub})} - \frac{\beta}{fQ^2} \quad (7)$$

2.3 Deriving the Hypotheses from the Theoretical Model

Based on the equilibrium solutions (Eq. 5, 6, 7) and their comparative static properties derived above, we can now formally state the testable implications of the model, which correspond to and provide the micro-foundations for the four hypotheses (H1-H4) proposed in Section 1. The model thus yields the following verifiable predictions:

Implication for H1 (The Attraction Effect): The model predicts a positive relationship between the level of corruption and the share of public employment. This is directly derived from Equation (5), which shows that $\partial s/\partial c = (Q * f)/\beta > 0$. This mathematical result provides the formal theoretical basis for H1.

Implication for H2 (The Opportunity Effect): The model also predicts a positive relationship between the public employment share and the equilibrium level of corruption. This is symmetrically derived from Equation (5), which can be rearranged to show that $\partial c/\partial s = \beta/(Q * f) > 0$. This mathematical result provides the formal theoretical basis for H2, illustrating how a larger public sector can expand the scope for rent-seeking. Together, the positive relationships in both directions derived from Equation (5) formalize the mutually reinforcing cycle between corruption and public employment: the attraction effect (H1) and the opportunity effect (H2).

Implication for H3 (The Rule of Law and Employment): The equilibrium solution for public employment share (Eq. 6) indicates that $\frac{ds^*}{dQ} = -\beta/[Q^3(w_{pri} - w_{pub})] < 0$. This analytically demonstrates that an enhancement in the quality of the rule of law reduces the equilibrium share of public employment, thereby formally supporting H3.

Implication for H4 (The Rule of Law and Corruption): The model elucidates the primary channel through which the rule of law suppresses corruption. While the partial derivative $\partial c^*/\partial Q$ from the equilibrium solution (7) can be technically ambiguous under the specific functional form $p = Qc$, the core economic mechanism embedded in the model is unequivocal: a higher rule of law quality (Q) directly increases the expected cost of corruption (p f = Q c f), as defined in Equation (1). This mechanism is aligned with the robust theoretical and empirical consensus (e.g., Treisman, 2007; Rothstein, 2012) cited in Section 1, which identifies the rule of law as the cornerstone for curbing corruption. Therefore, the model, in conjunction with this established consensus, provides strong foundational support for H4, leading us to expect a significant negative impact of institutional quality on corruption in the empirical analysis.

3. Data Sources, Model Specification, and Variable Definitions

3.1 Model Specification

To simultaneously control for time-invariant individual heterogeneity and individual-invariant time trends, we employ a two-way fixed effects model to test the four hypotheses proposed in this paper.

The four models are specified as follows:

$$Public_share_{it} = \alpha_0 + \alpha_1 corruption_{it} + \alpha_2 control_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (8)$$

$$corruption_{it} = \beta_0 + \beta_1 public_share_{it} + \beta_2 control_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (9)$$

$$Public_share_{it} = \gamma_0 + \gamma_1 law_{it} + \gamma_2 control_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (10)$$

$$corruption_{it} = \delta_0 + \delta_1 law_{it} + \delta_2 control_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (11)$$

In the model, the subscripts i and t denote province and year, respectively; $Public_share_{it}$ represents the share of public employment; $corruption_{it}$ denotes the level of corruption; $control_{it}$ refers to the set of control variables; μ_i represents the province fixed effects; λ_t represents the time fixed effects; and ε_{it} is the random disturbance term.

3.2 Variable Definitions

The definitions and measurement methods for each variable are as follows:

Core Variables

(1) Public Employment Share (public_share): This represents the public sector employment share for province i in year t. It is measured by the proportion of employment in the "Public Administration, Social Security, and Social Organization" sector relative to the total employment.

(2) Corruption Level (corruption): This indicates the regional level of corruption. Following the approach of Del Monte & Papagni (2001, 2007) and Wu Yiping (2008), it is measured by the number of corruption cases per 10,000 people in the province. Data on the number of corruption cases for each province are sourced from the China Procuratorial Yearbook and the annual work reports of provincial procuratorates. Population data are obtained from the official website of the National Bureau of Statistics.

(3) Legal standard level (law): Measured by the secondary indicators of the marketization index constructed by Fan Gang et al. (2003): the development of market intermediary organizations and the legal system environment.

2. Control Variables

(1) In the Public Employment Share Equation:

① Economic Development Level (lnpgdp): Theory suggests that the level of economic development influences the allocation of labor between the public and private sectors. On the one hand, as economic development progresses, market mechanisms may fail to efficiently allocate all societal resources, necessitating government reallocation. Concurrently, rising demand for public services such as education, entertainment, culture, healthcare, and welfare also requires the government to increase relevant personnel. This implies a higher demand for public sector employment, suggesting a larger public sector labor force in more developed economies. On the other hand, during periods of sluggish economic growth, the government may also increase public employment to alleviate job market pressure (Wang et al., 2014), implying a potential expansion of the public sector even at lower development levels. This inconsistency in theoretical predictions necessitates controlling for the level of economic development in the public employment share equation. Therefore, we include it, measured by the logarithm of provincial per capita GDP, to mitigate the impact of heteroskedasticity.

② Degree of Openness (open): Theoretically, the impact of openness on government size is debated between the "compensation hypothesis" and the "efficiency hypothesis," both logically connected to the public employment share. The "compensation hypothesis" posits that international economic integration exacerbates external risks and domestic income volatility (Rodrik, 1998). To buffer these social shocks, compensate disadvantaged groups, and maintain public support for open policies, governments are incentivized to expand their redistributive functions, manifested in increased social public expenditure and a larger government size. Extending this logic to public employment, the expansion of compensatory functions in social welfare, public health, and education often requires hiring more public sector personnel, potentially raising the public employment share (Alesina & Wacziarg, 1998). Conversely, the

"efficiency hypothesis" argues that global market competition disciplines government behavior, pushing it towards a "competitive government" model that reduces taxes, cuts inefficient public spending, and streamlines administration to enhance international competitiveness. This constraint on government size and pressure for "leaner government" directly curbs public sector hiring, exerting downward pressure on the public employment share (Garen & Trask, 2005). In summary, regardless of which effect dominates, the degree of openness may systematically affect the public employment share by influencing the government's functional orientation and size, warranting its inclusion as a control. Following mainstream literature, it is measured by the ratio of a region's total import and export volume to its local GDP. This indicator reflects the depth of a region's participation in international trade and its dependence on international markets. Data are sourced from provincial statistical yearbooks and the China Statistical Yearbook.

③ Industrial Structure (second & third): Industrial structure is a key factor determining the structure of labor market demand. Some studies point out that as industrial structure upgrades and the shares of the secondary and tertiary industries rise, the demand for public services provided by the government also increases, consequently promoting the expansion of government personnel (Li Liping, 2011). Therefore, industrial structure is an important economic context influencing the allocation of labor between the public and private sectors. This study uses the share of secondary industry output in GDP (second) and the share of tertiary industry output in GDP (third) to measure industrial structure, including them in the public employment share equation.

④ Logarithm of Population (lnpopulation): Population size is a fundamental factor influencing the scale of the public sector and its employment allocation. On the one hand, demographics directly affect the demand for public service personnel. The empirical study by Sun Tao and Li Ying (2011) shows that population factors can explain 90% of the inter-provincial variation in the size of the civil service. Moreover, population is a key consideration in the Central Commission for Institutional Establishment's (CCIE) approval of provincial administrative staffing quotas. Therefore, it is reasonable to infer that regions with larger populations may absorb a greater number of public sector employees, potentially leading to a higher level of public sector human capital. On the other hand, Blau suggests that the U-shaped long-run average cost curve characteristic of producer theory in economics is also present in administrative activities. Within a certain range, administrative organizations can benefit from lower per-unit costs by expanding the size of their service population. In empirical research on economies of scale in public organizations, population size is typically used to proxy the scale of public goods provision, while the official-to-population ratio or the number of government employees proxies administrative cost. This implies that, up to a point, an increase in population size may not necessitate a proportional increase in public employment; demand for public sector labor may even decrease. However, beyond this threshold, further expansion leads to diseconomies of scale, increasing average per-unit costs (and thus the demand for public employment) (Blau, 1970, 1972). This suggests the impact of population size on public sector human capital may also be U-shaped. Empirical findings on the effect of population size on the scale of public employment are mixed. Nolan (1979), studying 70 countries, found a U-shaped relationship between national population size and the size of government employment. Noell (1974), analyzing data from fifty U.S. states, found a negative correlation between population size and the scale of government employment. Kasarda's (1974) cross-national statistical analysis of 43 non-agricultural countries found evidence

of diseconomies of scale in administrative efficiency. Cheol (1995), using time-series analysis to study U.S. states from 1952 to 1990, concluded that the growth rate of government employees outpaced population growth. In studies using Chinese data, Zhang Guang and his collaborators conducted a series of analyses on provinces such as Hubei, Hebei, Zhejiang, Jiangxi, and Inner Mongolia (Yang & Zhang, 2008; Zeng & Zhang, 2007, 2008; Zhang & Jiang, 2006; Zhang & Zeng, 2008; Tang & Zhang, 2006; Zhang & Tang, 2006), consistently finding evidence of economies of scale at the county government level. In summary, to control for the influence of this fundamental factor, we include the logarithm of the year-end total population in the public employment share equation.

⑤ Relative Public Sector Wage (pwage): The relative public sector wage is another crucial control variable. Its theoretical basis stems from the fundamental principle of labor supply: individuals' sectoral choice decisions are significantly influenced by relative compensation levels. When public sector wages are higher relative to the average wage across all industries, public sector positions become more attractive, incentivizing labor to flow from the private to the public sector, thereby increasing the public employment share (Borjas, 2002). Conversely, if the relative public sector wage lacks competitiveness, it becomes difficult to attract and retain talent, potentially leading to a decrease in the public employment share. Therefore, controlling for the relative public sector wage helps isolate the labor market allocation effect driven by wage differentials, allowing for a clearer identification of the net effect of factors like corruption on the public employment share. In terms of measurement, this paper uses the ratio of the average wage of urban unit employees in the "Public Administration, Social Security, and Social Organization" sector to the average wage of urban unit employees in "All Industries." This indicator directly reflects the relative wage level in the core functional areas of the public sector. Data are sourced from various editions of the China Statistical Yearbook. The ratio form effectively eliminates the common trend effects of price levels and overall wage growth, enhancing the comparability of the data.

(2) Corruption Equation:

① Relative Public Sector Wage (pwage): The relative public sector wage is an important institutional factor influencing the motivation for corruption among officials. According to the "efficiency wage" theory (Becker & Stigler, 1974), higher public sector wages can increase the opportunity cost of engaging in corruption, thereby serving a "salaried honesty" function and inhibiting rent-seeking behavior. Most studies have found evidence for the effectiveness of high salaries in combating corruption. For instance, Wan Guanghua and Wu Yiping (2012), in their study on China, indicate that a high-salary anti-corruption policy can help control and reduce corruption. However, some research has raised doubts. Gong Ting and Wu Muluan (2012), reviewing the evolution of civil servant salary levels and corruption levels in China after 1997, found that despite continuously rising civil servant wages, corruption levels not only failed to decrease but actually showed an increasing trend. They consequently argue that there is no direct relationship between corruption levels and civil servant wages, casting doubt on the effectiveness of "salaried honesty." Furthermore, research by Hang Xing and Wang Liqun (2005) points out that while high public sector wages have some inhibitory effect on corruption, this effect diminishes as the amount involved in corruption increases, and its actual impact is not substantial. Tanzi (1998) notes that agents are heterogeneous; different officials respond differently to the same incentives. He categorizes the causes of corruption further into that

driven by greed and that driven by need. When public sector wages are at or above a level sufficient for a decent standard of living, corruption stems from greed; when wages fall below this level, it stems from need. Therefore, for some public officials, corruption may occur regardless of wage levels due to psychological or moral factors. Given the uncertainty in theoretical predictions, this paper includes the relative public sector wage in the corruption equation, measured in the same way as described earlier.

② Economic Development Level (lnpgdp): The relationship between the level of economic development and corruption is a long-standing focus of academic debate, with no consensus reached. First, most studies suggest that a higher level of economic development is conducive to reducing corruption. For example, Treisman (2000) argues that economic development increases education levels, literacy rates, and depersonalizes relationships, factors which in turn raise the probability of detecting corrupt acts, thus suppressing corruption. Second, some studies have drawn different conclusions. For instance, research by Liu Wenge et al. (2003) indicates that corruption worsens with economic growth, showing a positive correlation between the level of economic development and corruption levels. Finally, other studies propose that the relationship is not linear but non-linear. Ouyang Shu (2016), examining the economic development and corruption levels in China, the United States, and Hong Kong, suggests the existence of an inverted U-shaped relationship between economic development and corruption, similar to the Kuznets curve. Yang Feihu (2011), using Chinese data, also verifies an inverted U-shaped relationship between economic development and corruption, explaining it from the perspective of opportunity cost. Meanwhile, Li Guozhang et al. (2010), using Chinese time-series data from 1980-2008, not only confirmed an inverted U-shaped relationship but, by including a cubic term for economic development, suggested a possible N-shaped relationship: rising first, then falling, and after a turning point, potentially slowing in decline or even rebounding. In summary, it is necessary to include the level of economic development as a key control variable in the corruption equation, measured as described previously.

③ Degree of Openness (open): The mechanism through which openness affects corruption is complex. On the one hand, most studies find that openness inhibits corruption. On the other hand, some research finds this effect is not absolute. For instance, studies on China by Li Jinshan et al. (2016) show that the impact of openness on corruption levels varies in direction and magnitude across time and space. Research by Elbahnasawy et al. (2012) indicates that the anti-corruption effect of openness is sensitive to the choice of corruption measure. Li Zihao (2017), using Chinese panel data, also found that the inhibitory effect of foreign direct investment on corruption varies by region, period, and source of foreign capital. In light of this, this paper includes the degree of openness in the corruption equation, measured as described earlier.

3.3 Data Sources

In summary, this paper utilizes panel data covering 31 provincial-level regions in China from 1998 to 2010. Data for all variables are sourced from the China Statistical Yearbook, the China Procuratorial Yearbook, and provincial statistical yearbooks for the respective years.

3.4 Descriptive Statistics

Descriptive statistics of the data are presented in Table 1.

Table 1 Descriptive statistical results of Variables

Variable	Number of	Mean	Standard	Minimum	Maximum

	observations		deviation	value	value
corruption	713	0.29	0.115	0.038	1.65
Public_share	713	0.121	0.061	0.031	0.464
pwage	713	1.109	0.148	0.739	1.715
lnpgdp	713	10.039	0.939	7.759	12.013
law	713	5.291	3.476	-0.736	15.189
open	713	0.294	0.375	0.008	1.843
lnpopulation	713	8.081	0.873	5.528	9.443
second	713	0.445	0.085	0.158	0.615
third	713	0.428	0.092	0.286	0.839

As shown in Table 1, the average level of corruption in China during the sample period is 0.29, which is not particularly high. However, the minimum value is 0.038, while the maximum reaches 1.65, indicating substantial variation in corruption levels across different regions in China. On the other hand, from the perspective of labor allocation between the public and private sectors, public sector employees account for approximately 12% of the total workforce, a figure that falls within a reasonable range. Nevertheless, the minimum value is 3.1%, and the maximum is as high as 46.4%, suggesting significant disparities in the proportion of public employment across different regions in China.

4. Baseline Regression Results and Related Tests

4.1 Baseline Regression Results

We conduct two-way fixed effects model regressions for Equations (8) through (11), respectively. The specific results are presented in columns (1) to (4) of the table below. The findings show that the level of corruption significantly increases the share of public employment, and in turn, an increase in the public employment share further intensifies corruption. Concurrently, improvements in the quality of the rule of law suppress both the public employment share and corruption. Hypotheses H1 through H4 thus receive initial empirical support.

Table 2: Baseline Regression Results

Variables	Public_share(1)	Corruption(2)	Public_share(3)	Corruption(4)
Corruption	0.027*** (0.009)	——	——	——
Public_share	——	0.873** (0.369)	——	——
law	——	——	-0.004*** (0.001)	-0.014*** (0.004)
lnpgdp	-0.009 (0.018)	0.124*** (0.037)	0.001 (0.015)	0.129*** (0.033)
open	0.016 (0.011)	0.034 (0.072)	0.026** (0.011)	0.073 (0.066)
second	0.092 (0.143)	——	0.054 (0.122)	——
third	0.078 (0.135)	——	0.065 (0.12)	——
lnpopulation	-0.026	——	-0.016	——

	(0.042)		(0.04)	
pwage	-0.098***	0.033	-0.088***	-0.015
	(0.023)	(0.095)	(0.02)	(0.069)
Constant	0.439	-1.109***	0.302	-0.932***
	(0.364)	(0.344)	(0.346)	(0.317)
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.9355	0.4257	0.9409	0.4324
Observations	713	713	713	713

Note: Standard errors are in parentheses. *** ,** and * denote significance at the 1%, 5%, and 10% levels, respectively.

4.2 Endogeneity Tests

To address potential endogeneity issues arising from reverse causality and omitted variables, we next employ the Two-Stage Least Squares (2SLS) estimator with instrumental variables (IVs). The instruments are constructed as the average value of the endogenous explanatory variable in neighboring provinces and the third-period lag of the endogenous explanatory variable for the province itself. We employ the Limited Information Maximum Likelihood (LIML) estimation method, which is less sensitive to weak instruments. The regression results are presented in columns (1) to (4) of Table 3. The findings indicate that the results from the baseline regressions remain robust after correcting for potential endogeneity. Furthermore, the instrumental variable estimations pass the underidentification test, the weak instrument test, and the overidentification test, confirming the validity of the chosen instruments. Hypotheses H1 through H4 are thus further substantiated.

Table 3: Instrumental Variables (IV) Regression Results

Variables	Public_share(1)	Corruption(2)	Public_share(3)	Corruption(4)
Corruption	0.115**	——	——	——
	(0.053)			
Public_share	——	1.687***	——	——
		(0.529)		
law	——	——	-0.019***	-0.051***
			(0.002)	(0.011)
lnpgdp	-0.01	0.122***	0.029***	0.159***
	(0.008)	(0.018)	(0.009)	(0.022)
open	0.026***	0.019	0.045***	0.095***
	(0.007)	(0.031)	(0.01)	(0.032)
second	-0.075	——	-0.129**	——
	(0.054)		(0.052)	
third	-0.089	——	-0.053	——
	(0.06)		(0.058)	
lnpopulation	0.001	——	0.005	——
	(0.021)		(0.024)	
pwage	-0.09***	0.076	-0.066***	-0.0005
	(0.012)	(0.05)	(0.014)	(0.054)
Constant	0.278	-0.906***	-0.02	-0.863***

	(0.171)	(0.169)	(0.212)	(0.209)
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.9868	0.9188	0.9784	0.9047
Underidentification Test	9.872 [0.0072]	77.085 [0.0000]	67.685 [0.0000]	70.346 [0.0000]
Weak Identification Test	81.231 [8.68]	202.648 [8.68]	49.258 [8.68]	51.503 [8.68]
Overidentification Test	1.123 [0.2893]	2.637 [0.1044]	2.611 (0.1061)	2.221 [0.1361]
Observations	713	713	713	713

Note: Robust standard errors are in parentheses. ***,** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The underidentification test reports the Kleibergen-Paap rk LM statistic, with the p-value in square brackets. The weak identification test reports the Cragg-Donald Wald F statistic, with the Stock-Yogo test critical value for the 10% maximal IV size in square brackets. The overidentification test reports the Hansen J statistic, with the p-value in square brackets.

4.3 Robustness Tests

To further examine the reliability of our conclusions, we employ two robustness testing approaches.

First, we alter the measurement of key variables. For the corruption level, we use the ratio of corruption cases to the number of public officials. For the public employment share, we use the proportion of public officials in the total population. Regarding the quality of the rule of law (law), considering that it is itself a secondary indicator within the Fan Gang Marketization Index and that there is a clear interactive and symbiotic relationship between the rule of law and the degree of marketization—where the full realization of the rule of law relies on support from other dimensions of marketization—we use the overall Fan Gang Marketization Index as an alternative proxy for robustness testing. The regressions still employ the spatial and temporal lags of the endogenous explanatory variables as instruments for Two-Stage Least Squares (2SLS) estimation. The specific results are presented in Table 4. The regression results show that the signs and significance of the coefficients for the core variables remain largely unchanged, indicating that the findings of our baseline regressions are robust. Furthermore, most of the four regressions pass the tests for instrument validity, except for the overidentification test in the second regression. Overall, the tests in this section confirm the reliability of Hypotheses H1, H3, and H4.

Second, we modify the sample by excluding the special cases of the four province-level municipalities—Beijing, Tianjin, Shanghai, and Chongqing—and repeat the baseline regressions using panel data from the remaining 27 Chinese provinces. The results are shown in Table 5. The regression results indicate that the signs and significance of the coefficients for the core variables remain largely consistent, again supporting the robustness of our baseline findings. Similarly, all instrument validity tests are passed except for the overidentification test in the second regression, further corroborating the reliability of Hypotheses H1, H3, and H4.

Table 4: Robustness Check Using Alternative Variable Definitions

Variables	Public_share(1)	Corruption(2)	Public_share(3)	Corruption(4)

Corruption	0.003*** (0.001)	——	——	——
Public_share	——	104.85*** (29.02)	——	——
law	——	——	-0.003*** (0.0003)	-2.027*** (0.45)
lnpgdp	-0.014 (0.009)	6.9*** (1.71)	0.003*** (0.001)	7.57*** (1.425)
open	0.034*** (0.009)	-4.82** (2.41)	0.004*** (0.001)	-2.296 (1.872)
second	-0.153** (0.075)	——	-0.004 (0.005)	——
third	-0.181** (0.083)	——	-0.012* (0.006)	——
lnpopulation	-0.032 (0.025)	——	0.007*** (0.002)	——
pwage	-0.083*** (0.014)	4.6 (4.01)	-0.004*** (0.001)	-3.514 (2.787)
Constant	0.567** (0.233)	-30.44* (16.18)	-0.052*** (0.018)	-13.989 (12.874)
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.9770	0.9553	0.9815	0.9605
Underidentification Test	25.913 [0.0000]	77.085 [0.0000]	103.273 [0.0000]	130.546 [0.0000]
Weak Identification Test	29.265 [8.68]	202.648 [8.68]	177.803 [8.68]	643.378 [8.68]
Overidentification Test	0.418 [0.5179]	3.884 [0.0488]	2.301 (0.1293)	1.029 [0.3104]
Observations	713	713	713	713

Note: Robust standard errors are in parentheses. ***,** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The underidentification test reports the Kleibergen-Paap rk LM statistic, with the p-value in square brackets. The weak identification test reports the Cragg-Donald Wald F statistic, with the Stock-Yogo test critical value for the 10% maximal IV size in square brackets. The overidentification test reports the Hansen J statistic, with the p-value in square brackets.

Table 5: Robustness Check Excluding Municipalities

Variables	Public_share(1)	Corruption(2)	Public_share(3)	Corruption(4)
Corruption	0.105* (0.056)	——	——	——
Public_share	——	1.937*** (0.579)	——	——
law	——	——	-0.019***	-0.045***

			(0.002)	(0.012)
lnpgdp	-0.01 (0.01)	0.126*** (0.026)	0.02** (0.01)	0.135*** (0.028)
open	0.06*** (0.009)	-0.147*** (0.034)	0.063*** (0.01)	-0.026 (0.029)
second	-0.107** (0.049)	———	-0.126** (0.055)	———
third	-0.084 (0.056)	———	-0.036 (0.061)	———
lnpopulation	0.041 (0.028)	———	0.003 (0.031)	———
pwage	-0.123*** (0.014)	0.207*** (0.057)	-0.082*** (0.018)	0.073 (0.065)
Constant	-0.014 (0.237)	-1.071*** (0.252)	0.078 (0.267)	-0.719** (0.283)
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.9891	0.9210	0.9817	0.9103
Underidentification Test	6.877 [0.0321]	62.751 [0.0000]	64.254 [0.0000]	63.695 [0.0000]
Weak Identification Test	67.011 [8.68]	156.084 [8.68]	47.469 [8.68]	51.878 [8.68]
Overidentification Test	2.366 [0.1240]	4.918 [0.0266]	1.971 (0.1604)	0.721 [0.3959]
Observations	621	621	621	621

Note: Robust standard errors are in parentheses. ***,** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The underidentification test reports the Kleibergen-Paap rk LM statistic, with the p-value in square brackets. The weak identification test reports the Cragg-Donald Wald F statistic, with the Stock-Yogo test critical value for the 10% maximal IV size in square brackets. The overidentification test reports the Hansen J statistic, with the p-value in square brackets.

5. Conclusions and Implications

This paper systematically examines the relationships between corruption, the share of public employment, and the quality of the rule of law by developing a theoretical model and applying rigorous econometric methods to Chinese provincial panel data. The main conclusions are as follows:

First, corruption is a significant driver of the expansion of public sector employment. The study finds a robust and significant positive effect of regional corruption levels on the share of public employment. This conclusion holds in instrumental variable regressions and various robustness checks, even after controlling for economic development, industrial structure, population size, relative wages, and province and year fixed effects. This confirms the prevalence of the "attraction effect," whereby the corruption opportunities and rent-seeking potential associated with public sector positions distort labor market signals, attracting an excessive influx of labor into the public sector.

Second, the study fails to find robust empirical support for the hypothesis that public sector expansion intensifies corruption through the "opportunity effect." Although the baseline regression suggests a positive effect of the public employment share on corruption, this relationship proves fragile in robustness checks involving alternative variable measurements and sample adjustments. This indicates that the direct impact of scale expansion on corruption may not be linear or universal but is likely moderated by more complex factors such as the institutional environment, the effectiveness of oversight, or the stage of development. Therefore, a simple causal interpretation of "public employment → corruption" requires caution, and its underlying mechanisms warrant further clarification in future research.

Third, enhancing the quality of the rule of law is a key force for simultaneously curbing corruption and optimizing the scale of the public sector. The research confirms that a higher quality of the rule of law directly and robustly reduces the incidence of regional corruption cases and also significantly suppresses the excessive expansion of the public employment share. This implies that strengthening the rule of law not only directly "punishes malfeasance" by increasing the risks and costs of corruption but also indirectly "cleanses the source" by reducing the expected corrupt rents of public sector positions, thereby weakening the improper linkage between corruption and public sector expansion from both the supply and demand sides.

Based on the above conclusions, this paper proposes the following policy implications:

1.Focus on Curbing Corruption to Facilitate Better Labor Allocation. Given the significant attraction of corruption for public employment, sustained and in-depth anti-corruption efforts are crucial for optimizing the macro-allocation of human resources. It is essential to resolutely curb rent-seeking opportunities within the public sector and strip improper non-wage benefits from public positions. This will weaken their distortive appeal and guide labor flow towards the more productive and innovative private sector.

2.Prioritize the Rule of Law to Build a Robust Institutional "Firewall." Continuous efforts should be made to strengthen law-based governance, improve mechanisms for supervising and constraining the exercise of power, and reduce discretionary authority. This not only directly combats corruption but, more fundamentally, reduces the endogenous impetus for the disordered expansion of the public sector. Defining government boundaries and standardizing official conduct through the rule of law is a sustainable strategy for achieving a leaner and more efficient public sector.

3.Implement Differentiated and Refined Public Sector Management. Given the complex mechanism through which public employment may influence corruption, a simplistic "one-size-fits-all" approach to controlling public sector size is inadequate. Management should be tailored to local development realities and the process of government functional transformation, integrating scale control with functional optimization and efficiency enhancement. Priority should be given to streamlining departments and procedures with high rent-seeking risks and distorted relationships with the market, while ensuring necessary manpower for essential public services and market regulation.

This research has certain limitations. First, the corruption data, based on prosecuted cases, may involve measurement error. Second, while the instrumental variables pass most tests, the exogeneity assumption remains open to discussion. Finally, the mechanism of the "opportunity effect" is not fully elucidated. Future research could utilize richer micro-level data, more granular geographical or policy shocks to further identify the complex interactive network between

corruption and public employment, and deeply investigate the specific channels and conditions under which the rule of law exerts its effects.

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