Political Resource Curse under Authoritarianism: Evidence from China[*]

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Abstract

By analyzing a panel constructed on the political turnovers of 4,390 county leaders in China during 1999–2008, we find that the revenue windfalls accrued to these officials from land sales since 1998 have both undermined the effectiveness of the promotion system for government officials and fueled corruption. Instead of rewarding efforts made to boost GDP growth, promotion is now also positively correlated with signaling efforts or specifically increased spending on flamboyant (so-called "image") public projects, with those politically connected to their superiors and those who are beyond the prime age for promotion being the primary beneficiaries. Likewise, the same revenue windfalls have also led to corruption, as gauged from the increases in the government workforce and administrative expenditure but not social welfare spending. Our findings highlight how land revenue windfalls can lead to a political resource curse in a highly politically centralized authoritarian regime.

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1 Introduction

A consensus is slowly emerging that revenue windfalls—be they the result of natural resource abundance or government transfers—do not always benefit society (Ades and Di Tella, 1999; Brollo et al., 2014; Caselli and Michaels, 2013; Mehlum et al, 2006; Robinson, et al., 2006; Ross, 1999, 2012; Svensson, 2000; Vicente, 2010).[1] In particular, the one channel that has been identified recently pertains to the political process. Based on a political agency model with career concerns and endogenous entry of political candidates, Brollo et al. (2014) find that a larger budget, in their case government transfers in Brazil, is associated with both more corruption and a pool of individuals of a lower quality entering politics.[2]

As with natural resource abundance or government transfers elsewhere, we show that the windfall revenues that sub-provincial—specifically county—governments in China obtain from selling land for nonfarm development purposes and over which they have monopoly rights are also a political resource curse. We consider land revenue windfall in China a "curse" because it has been significantly undermining the alleged effectiveness of a mechanism of rewarding the subnational officials' effort (or ability that is otherwise unobserved) in boosting GDP growth for as long as three decades,[3] and produces the kinds of effects that Brollo et al. (2014) alluded to, even where voting is a closed option to the selection of political elites.

Touted as an "institutional foundation" of China's sustained economic growth, the coun-

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[1]Many authors pose what essentially is the same rhetorical question in regard to the welfare effects of natural resource abundance and/or revenue windfalls: "Suppose new oil is discovered in a country, or more funds are transferred to a locality from a higher level of government. Are these windfalls of resources unambiguously beneficial to society?" (Brollo et al., 2014: 1759); and, "Should communities that discover oil in their subsoil or off their coast rejoice or mourn? Should citizens be thrilled or worried when their governments receive fiscal windfalls?" (Caselli and Michaels, 2013: 208).

[2]The model has the following testable hypotheses. First, with a larger budget size the incumbent has more room to grab political rents without disappointing rational but imperfectly informed voters. In other words, the electoral punishment of corruption decreases with budget size, such that the incumbent behaves in a corruptive manner more frequently. Second, a larger budget also reduces the average ability of the pool of individuals entering politics, assuming that political rents are more valuable to those candidates with lower ability. Furthermore, the selection effect in turn exacerbates moral hazard, which increases the reelection probability of the incumbent.

[3]Since reforming its economic system in the late 1970s, China has sustained a near double-digit growth rate for well over three decades.

try's meritocratic political selection system—one which provides high-powered promotion incentives to China's subnational leaders—is predominantly viewed as the reason behind the miraculous success of its economic reform. Specifically, under a decentralized competitive setting—presumably necessitated by the sheer scale of the national economy, those who are able to grow their local economies the fastest will be rewarded with promotion to higher levels within the Communist hierarchy (also known as "jurisdictional yardstick competition", Maskin et al., 2000; Xu, 2011). Empirical evidence has indeed shown a strong association between GDP growth and promotion (Chen et al., 2005; Jia et al., 2014; Li and Zhou, 2005).[4]

While this institutional arrangement has likely remained intact at the provincial level (thanks to the absence of land revenue windfalls), the same cannot be said for the lower levels. Since 1998, sub-provincial officials (consisting of, in the decreasing order of hierarchy the prefecture and the county) have been assigned exclusive statutory rights to sell (mainly the arable) land, resulting in some of them reaping huge windfalls of such revenue (known in Chinese as land conveyance fee or *tudi churangjin*). Classified as "extra-budgetary revenue", it is a category that does not obligate them to share it with upper-level authorities.[5] For instance, while accounting for less than 10% of the county's extra-budgetary revenue before 1998, this land revenue grew to constitute nearly 80% of the county coffers in 2008 (Figure 1 Panel A).[6] This resulted both in an extraordinary rise in extra-budgetary revenue as well as in its share of total revenue (Figure 1 Panel B), to the extent that China's local officials have

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[4]More recently, Jia et al. (2014) find that connections play a complementary role to performance in the political selection of the provincial leaders, whereas Persson and Zhuravskaya (2014) find that the career concerns of those provincial party secretaries who rose through the ranks within the same province in which they govern are significantly less strong than those who were promoted in, and transferred from, other provinces.

[5]The allocation of rights by the central government to regional authorities over this "extra-budgetary" revenue is not something new. In order to invigorate the local leaders' incentives to spur economic growth, the central government had since 1984 already devolved to regional governments the rights over the profits and taxes of the enterprises under their jurisdictions (Blanchard and Shleifer, 2000; Montinola et al., 1995; Oi, 1992, 1999; Qian and Xu, 1993; Qian and Weingast, 1997).

[6]The privatization of the previously state-owned housing units that began in the 1990s and soon after the promotion of land auctioning practices since 2002, are believed to have inadvertently spurred the growth in land revenues. But the effect of land revenue on local coffers, while dramatic for the county, is much smaller for the province; for example, in 2008 land revenue accounted for only 9.2% of the extra-budgetary revenue at the province level but a hefty 79% at the county level. The county is important because it is the level where resources required for mobilizing development reside.

been criticized for having become overly dependent upon land sales in fuelling investment growth (*The Wall Street Journal*, March 1st, 2013). In addition, there is also convincing evidence linking land revenue with corruption.

Figure 1 about here

By constructing a unique data set that matches the biographical data of county party secretaries with the fiscal and socioeconomic data of 1,753 counties in 24 Chinese provinces over a 10-year period (1999-2008), we seek to analyze the effect of this revenue windfall on the political selection of China's local (county) leaders (adverse selection) and corruption (moral hazard). In the case of selection, we find that, while GDP growth continues to have a significant and positive effect on political turnover—specifically promotion, so does land revenue. But most importantly we find that land revenue reduces the significance of GDP growth in determining promotion. Furthermore, land revenue is found to have an additionally significant effect for those connected to their superiors in terms of sharing the same birthplace or having previously worked in the prefectural government, as well as those who have already passed the prime age of promotion—due presumably to their lack of competitiveness. To the extent that GDP growth is a good proxy for the unobserved ability of the county leaders, these lines of evidence lend credence to the claim that land revenue has an adverse effect in the selection of county leaders.

There are two possible channels through which land revenue may have "substituted" GDP growth to some extent in determining the promotion of county officials. The first plausible channel is *signaling.* By analyzing the patterns of county budget expenditures for the 1999-2007 period, we find that some county officials have directed disproportionately more resources to projects that serve to signal their "achievements"—notably ostentatious public projects, e.g. city construction projects, known in Chinese as "image" or political achievement projects, and to have strategically timed them in such manners as to prevent their signaling efforts from going to waste.[7]

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[7]The tendencies for public officials to engage in unproductive signaling behavior is by no means limited to only authoritarian regimes. For instance, empirical studies have consistently found that reelection incentives

A second, possible channel is outright corruption. We find strong evidence that expenditures involving cash and other allowances paid to government staff (administrative expenditure) and the beefing up of the government bureaucracy are much greater than the other expenditure categories such as social welfare spending and research subsidies provided to private enterprises—a finding that reinforces the evidence of a rent-seeking or simply corrupt local government (the moral hazard effect). In addition, by using an inferential or "forensic economics" approach, and by assuming that some county leaders may use land revenue directly to bribe their way to promotion, we find supportive evidence that, in the event of a crackdown on the corruption of higher-level (prefectural and provincial) officials in the same province in which the county officials serve, the additional effect of land revenue decreases significantly in the year in which such crackdown occurs. While having the same positive and significant effect on the size of bureaucracy—a proxy for corruption, such crackdowns do not have similar effects on city construction expenditure—a proxy for signaling.

To rule out the possibility that our estimations may be biased by the endogenous land revenue variable, we instrument land revenue with an interaction term that takes into account the amount of land in a county suitable for commercial and real estate development (as determined by terrain), on the one hand, and the exogenous (and time-varying) demand shock, on the other. We proxy for this demand shock using trends in the national interest rate, under the assumption that land revenue is essentially a product of the demand for, and supply of, land. To ensure that our instrument is robust, we replace the national interest rate with the provincial capital cities' house prices as our second instrument. Regardless of the instrument used, the result remains significant, relieving us of the concerns of both omitted variable bias and reverse causality. Additionally, we find that the two components of our instrument are insignificantly correlated with a county official's connections and/or factional ties, and that their significance has not increased over time (especially after 2002)

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for politicians under democracy have frequently led to signaling efforts in the respects of war making (Hess and Oerphanides, 1995), public goods provision (De Janvry et al., 2010; Brollo, et al. 2014) and more generally economic performance (Besley et al., 2010).

in response to the growing land revenues. Together, these findings alleviate the concern that well-connected officials might be able to duly influence the locational choice of their appointment.

By analyzing the effect of land revenue windfalls on the economic/political behavior of China's county officials, our paper contributes to the emerging literature on the political resource curse, as well as to the literature pertaining to the political selection of China's subnational leaders and its link to economic growth. Specifically, we find that, while the Chinese bureaucrats are immune to the reelection pressure that their counterparts in Western democracies face because they are essentially under a closed political system, they remain vulnerable to the selection problem because of their accountability to those who determine their promotion, and to corruption engendered in the process. While we are certainly not the first to study the political resource curse in a single-country setting (Brollo et al., 2014 and Caselli and Michaels, 2013, for example, both focus on Brazil), to our knowledge this is the first attempt to richly document and explain a political resource curse as it exists under an authoritarian regime.

The remainder of this paper proceeds as follows. We provide in the next section a review of the background literature on revenue and promotion incentives before we introduce, in Section 3, our data sources and variables definition. In Section 4 we report both the baseline and instrumented results of our hypothesis testing. Section 5 explores the two channels (namely unproductive signaling and corruption) through which land revenue may affect China's "yardstick competition" and their respective associated effects (adverse selection and moral hazards). It also extends our analysis of the selection outcome and checks the robustness of the corruption evidence. Section 6 provides the conclusion.

2 Background

This section provides a brief description of the political selection system in China and of the phenomenal growth of land revenue after 1998. It also explains why we employ the Chinese county as the unit of analysis.

2.1 Promotion based upon economic performance

Political selection in China is best characterized by what is popularly known as a "tournament" or more specifically "jurisdictional yardstick competition" (hereafter yardstick competition)—a system whereby public officials of the same level (e.g. the province) are made to compete with each other under broadly similar economic conditions for promotion to the next level up—for instance from county to prefecture, or from prefecture to province, and so forth (Li and Zhou, 2005; Maskin et al., 2000; Xu, 2011).[8] Defined as whether a change in hierarchical rank has occurred regardless of whether the provincial leader has taken up a position in the central government, promotion has played a uniquely important role in the Chinese context because, by providing career incentives to public officials put in charge of boosting economic growth, it allows economic activities in a large economy to be efficiently decentralized, while keeping the political system highly centralized.[9]

While "yardstick competition" provides sufficiently strong career incentives in guiding the economic-cum-political behavior of China's local officials, competition is so fierce, however, that only a handful of officials ever get promoted. For instance, of the 17,531 county-year observations in our panel of county officials, only 1,216, a meager 6.94%, have ever been

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[8]These preconditions include: a) the devolution of property rights by the central state to various levels of regional governments to directly set up and manage enterprises of various ownership types appropriate to their levels and compete with each other on a regional basis, and b) a diversified, non-monopolistic economic structure with the effect of encouraging competition among rival producers of the same goods. China allegedly fulfilled these conditions at the reform outset, which, arguably, are conducive to marketization (Qian and Xu, 1993; Xu, 2011).

[9]Our definition thus differs from the criterion that considers mobility from the province to the center as promotion—one that is based on the consideration that moving to a more resourceful position in the central government (even at the same hierarchical rank) represents the standard trajectory of many national leaders (Huang, 2002; Bo, 2004).

promoted—a magnitude even lower than the province's 8.93% and the prefecture's 10.84%.[10] Moreover, given that promotion rarely occurs beyond the first term of office—nearly 86% (1,042/1,216) of those in our sample got promoted within the first five years, efforts devoted to achieving promotion need to be timed optimally. Among those who failed to be promoted after the first term—the overwhelming majority, 90.53% (13,459/17,531) either stayed in the same position or transferred to a different locale of the same level and served in the same capacity. Those approaching retirement age—set at 55 for the county, 60 for the prefecture, and 65 for the province—would be assigned to an "advisory" position to while away their time before eventually retiring. The ferocity of competition implies that the Chinese officials may deploy unsupervised revenue windfalls at their disposal in ways that would enhance their promotion prospects. In particular, given that promotion is typically evaluated by one's immediate supervisors (i.e., county by prefecture, prefecture by province), "yardstick competition" easily gives rise to rent-seeking or even outright corrupt behavior, as we shall show.

2.2 Land Conveyance Fee—an Unexpected Source of Revenue Windfall

For incentive reasons the central government has since the early 1980s sanctioned— perhaps even encouraged—the various levels of local governments from the township up to the prefecture to generate and retain revenues not required for sharing with the upper level of administration. The profits and taxes generated from nonfarm enterprises owned and managed by the local authorities (especially at the township level) before the turn of the century is a case in point. But with the eventual demise of these non-private enterprises (many of which have actually turned private), local governments were forced to turn to new sources of "extra-budgetary" financing. The unwitting passing of a statutory bill at the 15th

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[10]If we count only those who have ended their office as county party secretaries in 2008—the end year of our analysis, the promotion rate becomes substantially higher—33.56% (1,216/3,623). The promotion rate for the province using this calculation is also higher—54.2%.

National Congress of the Communist Party of China in 1998 granting local authorities the *de jure* ownership over land under their geographical jurisdictions gave local governments a new lifeline (Lin and Ho, 2005; Kung et al., 2013).[11] While this legislation was enacted to ensure farmland requisitioned for development in the urbanization process will remain firmly in the hands of the state (instead of private individuals), the outcome amounts essentially to the assignment of exclusive statutory rights to local authorities over an unregulated revenue obtained from selling the land use rights.

It probably comes as no surprise that revenues received from selling the land use rights have flooded the local coffers. Take the county for example. While land revenue was negligible initially, it grew phenomenally over time; by 2008 it accounted for a whopping 79% of the entire extra-budgetary revenue and approximately 38% of the total revenue—dwarfing the enterprise income (Figure 1 Panel A). Reaching 91.46 million yuan in 2008, this unregulated revenue was 1,221 times its size in 1998 (in 1993 constant dollar terms). The discretionary nature of this revenue makes it all the more attractive for the local governments, who could expend them in a myriad of ways and for multiple purposes.

2.3 The County as the Unit of Analysis

We choose the county to be our unit of analysis for the following reasons.[12] First, the county is better suited than the province for testing the hypothesized strengths of land revenue because it accounted for nearly 79% of the extra-budgetary revenue on average whereas the average province accounted for only 9.2% in 2008. And while the prefectural governments similarly enjoy direct authority over urban land development, land revenues accounted for proportionately less of the extra-budgetary revenue (a moderate 50.24%), not to mention that the cost of requisitioning land (due to its urban nature) is sharply higher for

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[11]The land referred to in this context is arable land, which is owned collectively by the villagers when it is used for farming. Once the usage switches to nonagricultural, however, ownership changes hand from the collective to the (local) state and the latter becomes the residual claimant of the land revenue.

[12]To reiterate, subnational governments in China consists of four levels—province, prefecture, county, and township.

the prefectural governments (Lin and Ho, 2005; Yew, 2011).[13] Second, as mentioned earlier promotion is also fiercest at the county level—6.94% versus the province's 8.93% and the prefecture's 10.84%. This tends to make the county officials eager for promotion go after land revenues with a vengeance. Third, given that sizeable state-owned enterprises had, for historical reasons, established and concentrated at the municipal and prefectural levels, the industrial market structures at these levels tend to be far more concentrated than that of the county and thus resemble "yardstick competition" less (Xu, 2011). Finally, the county in China is a sufficiently sizeable spatial unit.[14] Together, these considerations suggest that county officials should have the strongest incentives to deploy land revenues for furthering their own gains.

Ideally, we would want to test the effect of land revenue windfall on both the county party secretaries and the county magistrates, given that the county is managed by both. However, given that the county party secretaries are in reality the de facto "first-in-command" officials (*Yibashou*) in charge of running the local economies (Lieberthal, 2003; Joseph, 2010), and in light of the prohibitively large amount of data work involved, we choose to study only the county party secretaries.[15]

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[13]While the township and village authorities may have as strong an incentive to convert farmland into non-arable usages, the county government is the lowest level of administration authorized to make decisions on land conversion (e.g. via the formulation of annual land use plans) according to the 1998 Land Management Law.

[14]For instance, the largest county in China, Ruoqiang County in Xinjiang Province, is twice the size of a small European country such as Iceland (208,226 compared to 103,001 square kilometers).

[15]While the county magistrate was the *de facto* leader of the local economy and society in the Qing dynasty (Qu, 1969; Zelin, 1992), his supremacy has been superseded since the founding of the People's Republic. From then on, the county party secretary has effectively replaced the county magistrate as the local leader.

3 Data and Variables

3.1 Data

To find out whether land revenue has the anticipated effect of weakening GDP growth in the selection of China's county officials, and, more specifically, whether it has led to adverse selection and moral hazard effects, we construct a panel data set that consists of variables on the outcomes of political turnover—our dependent variable, land revenue and GDP growth rate—our key independent variables, and a number of control variables, including, *inter alia*, tax revenue, level of per capita GDP and population, and a number of individual characteristics, including three proxies measuring factional ties and connections. We construct the variable *political turnover* by first obtaining the names of county party secretaries from the *Provincial Yearbook (Sheng Nianjian)*, followed by searching for their personal biographies—including a number of individual characteristics ranging from age, sex, and place of birth to education, work history, and so forth—using the Chinese internet search engine *Baidu Encyclopedia (Baidu Baike)* (see Figure A1 in the Appendix for an example of a county party secretary's vita).[16] To construct the land revenue and other fiscal revenue variables, we turned to a publication entitled *Fiscal Statistical Compendium for All Prefectures and Counties (Quanguo Dishixian Caizheng Tongji Ziliao)*, from which data is available for the period 1999-2006, and the website of the Land Transaction Monitoring System (`http://www.landchina.com/`), for 2007-2008 data. Similarly, it contains detailed information on expenditures, which thus allow us to test how county party secretaries may have used land revenue to further their promotion prospects. Finally, we resorted to the *Provincial Statistical Yearbooks (Sheng Tongji Nianjian)* for the earlier period of 1999-2001 and the *Statistical Yearbook of Regional Economies (Quyu Jingji Tongji Nianjian)* for the later period of 2002-2008, for computing the county-level per capita GDP growth rates and

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[16]By regulation (Regulation on the Public Announcement of Senior Officials Prior to Appointment, *"Lingdao Ganbu Renzhiqian Gongshi Zhidu"*), the Chinese government is obligated to make public the curriculum vitae of all government officials prior to their appointment.

other control variables (e.g., population). Table A1 in the Appendix provides further details on the various data sources.

By matching the biographical data of county party secretaries with the fiscal and socioeconomic data of the counties,[17] we constructed a panel data set on 1,753 counties (out of a total of 2,002 Chinese counties) covering 24 provinces over a ten-year period (1999-2008).[18] Altogether we have 17,521 county∗year observations available for analysis, involving a total of 4,390 county party secretaries. We choose 1999 as the starting point of our analysis because the statutory law that enabled local governments to appropriate land revenue was passed in 1998 (at the 15th National Party Congress), and, perhaps because of that the data on land revenue are made publicly available only from 1999 onwards. We end our analysis in 2008 because that is the most recent year for which data on fiscal revenues are available.

3.2 Variables

3.2.1 Dependent Variable

Political Turnover. Our dependent variable is political turnover of the county party secretaries on a yearly basis, which assumes one of the following outcomes: Promotion, Lateral Transfer, Staying in Office, Retirement, or Termination (for wrongdoings such as corruption or natural death). Following Li and Zhou (2005), political turnover is coded as an ordinal variable, with promotion taking on the value of 3, lateral transfer to positions of the same rank and/or staying in office 2, retirement 1 and termination zero. A detailed description and classification of these various outcome categories is provided in Table A2

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[17]In cases where there are two county party secretaries serving in the same year—one outgoing and the other incoming, we follow Li and Zhou (2005) and Shih et al. (2012) and match the data of those whose term ends before (or, alternatively, starts from) the 1st of July of a given year.

[18]Our sample excludes the four directly governed municipalities of Beijing, Tianjin, Shanghai, and Chongqing, and Hainan Province, where county party secretaries are under the direct supervision of either the municipal or provincial government and thus are of a higher status than their counterparts from the other provinces. The provinces of Tibet and Hebei are excluded from our sample due to the lack of data. Our sample also excludes the 840 districts (*qu*), because, unlike the county proper, the leaders of these county-level jurisdictions lack the independent authority to formulate and develop annual land use plans. Additionally, we also exclude the seven counties whose status was only recently upgraded from township within the timeframe of our sampling period (1998-2008).

in Appendix II. Figure 2 shows the distribution of these outcomes for the 17,521 county-year observations. Of these, a mere 6.93% was promoted. An overwhelming percentage, 90.53%, either stayed in office or moved laterally to positions of equivalent rank (either as party secretary in another county or worked in the prefectural government at a comparable rank). Less than 3% (2.07%) retired directly from completing their term as county party secretaries, and a mere 0.47% had their office terminated due to corruption, resignation or natural death.

<div align="center">Figure 2 about here</div>

3.2.2 Independent Variables

Land Revenue. Our key independent variable is total land revenue (logged).

Per Capita GDP Growth Rate. Following Li and Zhou (2005), we employ the per capita annual GDP growth rate during the 1999-2008 period to proxy for the criterion used for political selection.

<div align="center">Table 1 about here</div>

3.2.3 Control Variables

To avoid the omission of those variables that may be correlated with turnover and land revenue, it is necessary to control for them in the regressions.

Tax Revenue (logged). Foremost is tax revenue, which had more than tripled during 1998-2008; those who were able to increase this revenue source more than the average may stand a better chance of promotion.[19]

Per Capita GDP and *Population* (both logged). In addition to county fixed effects, we also control for the size of a county's local economy measured in terms of both GDP per capita and population.

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[19]Fiscal tax revenue increased from a modest 142 billion *yuan* in 1998 to 609 billion yuan in 2008—an increase of 328.87% (calculated from the *Fiscal Statistical Compendium for All Prefectures and Counties*).

Individual Characteristics of County Party Secretaries. Given that individual characteristics are likely correlated with promotion, we control for these observable characteristics. Foremost is *Age*, which, against the mandatory retirement age of 55 is most certainly a crucial determinant of the probability of promotion. Table 1 shows that the average age of the county party secretaries in our sample is 46, which is way below the official retirement age of 55. We also include the squared term of age to control for its concaving effect on political turnover (Panel A, Table 1).

Given the panel nature of the model (which pools together all the county party secretaries at different stages of their career), it is necessary to control for the varying duration of their tenure. While the odds for promotion likely increases with duration, evidence suggests that there is an optimal period beyond which promotion would be unlikely (Guo, 2009). To control for such possibilities we thus include both *year in office* and its squared term in our estimations. The average duration of tenure of the county party secretaries in our sample is just 4 years (Panel A, Table 1, see also Figure A2 in Appendix III).

Another observable individual characteristic that may bear upon promotion is *education* (e.g., Shih et al., 2012). The majority of our county leaders (87.29%) have at least a college degree or 17 years of education on average (Panel A, Table 1).

We control also for *Local Origin*, which is a variable coded 1 if a county official comes from the prefecture that encompasses the county in which s/he holds office. About 58.97% of our county leaders came from the same prefecture in which they were born (Panel A, Table 1).

Factional Ties/Workplace Connection/Birthplace Connection. The proposition that promotion is premised upon GDP growth has not been unquestioned. Some claim that loyalty is in fact the more important consideration when deciding who to promote (Shih et al., 2012), whereas others argue that, once a set of shared characteristics (such as place of birth, whether attended the same school and/or worked in the same administration, etc.) between two successive levels of officials are controlled for, the relationship between GDP growth and

promotion simply disappears (Opper and Brehm, 2007; Yao and Zhang, 2012).

We construct one measure each for workplace connection, birthplace connection and factional ties. Workplace connection is proxied by a dummy variable indicating whether a county official has previously worked in a prefectural government (PGE). Since the appointment system in China requires that it is the one-level-up prefecture government's authority to decide county officials appointment (so called "One Level Down" policy; justified on grounds of "gaining important local experience"), a county party secretary's experience in the prefecture government could affect the likelihood of promotion through their stronger (formal or informal) connection with the appointment authority—the prefecture governments. About 37.7% have such ties with a prefectural government (Panel A, Table 1).

Similar to workplace connection, birthplace connection is also a dummy variable indicating whether a county official was born in the same prefecture as his/her immediate supervisors—be it the party secretary or the mayor of the supervised prefecture. We choose this particular measure as evidence suggests that those provincial officials who share the same birthplace with the national leaders are more likely to be promoted (Shih et al., 2012; Opper and Brehm, 2007). In our sample, only 18.4% of the county officials came from the same prefecture as their immediate supervisors (Panel A, Table 1).

Finally, the proxy for factional ties is the so-called "*tuanpai*" (factional) experience. This variable is also a dummy variable, referring to whether a county official has served as party secretary in the Communist Youth League (CYL). In China, the CYL is a political organization upon which a certain "faction" known as tuanpai has been relying for grooming future leadership (Li, 2001, 2005; Bo, 2004). In this sense, CYL experience can be a good proxy measuring a county party secretary's factional ties. In our sample, a mere 14.8% of county officials have the credential of a CYL party secretary (Panel A, Table 1).

4 Empirical Results

4.1 Relationship between Land Revenue, GDP Growth and Promotion

To test the hypothesis that the political selection of China's county leaders based upon "yardstick competition" may have been weakened by land revenue windfalls, we regress political turnover on GDP growth, then land revenue first, before we do so on their interaction term. In addition to the linear regression, the ordinal nature of our dependent variable means that the ordered logit model must also be included (controlling for the two-way fixed effects) as part of our baseline estimations. The equation underlying this regression exercise assumes the following form:

$$Turnover_{it} = \alpha_1 LandRev_{it} + \alpha_2 GDPGrowth_{it} + \alpha_3 LandRev_{it} * GDPGrowth_{it}$$
$$+ \beta_1 X_{it} + \beta_2 W_j + \phi_i + T_t + \delta_j + \nu_{ijt} \quad (1)$$

where i indexes a county, t indexes a year and j indexes a party secretary. Denoting the annual land revenue (log) in county i at year t, our key explanatory variable $LandRev_{it}$ is employed to proxy for the effect of land revenue on the political selection of China's county leaders. Likewise, given the alleged importance of GDP growth for promotion, $GDPGrowth_{it}$, defined as the per capita annual growth rate of GDP in county i at year t, is similarly included in our estimations. Before testing our hypothesis, it is necessary to confirm, first and foremost, that both GDP growth and land revenue have an independently significant and positive effect on political turnover. We are thus also interested in α_1 and α_2, although α_3 remains our coefficient of key interest. X_{it} is a vector of county-level control variables, which include total tax revenue, level of per capita GDP and population size (all in natural logarithm). Including such characteristics as age, year in office, education, birthplace, measures of factional ties and connections, W_j is a vector of individual characteristics of county

party secretary j. T_t refers to the year fixed effects, while ϕ_i and δ_j are the county and party secretary fixed effects, respectively.

Table 2 reports the estimation results based on Equation (1). Column (1) shows that higher GDP growth is positively correlated with promotion—a finding consistent with evidence at the province level (Li and Zhou, 2005). Interestingly, column (2) shows that land revenue is similarly positive and in fact even more significant than GDP growth (at the 1% level in both the linear estimation (column (2)) and ordered logit estimation (column (6)). The finding that land revenue has an independently significant effect on promotion suggests that, in furthering their careers China's county leaders have succeeded in boosting GDP growth as well as their coffers. To rule out the possibility that promotion may be affected by the unobserved "ability" of county officials we control for personal fixed effects in column (3). Doing so renders GDP growth insignificant, suggesting that it is indeed a good proxy for ability. But the same cannot be said for land revenue, which remains significant (and with similar magnitude), suggesting, conversely, that the effect of land revenue is unlikely correlated with ability.

Another potential concern is that the effect of land revenue can come from higher prices or larger quantity sold. To the extent that the revenue effect is driven by some officials' selling more land, our estimate would be biased. To address this concern we decompose the revenue effect into price and the quantity of the land sold during the period of 1999-2008 based on data collected through the Land Transaction Monitoring System.[20] Column (4), which reports the results, shows that the effect of land revenue derives exclusively from price instead of quantity. This finding makes perfect sense, in light of the quantity restrictions (specifically quotas) the central government has placed upon the local authorities (since 2003) to prevent them from overzealously converting the arable land into commercial, nonfarm purposes.[21]

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[20]The Land Transaction Monitoring System (http://www.landchina.com/) is a data bank set up by the Ministry of Land and Resource. It keeps a record of each and every land transaction, from which information on both price and quantity can be obtained for aggregation to the county level.

[21]Starting from 2005, the Ministry of Land and Resource has been supervising farmland conversion undertaken by the counties and prefectures on an annual basis and taking punitive action against those who went beyond the sanctioned quantity that range from the mere issuing of warnings and criticisms to outright

Based on the evidence that both GDP growth rates and land revenue have an independently positive and significant effect on promotion, we examine how land revenue may affect GDP growth and in turn promotion by interacting GDP growth with land revenue. The result, reported in columns (5) and (7), shows that the pertinent interaction term is significantly negative across both linear and ordered logit regressions, suggesting that land revenue has unwittingly replaced (to some extent) GDP growth in the selection of county officials for promotion. Specifically, the larger the land revenue the smaller the effect of GDP growth on promotion, *ceteris paribus*. In other words, land revenue has a distortionary effect on the political selection of county officials based on the economic growth "tournament".

Insofar as the individual attributes are concerned both age and its squared term are significant. Our evidence suggests that one must be promoted before turning 47 (-(0.4331/(-0.0046*2))), or never hope to be promoted because the chance declines precipitously thereafter. Like age, education is also positively correlated with turnover—a finding consistent with the evidence at both prefectural and provincial levels that political selection in post-reform China is indeed based on meritocracy (Jia, et al., 2014; Li and Zhou, 2005). Last but not least, the three proxies for factional ties and connections, namely Communist Youth League, Prefectural Government Experience and Birthplace Connections, are also highly significant (at the 1% level). These results send mixed messages: at the sub-provincial level both performance and connections are partial determinants of promotion (more on this in Section 5).[22]

<div align="center">Table 2 about here</div>

4.2   Evidence using Instrumental Variables

It is obvious that land revenue is endogenous to political turnover. For example, the ambitions of county party secretaries have been omitted, which is likely to affect both land revenue and promotion simultaneously. And, to the extent that promotion is decided and

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demotion in the most serious of cases.

[22]The same is true for the provinces (Jia et al., 2014).

revealed, say, one year in advance, it may also affect the incentive to maximize land revenue during that final year of tenure, thereby raising concerns of reverse causality. This would be especially the case, for instance, if selling land beyond the sanctioned quota reduces one's chance of promotion. The same problem may also occur if a county party secretary who perceives a slim chance of promotion ends up selling more land.

To deal with these concerns, we employ an instrumental variable approach to re-estimate our baseline regressions. Given that land revenue is the product of price and quantity, we instrument land revenue with both the supply of, and demand for, land.

In the case of land supply, we construct an index that allows us to measure the percentage of land in each Chinese county *unsuitable* for urban development, based upon an architectural safety standard that considers land with a slope of 15 degrees or below to be safe for real estate construction.[23]

We first obtained the elevation data from the United States Geographic Service (USGS) Digital Elevation Model (DEM) at the 90-meter resolution, which typically are spaced at the 90 square-meter cell grids across the entire surface of the earth on a geographically projected map. Based on information on elevation for each grid in relation to its adjacent grids, we generate a slope for each grid on a projected map of China. We then match this slope map with the county maps of China to delineate their administrative boundaries. Using 15 degrees as the cutoff point, we assign the value of 1 to those grids with slope above 15 degrees, and 0 otherwise (Figure A3 in the Appendix provides a visual example of a grid map and two sample counties with extremely high and extremely low unsuitability). Grids corresponding to the water bodies are also coded 1. Dividing the number of unsuitable grids by the total number of grids yields the percentage of land unsuitable for real estate development. For the whole of China, the county average of unsuitable land for development is 25.7%, with a standard deviation 23.1% (see Panel B of Table 1).We then interact the geographic constraint on a county's land supply with the temporal variations in the national

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[23]This approach is inspired by Saiz (2010), who exploits the variation in water bodies and steep-sloped terrain as the key determinants of housing supply in the major metropolises in the United States.

interest rate to construct our instrument.

Our identification strategy follows essentially that of Mian and Sufi (2011) and Chaney et al. (2013), who instrument regional real estate prices by interacting the elasticity of land supply with nationwide movements in the real interest rate. The logic is that, when interest rate decreases, the demand for real estate increases, *ceteris paribus*. Whether the increase in the demand for housing will be translated into more housing construction or merely higher land prices depends fundamentally on the elasticity of land supply. Where the supply of land is elastic, more houses will be constructed and, accordingly, house prices will remain stable. Conversely, an inelastic land supply will translate the rising demand mostly into higher prices. Thus, we expect that a reduction in the interest rate will have a distinctly larger impact on land prices in counties where the supply of land is more constrained by topography, and, as a corollary, higher land prices will bring more land revenues to the local coffers. Our instrumental variable is thus an interaction term between the geographic constraint of a county's land supply and movements in the national interest rate.[24] In formulating this instrument, we assume that interest rate movements have no direct effect on political turnover except through the channel of land revenue.

To check the validity of this identification strategy, we employ a second instrument using an alternative measure to proxy for demand shock. This alternative proxy is the house prices in China's provincial capital cities. Compared to interest rates this particular proxy has the additional advantage of providing also variations across space as well as over time. The underlying assumption behind this particular strategy is that, being in the rural sector house prices in the Chinese counties are more likely influenced by those in the surrounding metropolises rather than the other way round. Our second instrument is thus an interaction

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[24]As each administrative jurisdiction (the county included) is only sanctioned to sell a certain amount of land annually, it may well be this land quota rather than suitability that arguably determines a county's supply constraint. Unfortunately, data on land quota is available only for the more recent period of 2009-2011 and at the higher (prefecture) level, which prevents us from testing this alternative conjecture for the period 1999-2008. But we take the available data anyway and regress the unsuitability index on the land quota. The pertinent coefficient is highly and positively significant, giving us the confidence to use unsuitability as an integral part of our instrument.

of land supply constraint and house prices in the provincial capital cities. The first-stage of the 2SLS setup assumes the following specification (Equation 2):

$$LandRev_{it} = \gamma_1 Unsuitable_i * InterestRate_t + \gamma_2 Unsuitable_i * HousePrice_{pt} + \gamma_3 GDPGrowth_{it}$$
$$+ \xi_1 X_{it} + \xi_2 W_j + \phi_i + T_t + \delta_j + \omega_{ijt} \quad (2)$$

where $Unsuitable_i$ denotes the percentage of a county's land unsuitable for housing construction, $InterestRate_t$ the variations in the interest rate, and $HousePrice_{pt}$ the house prices in China's provincial capital cities.

In the second stage, we regress political turnover on the predicted values of land revenue based on the following specification (Equation 3):

$$Turnover_{it} = \theta_1 \widehat{LandRev}_{it} + \theta_2 GDPGrowth_{it} + \theta_3 LandRev_{it} * \widehat{GDPGrowth}_{it}$$
$$+ \varphi_1 X_{it} + \varphi_2 W_j + \phi_i + T_j + \delta_j + \sigma_{ij} \quad (3)$$

Table 3 reports the instrumented results. In the first model (column (2)), we use the interaction of land supply constraint and national interests rate (IV_1) as instrument, and control for the alternative instrument of house prices in the provincial capital cities (IV_2). In the second model (column (3)), we use IV_2 as our instrument and control for IV_1. In the third and final model (columns (4) and (5)), we use both IVs and report the p-value for the over-identification test. Column (1), which reports the first-stage results, shows that both IV_1 and IV_2 are significantly correlated with the endogenous land revenue variable. Reporting the second-stage results, columns (2), (3) and (4) show that the predicted value of land revenue is significant at the 5% level in all these regressions. In all three models, GDP growth rate is also significant at the 5% level, a result reaffirming the validity of the "yardstick competition" claim. Additionally, columns (2) and (3) show that neither instrument has a significant effect

on political turnover; this satisfies the exclusion restriction condition that both instruments are affecting political turnover only through the land revenue channel. Finally in column (5), we include the interaction term between land revenue and GDP growth and instrument it with the two IVs. As with the OLS result, the interaction term is significant and negative, which confirms our hypothesis that land revenue does in fact significantly weaken the impact of GDP growth on political selection.

The larger coefficients in the IV-fixed effects estimations suggest that the earlier fixed effects estimations had likely suffered from either omitted variable bias or reverse causality. Given that ability is the most likely omitted variable and that its omission would likely bias the OLS estimation upwards, reverse causality would seem a more likely culprit, as those who had served as county officials longer would more likely perceive a smaller likelihood of promotion and thus are more predisposed toward maximizing land revenue instead. To confirm this, we repeat the same regressions on a subsample of county party secretaries under age 50 at the time of their appointment. Given the official retirement age is set at 55, those who were 50 and above when they were appointed as county party secretaries are indeed much less likely to be promoted (the pertinent coefficient is insignificant, results not separately reported).

<div align="center">Table 3 about here</div>

4.3   Problem of Endogenous Appointment

While the instrumental variable approach helps to alleviate any endogeneity problems potentially caused by omitted variable bias and/or reverse causality, it is unable to resolve the problem stemming from the endogenous appointment of well-connected officials. To ensure that no officials could duly influence the decision of which county they are appointed to, we perform the following falsification tests. First, to the extent that well-connected officials could duly influence appointment with respect to locational choice, we would expect factional ties and/or workplace connection to be positively and significantly correlated with

the unsuitability for land development. Second, we would also expect such correlations to increase over time—especially since 2002, after the various land auctioning practices came into being. We thus regress the index of a county's unsuitability for land development and house prices in the provincial capital cities on the individual characteristics of the county party secretaries (comprising age and its squared term and education), and most importantly, on our measures of factional ties and connections.[25] Reported in Table 4, the results clearly show that all variables are insignificantly correlated with the two components of our instrument (columns (1) and (5)).

But that is not sufficient to relieve us of the concern that appointment may be endogenous. For example, it might be the case that appointment was more or less random initially, but as land revenue became increasingly lucrative for the local coffers, the better connected were assigned to counties capable of generating proportionately more land revenues. In other words, appointment may become increasingly endogenous over time in response to the growing importance of land revenues. To show that this is indeed not the case, we repeat the same regression exercise but this time we regress the two components of our instrument on those county party secretaries who were appointed *after* 2002—when land revenues really began growing in earnest. Reported in columns (2) and (6) of Table 4, the results are strikingly similar to those of the full sample (columns (1) and (5)). To further confirm this, we interact each of the three connections-cum-ties variables with year of appointment. If appointment is indeed endogenous, the pertinent coefficients should be significant and positive. With the exception of column (10), their effects are all insignificantly correlated with either component of our instrument (columns (3)-(5) and (8)-(9)). And, although the interaction term of birthplace connection and year of appointment is significant (column (10)), its sign is negative, effectively rejecting the possibility that those who have birthplace connection would be favorably assigned to counties in which house prices have gone up.

Table 4 about here

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[25]We exclude local origin, as it is not significantly correlated with promotion (see Table 2).

An important reason why endogenous appointment is less likely to occur at the county level may be attributed to the existence of a "rotation" system at the provincial level to groom political leaders before appointing them to still higher positions in the central government or party (Zhang and Gao, 2007), and the lack of one below the province. Indeed, the vast majority of the county leaders, 76.6%, were promoted to positions within the same prefecture.

5   Why Maximizing Land Revenue May Help Promotion?

In this section we explore the possible channels through which land revenue may affect promotion, by first investigating whether county officials may spend part of the land revenue on signaling "achievements" and whether that may result in the promotion of those of a lower quality (adverse selection). We then examine whether there is corruption.

5.1   Signaling

Our empirical evidence strongly suggests that the career incentives created by "yardstick competition" have been weakened by the growing land revenue. A possible channel is signaling. Our conjecture is based on the reasoning that the performance indicators employed to assess cadre performance—most notably GDP growth and budgetary revenues—are insufficiently differentiated among the counties within the same prefecture (where competition for promotion occurs).[26] This can be gleaned from Table 5, which reports the decomposition of a number of key performance indicators. The table clearly shows that for most of these indicators variations within the same prefecture are indeed inconsequential. In sharp

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[26]In addition to per capita GDP growth, the other evaluation criterion less emphasized in the literature but also clearly articulated in the official documents is the importance of per capita fiscal revenue growth. See, for example, Article 28, "Provisional Guidelines on Comprehensive Evaluation of Local Party Secretaries and Government Officials Based on the Scientific Outlook on Development" (*Tixian Kexue Fazhanguan Yaoqiu De Difang Dangzheng Lingdao Banzi He Lingdao Ganbu Zhonghe Kaohe Pingjia Shixing Banfa*), the Department of Organization (2006).

contrast, land revenue varies enormously from one county to another within the same prefecture. While land revenue does not translate into competition directly, those with more land revenue at their disposal are better able to use them in such ways as to enhance their promotion prospects.

Table 5 about here

Under the foregoing circumstance, signaling thus becomes an important channel for the career-minded county leaders to enhance their promotion prospects. Indeed, our conjecture is based on the rich evidence of signaling activities undertaken by many of China's local officials.[27] These activities include a wide gamut of large-scale construction projects (so-called "image project", *Xingxianggongcheng* or "political achievement projects", *Zhengjigongcheng*) that range from large public squares or plazas to ostentatious government buildings (Cai, 2004; Guo, 2009; Pei, 2008; Smith, 2009; Yew, 2011, 2012).[28]

The supervising authorities may consider these projects a useful measure to be employed in assessing the officials competing for promotion because, being "visible" and "quantifiable", they provide a distinguishable metric for evaluating performance. Moreover, in the event that some prefectural leaders are similarly career-minded, they themselves would take credit from such projects and use them for impressing their supervisors at the provincial level (Guo, 2009).

The county leaders have a penchant for "image projects" because these projects can usually be completed within a few years, thereby enabling their achievements to be timely revealed—a feature that concurs particularly strongly with their short tenure of less than four years on average. As a matter of fact, signaling is by no means confined to only democracies, where incumbent politicians spend to impress voters (Alt and Lassen, 2006; Besley and Case,

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[27]Excessive signaling is likely to cause the principal to put too strong an emphasis on high-powered incentives, which could be harmful as they may induce moral hazard behavior on the part of the agents (Acemoglu et al., 2008; Dixit, 2002; Holmstrom and Milgrom, 1991). This is arguably the case during China's Great Leap Forward (Kung and Chen, 2011) and is likely also the situation facing China today given the disproportionate emphasis placed upon economic growth (Jia, 2013; Xu, 2011).

[28]For example, in 2007 up to 20% of China's municipal governments had been criticized by the Ministry of Construction for having lavishly engaged in these wasteful "image projects" (Yew, 2012).

1995; Streb, 2005). In a way, signaling can be even more effective in autocratic regimes such as China because promotion is effectively decided by a small group of people, or, in the extreme case by a single person—the party secretary.[29]

To test the channel of signaling we regress the six major categories of county government expenditure—all normalized by the county population—on the size of land revenue, with full controls of the variables employed in the previous regressions, including county- and year-fixed effects. The summary statistics of these expenditures are reported in Panel C in Table 1 and the regression results in Table 6 (Panel A for regression results and Panel B for IV results).[30] The results lend strong support to the signaling story. Altogether there are four categories of expenditure that are highly significant (at the 1% level). City Construction, which consists of expenditures on ostentatiously large-scale projects such as grand plazas or parks, is most revealing of the signaling story (column (4)).[31] As it is highly unlikely for local leaders to finance "image" projects with budgetary fiscal revenue, the extra-budgetary revenue becomes virtually the only viable alternative (Zhan, 2012; Wu, 2010). Another expenditure that is suggestive of a signaling story pertains to that of "land acquisition and development", which essentially represents compensation paid to the farmers for having requisitioned their arable land. As construction for urban development requires first of all the clearing of land, the significance of this expenditure suggests that the land revenue-maximizing officials are aggressive in converting farmland.

To further verify the signaling story, we investigate if a cyclical pattern specific to these

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[29]While formally the prefectural party committee is in charge of promotion of county officials, oftentimes it is the party secretary who has absolute power in deciding on who to promote (Edin, 2003; Whiting, 2004).

[30]Provincial capital's house prices may affect land development expenditures or other categories of expenditure through channels other than land revenue. For example, to the extent that house prices in nearby metropolitan areas are correlated with the local living standard, compensations paid to the evicted farmers for land expropriation—a major part of land development expenditure—are typically also correlated with the local living standard (Cai, 2012). In this sense, house prices in the provincial capital cities may affect local land development expenditure through the channel of local living standard. This is why we adopt only the instrument based upon the interaction between the unsuitability index and national interest rate.

[31]This category also consists of expenditure incurred for the maintenance of urban public infrastructure. Unfortunately we are unable to disaggregate it into the portion for "image" projects and the portion for maintenance projects. While expenditure on such items as the construction of highways and industrial parks is likely conducive to economic growth, their approval goes beyond the authority of the county government.

two categories of expenditures exists; that is, whether county officials invest at certain strategic points of their career (Cai, 2004; Guo, 2007, 2009; Pan, 2013). The timing of expenditure is crucial for promotion, because too early an investment may become neglected when the time for promotion comes; plus an exceedingly high benchmark would render subsequent effort unsustainable. Similarly, investing after one's first term would be too late, given the pattern that the majority of promotion occurs at the end of the first term (Guo, 2009). In short, one must choose the time to invest optimally to avoid having their signaling efforts go to waste. To confirm this, we add the interaction term between land revenue and year in office and its quadratic term to determine if there is any nonlinear effect on the two categories of expenditures having a strong content of signaling (Panel C, Table 6). In view of the findings that the curvilinear effects are found only for Land Development and City Construction but not the other expenditures, the results are indeed strongly consistent with a signaling story. Based on the pertinent coefficients, the maximum for both types of expenditures is 4 (-0.178/(2*(-0.021))=4.238 and -0.197/(2*(-0.023))=4.282), which is strikingly consistent with the finding that the best time for one to signal one's ability is near the completion of one's first term (of five years) as a county party secretary (Guo, 2009).

Table 6 about here

5.2   Adverse Selection: Who Benefits the Most from Land Revenue?

To ascertain whether land revenue has any adverse selection effect on the promotion of county officials, we regress political turnover outcome on a number of individual characteristics, including, most importantly, factional ties and connections, as we are especially concerned with the potential effect of political connections on promotion.

The pertinent results are reported in Table 7. To gauge the additional effect of land revenue on factional ties and connections, we include the interaction term between each of the three types of ties-cum-connections, viz. Communist Youth League (CYL), Birthplace

Connection (BC), and Prefectural Government Experience (PGE) in columns (1)-(3), in addition to controlling for their main effects. We find that land revenue has an additional significant effect on both BC and PGE, but not CYL, suggesting that land revenue benefits those who are connected to their superiors through either the workplace or the birthplace.

We repeat the same exercise in columns (4) and (5), this time on age and education. To meaningfully gauge the effect of land revenue on age, we construct a dummy variable that divides the county party secretaries into two groups—one below the age of 47 and the other above—based on the finding that promotion rarely occurs beyond the age of 47 (calculated based on the pertinent coefficients in column (3) of Table 2 (-(0.4331/(-0.0046*2))=47). Reported in column (4), the result clearly shows that, while those above the age of 47 are indeed less likely to be promoted, they could use land revenue—directly via signaling or indirectly through outright bribery—to reverse this comparative disadvantage; the interaction term between "above age" and land revenue is positive and significant at the 5% level. Regardless of why the CCP rarely promotes a county official after they turned 47, if we take this threshold as (exogenously) given anyway, we may consider those who failed to obtain a promotion before they turned 47 as a sign of incompetence; after all, more than 85% of those who obtained a promotion in our sample did so within their first term of service as county party secretaries (1,042/1,216). In other words, we may consider land revenue as having an adverse selection effect on political selection, to the extent that it affords those who had previously failed in the "tournament" a second chance for promotion. Land revenue, however, has no additional significant effect on education (column (5)).

Table 7 about here

5.3 Moral Hazard: Evidence on Corruption

In light of land revenue's significant and positive correlation with both Administrative Expenditure[32] and Size of Bureaucracy (the latter measured by the number of government

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[32]This category is made up of public sector payroll and a variety of in-kind benefits and subsidies provided to government staff, including bonuses and a variety of allowances and official entertainment expenses. Lu

employees per 100,000 population), there is a strong likelihood of rent-seeking behavior if not downright corruption (columns (6)-(7), Table 6).[33] To the extent that a larger bureaucracy is also considered an "achievement", it too may be regarded as having an adverse selection effect on political selection. In contrast, perhaps due to their limited tenure, county officials in China are not "stationary bandits" and do not have a sufficiently long time horizon and accordingly the fiscal incentives to invest and tax at the long-run revenue-maximizing rate, as Mancur Olson (1993) had optimistically expected. Consequentially, the increase in land revenue has not been translated into greater social welfare spending—be it Education or Social Security; the pertinent coefficients are both insignificant. Production Expenditure, which consists primarily of subsidies made to the private industrial sector for research and development, is even worse; the negative (and significant) coefficient suggests that spending in this regard has in fact decreased, at a 1% level of significance for the IV estimation. On the whole, evidence suggests that land revenue has not been deployed in a manner conducive to either economic growth or social welfare enhancement.

A more direct source of corruption in this context pertains to the use of land revenue by county officials in bribing their superiors in exchange for promotion. Given the insurmountable difficulties associated with identifying outright corrupt behavior of this kind, however, we perform a robustness check by adopting the so-called "forensic economics" approach in identifying the *discontinuous* changes in incentives underlying the hidden behavior of corruption (Zitzewitz, 2012). For example, Di Tella and Schargrodsky (2003) find that in Buenos Aires, prices paid by hospitals to private suppliers fell by 15% during a crackdown on corruption. To the extent that the crackdown is random, they conclude that the pertinent magnitude (of 15%) is a good measure of corruption in government procurements. Following this approach, we hypothesize that the effect of land revenue on the political turnover of the county party secretaries would be significantly reduced in the event (year) of a crackdown

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(2000a, 2000b) refers to this phenomenon in the Chinese context as "organizational corruption".

[33]Typically, corruption is positively associated with the size of bureaucracy (Krueger, 1974; Mauro, 1995, 1998; Tollison, 1982).

on the corruption of their superiors, i.e., the prefectural and provincial officials of the same province.

An important reason why a crackdown on the county officials' superiors may deter them from committing bribery is that it reminds them that they can and do get caught. To see if that is really the case, we collect data on the crackdown of corruption involving high ranking officials—specifically those at the prefectural level and above. The pertinent data are collected from *Procuratorial Daily* (*Jiangcha Ribao*), the mouthpiece of the Department of Procuratorate.[34] Based on reports in the *Procuratorial Daily*, we construct two sets of variables for measuring the crackdown on corruption as it occurs in a province in a given year. The first is a dummy variable, which would be assigned the value of 1 if a provincial official (provincial governor or its equivalent) has been apprehended for corruption, and zero otherwise. We do the same for the prefectural officials. The second variable enumerates all corruption cases involving the provincial officials, followed by the prefectural officials (prefectural mayor or its equivalent). A total of 86 provincial officials and as many as 438 prefectural officials had been apprehended for corruption during 1998-2008. We then use this information to test the hypothesized corruption channel by regressing political turnover on the interaction between the instrumented land revenue and the crackdown dummy, controlling for both land revenue and the main effect of the crackdown. Moreover, to verify that the crackdown has only affected corruption but not signaling, we perform a "falsification test" by separately regressing the expenditure on city construction (the proxy for signaling) and size of bureaucracy (the proxy for corruption) on the foregoing interaction term. If this "forensic" approach works, the interaction between land revenue and crackdown should not have a significant effect on administrative expenditure but it should have a significant effect on the size of bureaucracy.

The regression results are reported in Table 8. Columns (1), (2), (5), (6), (9), and (10)

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[34]Published by the People's Procuratorate of China, the *Procuratorial Daily* contains a column that periodically reports major corruption cases discovered by the central government's inspection team (*zhongyang xunshizu*).

report the results using the dummy variable, whereas columns (3), (4), (7), (8), (11), and (12) show the results based on the actual magnitude. While land revenue continues to have a positive and significant effect on promotion, the interaction term between land revenue and corruption crackdown is significantly negative in the regressions in which the dependent variable is political turnover (columns (1)-(4)). This supports the underlying assumption concerning the deterring effect of corruption crackdown on bribing one's way to promotion using land revenue. In particular, given the near identical size of the two variables, viz. land revenue and the interaction term between land revenue and corruption crackdown, it is safe to conclude that land revenue has virtually no effect on promotion in the year when, and in the province/prefecture where, a crackdown on corruption occurred. As hypothesized, the interaction term does not have a significant effect on City Construction expenditure (columns (5) through (8)) but, as with the case of political turnover it has a significant and negative effect on Government Size (columns (10) and (12)). Together, these results support the hypothesis that crackdown on corruption deters only the illegal, corruptive behavior of officials but not their signaling efforts.

Table 8 about here

6 Conclusion

The idea that abundance of natural resources—inherently a blessing—eventually turns into a "curse" has now been extended to abundance of other kinds of resources. We have seen, for example, from the work of Brollo et al. (2014) how fiscal transfers in Brazil have distorted the politicians' incentives; the results are more corruption in the government and deterioration in the quality of the competing candidates—a political resource curse any way we look at it. Following this literature, we asked whether similar curses may occur in authoritarian regimes where public officials rather than politicians are appointed and promoted instead of being voted into office. Stated differently, could the lack of democracy

be a saving grace for the authoritarian regimes? A policy that assigns the rights over land revenues to the sub-provincial governments allows us to test the political resource curse hypothesis in an entirely different political setting.

Based on the premise that public officials in China are appointed and evaluated for promotion by their immediate superiors, and that promotion has long relied on the so-called "yardstick competition" (with GDP growth being a proxy for ability), land revenue windfalls and GDP growth are found to exhibit similarly positive relationships with promotion. But more importantly, we found that land revenue has the additional significant effect of reducing the importance of GDP growth in promotion, thereby distorting Chinas political selection of its sub-provincial officials. The effects of this revenue windfall are decidedly negative, as it results in the same kinds of adverse selection and moral hazard problems that Brollo et al. (2014) have independently found in democracies. In our empirical study of the political resource curse in an authoritarian regime, the first of its kind, we have found evidence of land revenues being deployed for the purpose of unproductive signaling—specifically increased spending on flamboyant public projects, with negative impacts on political selection as well as corruption.

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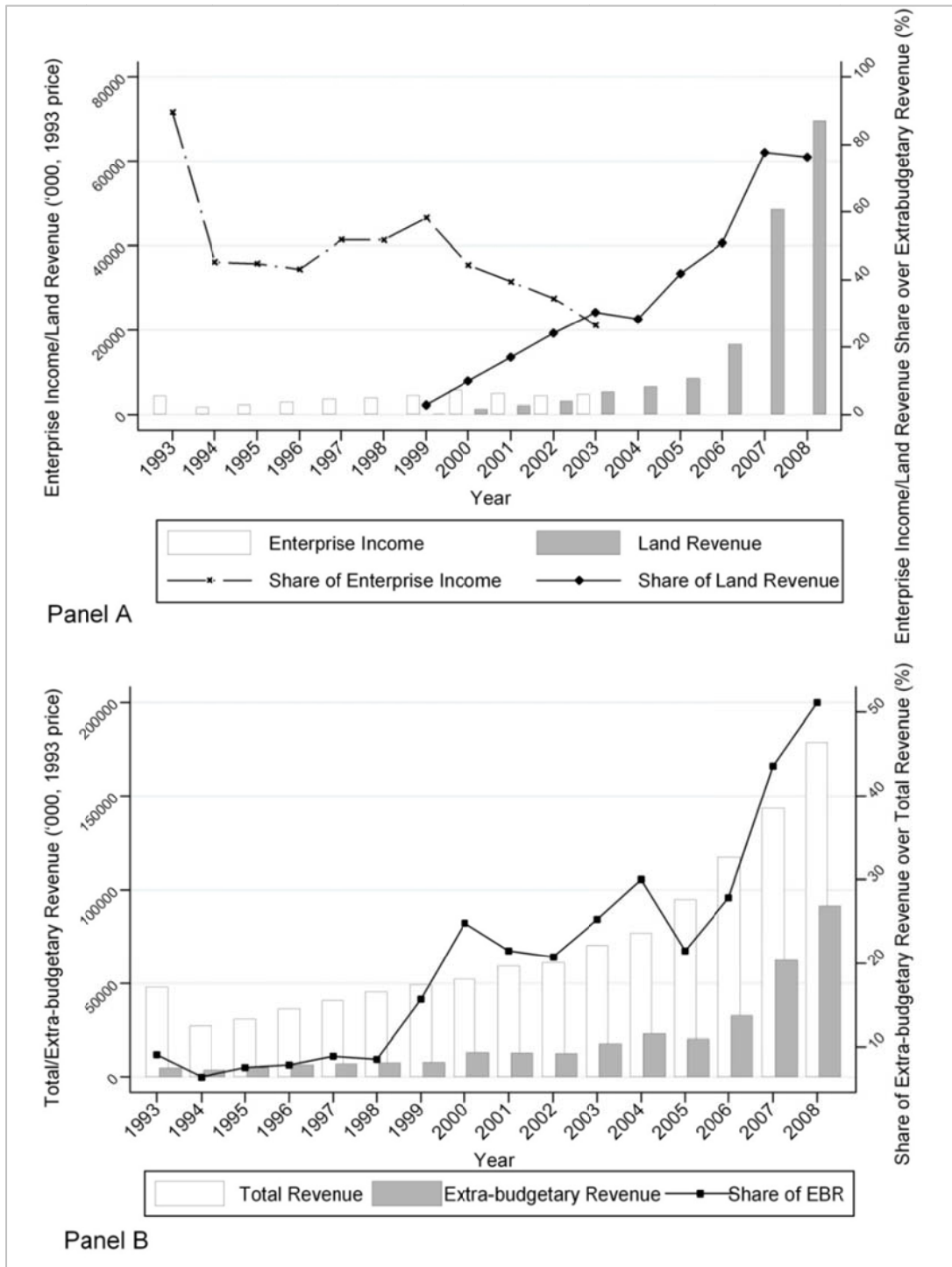
Figure 1. County *Revenues* Structure, 1993-2008

Panel A

Panel B

Figure 2. Political Turnover of County Party Secretaries, 1999-2008
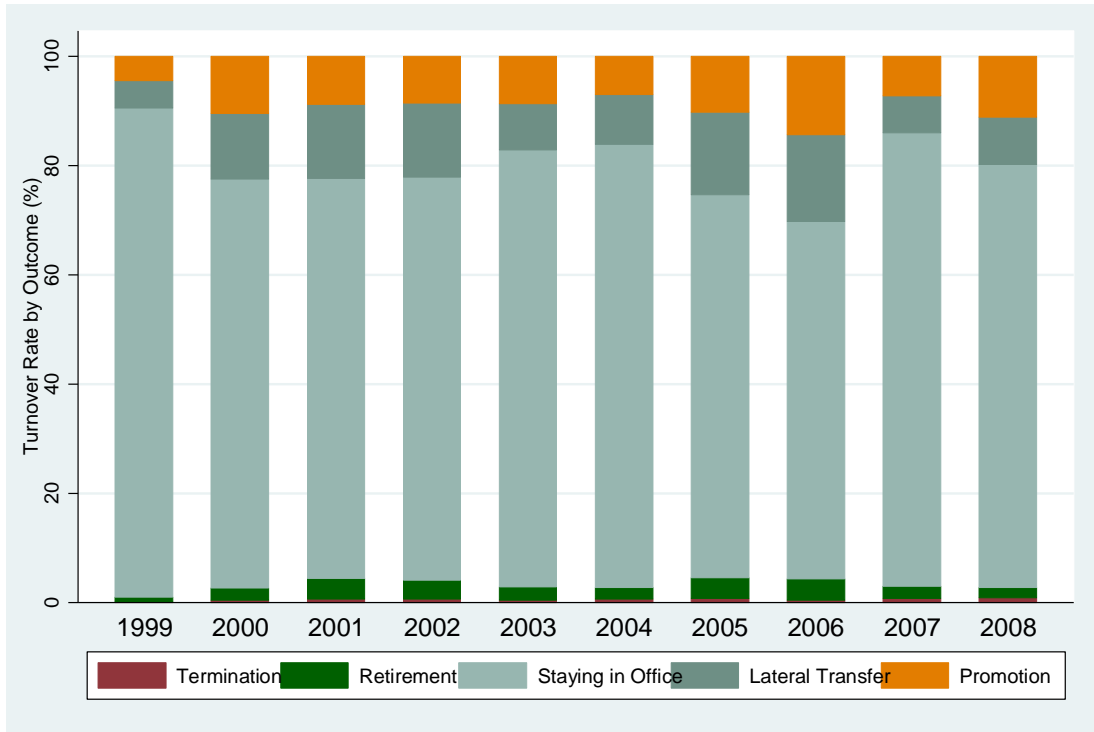
Table 1. Summary Statistics of Independent Variables (1999-2008)

Variables	Observations	Mean	Std. Dev.
Panel A. Variables employed in the regression analysis			
County-level Variables			
GDP Growth Rate	17409	0.107	0.166
Land Revenue (Log)	17531	3.666	3.291
Log of Per Capita GDP	18823	-1.450	0.731
Log of Tax Revenue	19220	8.951	1.171
Log of Population	18846	11.978	1.062
Individual-level Variables			
Age	11419	45.707	3.997
Age^2	11419	2105.113	366.329
Year in Office	16500	2.512	1.476
Year in Office^2	16500	8.491	10.054
Year of Education	11422	17.079	1.868
Local Origin	11422	58.965%	49.192%
CYL Party Secretary	11422	14.779%	35.490%
Workplace Connection	11422	37.673%	48.459%
Birthplace Connection	11422	18.368%	38.724%
Panel B: Variables employed in the IV regression analysis			
Unsuitable Index	19273	0.257	0.231
Log of Capital City House Price	18860	0.179	3.287
Interest Rate	19284	2.142	.875
Panel C: Expenditure Variables employed in analysis of signaling			
Log of Per Capita Production Expenditures	15352	1.833	3.633
Log of Per Capita Education Expenditures	13585	5.230	1.149
Log of Per Capita Social Security Expenditures	15352	3.680	1.978
Log of Per Capita City Construction Expenditure	15352	5.877	1.156
Log of Per Capita Land Development Expenditure	15352	0.979	3.440
Log of Per Capita Administration Expenditures	15352	3.855	1.841
Log of Number of Officials in the 10,000s Population	15307	0.071	0.052

Table 2. Land Revenue Windfall and Political Turnover, Baseline Model

	Linear Model					Ordered Logit	
	Political Turnover (Termination=0; Retirement=1; Same Level=2; Promotion=3)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth Rate	0.069***	0.067***	0.050	0.071**	0.062**	0.658**	0.643**
	(0.026)	(0.026)	(0.034)	(0.035)	(0.025)	(0.258)	(0.254)
Land Revenue (Log)		0.006***	0.007**		0.006***	0.049***	0.049***
		(0.002)	(0.003)		(0.002)	(0.016)	(0.016)
GDP GR*Land Rev.					-0.039***		-0.333***
					(0.012)		(0.106)
Land Price (Log)				0.015***			
				(0.003)			
Area of Land Sale (Log)				-0.007			
				(0.005)			
Age	0.161***	0.160***	0.433***	0.174***	0.158***	1.680***	1.663***
	(0.028)	(0.028)	(0.058)	(0.032)	(0.028)	(0.309)	(0.311)
Age^2	-0.002***	-0.002***	-0.005***	-0.002***	-0.002***	-0.019***	-0.019***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.003)	(0.003)
Year in Office	0.017	0.016	-0.032	0.032*	0.016	0.175*	0.179*
	(0.011)	(0.012)	(0.158)	(0.017)	(0.012)	(0.103)	(0.104)
Year in Office^2	0.004**	0.004**	0.005**	0.002	0.004**	0.055***	0.055***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.015)	(0.015)
Years of Education	0.010***	0.010***		0.012***	0.010***	0.098***	0.096***
	(0.003)	(0.003)		(0.005)	(0.003)	(0.030)	(0.030)
Local Origin	-0.016	-0.015		-0.018	-0.016	-0.183	-0.195
	(0.012)	(0.012)		(0.017)	(0.012)	(0.125)	(0.125)
CYL Party Secretary (CYL PS)	0.063***	0.063***		0.060***	0.063***	0.572***	0.563***
	(0.016)	(0.016)		(0.023)	(0.016)	(0.151)	(0.151)
Workplace Connection (WC)	0.081***	0.080***		0.064***	0.079***	0.807***	0.794***
	(0.013)	(0.013)		(0.017)	(0.013)	(0.121)	(0.120)
Birthplace Connection (BC)	0.100***	0.099***		0.105***	0.099***	0.952***	0.947***
	(0.015)	(0.015)		(0.021)	(0.015)	(0.135)	(0.135)
Cutoff Point 1						41.843***	41.858***
						(8.099)	(8.080)
Cutoff Point 2						43.633***	43.655***
						(8.117)	(8.099)
Cutoff Point 3						51.941***	51.982***
						(8.134)	(8.117)
Control variables†	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County.-and Year-FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Person Fixed Effects	No	No	Yes	No	No	No	No
Clustered at Pref.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	10361	10361	10361	5937	10361	10361	10361
Adj. R-squared	0.046	0.048	0.121	0.049	0.050	0.216	0.218

†Control variables include per capita GDP (log), population (log), and total tax revenue (log), and tenure length. Robust Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported

Table 3. Land Revenue Windfall and Political Turnover, Instrumented Evidence

	IV Model				
	Land Revenue	Political Turnover			
	1st Stage	2nd Stage	2nd Stage	2nd Stage	2nd Stage
	(1)	(2)	(3)	(4)	(5)
Unsuitability*Interest Rate (IV1)	8.136***		-0.211		
	(0.555)		(0.152)		
Unsuitability*Capital City House Prices (IV2)	0.292***	0.008			
	(0.036)	(0.006)			
Land Revenue (Log)		0.014***	0.040**	0.015***	0.010**
		(0.004)	(0.019)	(0.004)	(0.005)
GDP Growth Rate	0.296*	0.065**	0.057**	0.065**	0.058**
	(0.158)	(0.026)	(0.027)	(0.026)	(0.029)
GDP GR*Land Rev.					-0.089**
					(0.040)
Control Variables†	Yes	Yes	Yes	Yes	Yes
County.-and Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered at Prefecture	Yes	Yes	Yes	Yes	Yes
Number of Observations	10106	10106	10106	10106	10106
Adj. R-squared	0.394	0.132	0.179	0.133	0.131
P-value of Over-identification Test				0.211	0.144

†Control variables include log of per capita GDP, log of tax revenue, log of population, age, age square, years of education, local origin, CYL party secretary, workplace connection, birthplace connection, year in office and year in office square; Robust Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported

Table 4. The Effect of County Party Secretaries' Characteristics (Including Factional ties, Workplace Connection and Birthplace Connection) on Land Unsuitability and House Prices

	Land Unsuitability Index					Log of Capital City House Price				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age†	-0.007	0.004	-0.007	-0.007	-0.007	0.013	0.007	0.013	0.013	0.014
	(0.009)	(0.014)	(0.009)	(0.009)	(0.009)	(0.016)	(0.010)	(0.016)	(0.016)	(0.016)
Age^2	0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.001	-0.000	-0.001	-0.001	-0.001	0.001	-0.001	0.001	0.001	0.000
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
CYL PS	0.004	0.004	1.970	0.004	0.004	0.006	-0.001	-3.661	0.006	0.006
	(0.005)	(0.007)	(2.918)	(0.005)	(0.005)	(0.008)	(0.007)	(6.811)	(0.009)	(0.008)
CYL PS*Year			-0.001					0.002		
			(0.001)					(0.003)		
WC	-0.004	-0.005	-0.004	1.319	-0.004	0.004	0.009	0.004	4.628	0.004
	(0.004)	(0.006)	(0.004)	(2.519)	(0.005)	(0.007)	(0.006)	(0.007)	(5.699)	(0.007)
WC*Year				-0.001					-0.002	
				(0.001)					(0.003)	
BC	-0.000	0.003	-0.000	-0.000	-1.673	0.013	0.006	0.013	0.012	23.423**
	(0.005)	(0.009)	(0.005)	(0.005)	(2.878)	(0.012)	(0.009)	(0.012)	(0.012)	(9.755)
BC*Year					0.001					-0.012**
					(0.001)					(0.005)
Pref.-and Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	3849	2213	3849	3849	3849	3530	1913	3530	3530	3530
Adj. R-squared	0.751	0.737	0.751	0.751	0.751	0.997	0.920	0.997	0.997	0.997

†Refers to age when the county party secretaries took office. Standard errors in parentheses;* $p<0.10$, ** $p<0.05$, *** $p<0.01$; Constant terms are not reported.

Table 5. The Decomposition of Performance Indicators*

	Between Prefecture Variance	Within Prefecture Variance
Per Capita GDP (log)	66.14%	33.86%
GDP Growth Rate	99.43%	0.57%
Per Capita Total Revenue (log)	60.79%	39.21%
Total Revenue Growth Rate	96.94%	3.06%
Total Employment Population (log)	68.35%	31.65%
Average Salary of Urban Employee (log)	72.90%	27.10%
Per Capita Total Fixed Asset Investment (log)	65.81%	34.19%
Extra-budgetary Revenue (log)	32.52%	67.48%
Land Revenue (log)	14.73%	85.27%

* The indicators are from the 2008 statistics.

Table 6. The Effect of Land Revenue Share on Government Expenditures, 1999-2007

	Production Expenditure	Education Expenditure	Social Security Expenditure	City Construction Expenditure	Land Development Expenditure	Administration Expenditure	Bureaucracy Size
Panel A	Fixed Effects Regression Estimation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth Rate	0.347*	0.049***	0.003	0.103**	-0.133	0.052	0.006**
	(0.177)	(0.013)	(0.088)	(0.045)	(0.112)	(0.074)	(0.002)
Land Revenue (Log)	-0.065***	0.001	0.029***	0.063***	0.563***	0.031***	0.004***
	(0.016)	(0.001)	(0.010)	(0.007)	(0.017)	(0.006)	(0.000)
Number of Observations	9868	8499	9868	10821	9868	10821	9836
Adj. R-squared	0.499	0.975	0.747	0.932	0.735	0.905	0.439
Panel B	IV Regression Estimation						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
GDP Growth Rate	0.369**	0.049***	0.014	0.082*	-0.119	0.054	0.006**
	(0.174)	(0.013)	(0.087)	(0.046)	(0.111)	(0.075)	(0.002)
Land Revenue (Log)	-0.154***	0.003	-0.015	0.110***	0.509***	0.026***	0.004***
	(0.032)	(0.003)	(0.018)	(0.022)	(0.027)	(0.008)	(0.001)
Number of Observations	9818	8423	9818	10792	9818	10792	9782
Adj. R-squared	0.397	0.969	0.696	0.918	0.683	0.888	0.332
Control Variables†	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County- and Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

†Control variables in the models include log of per capita GDP, log of tax revenue, log of population, age, age square, years of education, local origin, CYL party secretary, workplace connection, birth connection, year in office and year in office square. Standard errors in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Constant terms are not reported.

(Continued on the table)

	Production Expenditure	Education Expenditure	Social Security Expenditure	City Construction Expenditure	Land Development Expenditure	Administration Expenditure	Bureaucracy Size
Panel C				IV Regression Estimation			
	(15)	(16)	(17)	(18)	(19)	(20)	(21)
GDP Growth Rate	0.367**	0.049***	0.013	0.001	-0.118	0.047	0.006**
	(0.176)	(0.013)	(0.087)	(0.119)	(0.112)	(0.076)	(0.003)
Land Revenue (Log)	-0.082	0.001	-0.003	0.258***	0.217***	0.177***	0.008***
	(0.079)	(0.009)	(0.050)	(0.081)	(0.079)	(0.048)	(0.002)
Land Revenue*Year in Office	-0.057	0.002	-0.012	0.178***	0.197***	-0.103***	-0.003*
	(0.058)	(0.005)	(0.033)	(0.050)	(0.049)	(0.028)	(0.002)
Land Revenue*Year in Office^2	0.008	-0.000	0.002	-0.021***	-0.023***	0.013***	0.000*
	(0.009)	(0.001)	(0.005)	(0.007)	(0.007)	(0.004)	(0.000)
Number of Observations	9818	8423	9818	9818	9818	10792	9782
Adj. R-squared	0.395	0.969	0.696	0.769	0.671	0.885	0.328
Control Variables†	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County- and Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

†Control variables in the models include log of per capita GDP, log of tax revenue, log of population, age, age square, years of education, local origin, CYL party secretary, workplace connection, birth connection, year in office and year in office square. Standard errors in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Constant terms are not reported.

Table 7. Heterogeneous Effects of Land Revenue on Political Turnover, 1999-2008

	IV Estimation on Political Turnover				
	(1)	(2)	(3)	(4)	(5)
Land Revenue (Log)	0.015***	0.006	0.009**	-0.000	0.011***
	(0.004)	(0.005)	(0.004)	(0.006)	(0.004)
CYL Party Secretary	0.069	0.061***	0.064***	0.066***	0.063***
	(0.050)	(0.016)	(0.016)	(0.017)	(0.016)
CYL Party Secretary*Land Revenue	-0.002				
	(0.012)				
Workplace Connection	0.080***	0.002	0.079***	0.078***	0.071***
	(0.013)	(0.039)	(0.013)	(0.013)	(0.012)
Workplace Connection*Land Revenue		0.020**			
		(0.009)			
Birthplace Connection	0.098***	0.097***	-0.025	0.097***	0.101***
	(0.018)	(0.018)	(0.064)	(0.018)	(0.017)
Birthplace Connection*Land Revenue			0.032**		
			(0.016)		
Above Age				-0.594**	
				(0.300)	
Above Age*Land Revenue				0.071**	
				(0.034)	
Education	0.010***	0.009***	0.011***	0.010***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Education*Land Revenue					0.001
					(0.003)
Control Variables †	Yes	Yes	Yes	Yes	Yes
County.-and Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered at Prefecture	Yes	Yes	Yes	Yes	Yes
Number of Observations	10106	10106	10106	10406	10406
Adj. R-squared	0.130	-0.135	-0.136	-0.169	-0.134
P-value of Over-identification Test	0.300	0.247	0.058	0.321	0.197

†Control variables in the models include log of per capita GDP, log of tax revenue, log of population, age, age square, local origin, year in office and year in office square. Robust standard errors in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Constant terms are not reported.

Table 8 The Effects of Land Revenue on Political Turnover and Expenditures during Crackdown on Corruption, 1999-2008

2SLS Estimation on:	Province	Prefecture	Province	Prefecture
	Political Turnover			
	(1)	(2)	(3)	(4)
Land Revenue (Log)	0.023***	0.022***	0.013***	0.018***
	(0.007)	(0.007)	(0.004)	(0.005)
Corruption Crackdown	0.076**	0.076**		
	(0.037)	(0.034)		
Land Revenue*Corruption Crackdown	-0.017*	-0.016**		
	(0.009)	(0.008)		
Number of Corruption Crackdown			0.013**	0.005
			(0.006)	(0.007)
Land Revenue*Number of Corruption Crackdown			-0.009**	-0.013**
			(0.004)	(0.005)
Number of Observations	10106	10106	10106	10106
Adj. R-squared	0.141	0.139	0.144	0.144
P-value of Over-identification Test	0.537	0.282	0.338	0.427
	City Construction Expenditure			
	(5)	(6)	(7)	(8)
Land Revenue (Log)	0.520***	0.518***	0.524***	0.524***
	(0.035)	(0.039)	(0.028)	(0.029)
Corruption Crackdown	-0.068	-0.009		
	(0.241)	(0.220)		
Land Revenue*Corruption Crackdown	0.019	0.021		
	(0.055)	(0.050)		
Number of Corruption Crackdown			0.01	0.002
			(0.034)	(0.030)
Land Revenue*Number of Corruption Crackdown			-0.006	0.006
			(0.025)	(0.025)
Number of Observations	9818	9818	9818	9818
Adj. R-squared	0.775	0.775	0.775	0.775
	Bureaucracy Size			
	(9)	(10)	(11)	(12)
Land Revenue (Log)	0.005***	0.005***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Corruption Crackdown	0.012***	0.007		
	(0.005)	(0.005)		
Land Revenue*Corruption Crackdown	-0.003**	-0.002		
	(0.001)	(0.001)		
Number of Corruption Crackdown			0.001	0.001*
			(0.001)	0.000
Land Revenue*Number of Corruption Crackdown			0.000	-0.001***
			(0.001)	0.000
Number of Observations	9782	9782	9782	9782
Adj. R-squared	0.328	0.329	0.33	0.332
Control Variables †	yes	yes	yes	yes
County.-and Year-Fixed Effects	yes	yes	yes	yes
Clustered at Prefecture	yes	yes	yes	yes

†Control variables in the models include log of per capita GDP, log of tax revenue, log of population, age, age square, years of education, local origin, CYL party secretary, workplace connection, birth connection, year in office and year in office square. Robust standard errors in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Constant terms are not reported.

Appendix

I Data Sources

Table A1. Data Sources

Variables	Coverage	Source
Individual Characteristics of County Party Secretaries		
Age		
Year of Education	24 provinces (1999–2010),	*Provincial Yearbook and Baidu Encyclopedia*
Local Origin	17,521 person-year observations covering 1,753 counties involving 3923 individuals	
Communist Youth League Party Secretary		
Prefectural Government Experience		
Birthplace Connection		
County-level Fiscal Revenues and Expenditures		
Land Revenue (log)		*Prefectural and County Financial Statistics (Dishixian Caizheng Tongji Ziliao) (1999–2007); Land Transaction Monitoring System (http://www.landchina.com/) and Provincial Fiscal Yearbook (2008)*
Tax Revenue (log)	31 provinces and prefectures (1999–2008)	
Per Capita Production Expenditures (log)		
Per Capita Education Expenditures (log)		
Per Capita Social Security Expenditures (log)		
Per Capita City Construction Expenditure (log)	31 provinces and prefectures (1999-2007)	*Prefectural and County Financial Statistics (Dishixian Caizheng Tongji Ziliao) (1999-2007)*
Per Capita Land Development Expenditure (log)		
Per Capita Administration Expenditures (log)		
Number of Officials in the 10,000s Population (log)		
County-level Socioeconomic Characteristics		

GDP Growth Rate Per Capita GDP (log) Population (log)	31 provinces and prefectures (1999–2008)	*Statistical Yearbook of Regional Economies (Quyu Jingji Tongji Nianjian) (2002–2009), county level data and Provincial Statistical Yearbook (Sheng Tongji Nianjian) (1999–2001)*
GIS Data & Land Related Data		
Slope Map	31 provinces and prefectures	*SGS Digital Elevation Model (DEM) at 90 square-meter-cell grid resolution*
County Administrative Boundary Maps	31 provinces and prefectures	*China County Population Census Data with GIS Maps (1953, 1964, 1982, 1990, 2000) from the China Data Center*
Interest Rate Capital City House Price	10 years (1999-2008) 31 provinces and prefectures (1999-2008)	*The website of the People's Bank of China (http://www.pbc.gov.cn/)* *Statistical Yearbook of Regional Economies (Quyu Jingji Tongji Nianjian) (2000–2009), prefectural level data*
Corruption Case	10 years (1999-2008) 524 cases	*Procuratorial Daily (Jiangcha Ribao)*

II   Definitions of, and Criteria Employed in, Coding Political Turnover

There are altogether four political turnover outcomes: Promotion, Lateral Transfer, Retirement, and Termination. Table A2 below provides the Criteria Employed in Coding Political Turnover.

i   Promotion

Typically, county party secretaries would be promoted to the position of vice party secretary or mayor at the prefecture level. In addition, following the Chinese Communist Party's own internal ranking system, appointment to head one of the several "strategically important" departments (prominent examples include the Department of Organization (*Zuzhi Bu*) and Public Security Bureau) is considered equivalent in rank to either vice party secretary or mayor at the prefecture level and thus promotion. For details see "Provisional Terms and Regulations Governing the Top Leadership (Party and Government Officials)" (*Guojia Gongwuyuan Zhanxing Tiaoli*), State Council, and "Regulations on the Selection and Appointment of Top Party Secretaries and Government Officials" (*Dangzheng Lingdao Ganbu Xuanba Renyong Gongzuo Tiaoli*), Department of Organization. See also Li (2001).

ii   Lateral Transfer or Staying in Office

Lateral transfer refers to appointments to positions at essentially the same rank. For example, this could conceivably occur where a county chief is transferred from one county to another either in the same capacity as county party secretary or as head of what the Chinese regards as a "non-strategic" department at the prefecture level (examples of such departments include the Department of Education or Workplace Safety). We consider such transfers as "lateral" because both the ranking and compensation that come with the new appointment are the same as those associated with the previous one, so they are clearly not promotions.

Staying in office refers to the situation where a county party secretary stays in the same

position for one more year. Given the ranking will not change if the party secretary stays in office, it is equivalent to a lateral transfer.

iii   Retirement

Upon retirement one may be appointed to take up an advisory position in the Chinese People's Political Consultation Committee (*Zhongguo Renmin Zhengzhi Xieshang Huiyi*) or the People's Congress.

iv   Termination

Termination happened when county party secretary unusually leaves office due to the incidence of natural death, severe illness, or imprisonment due to wrongdoing.

Table A2 Criteria Employed in Coding Political Turnover †

A county party secretary is "promoted" if he/she attains one of the following positions upon the end of term:	
地市级市委副书记	Deputy Secretary of Prefectural Party Committee *(Dijishi Shiwei Fushuji)*
地市级市委组织部部长	Minister of Party Committee Organization Department *(Dijishi Shiwei Zuzhibu Buzhang)*
地市级市委宣传部部长	Minister of Party Committee Propaganda Department *(Dijishi Shiwei Xuanchuanbu Buzhang)*
地市级纪委书记	Secretary of the Discipline Inspection Commission *(Dijishi Jiwei Shuji)*
地市级副市长	Vice Mayor *(Dijishi Fu Shizhang)*
地级市政府秘书长	Secretary General *(Dijishi Shizhengfu Mishuzhang)*
地市级市公安局局长	Chief of Public Security Bureau *(Dijishi Gonganju Juzhang)*
地市级中级人民法院院长	Chief Justice of Intermediate People's Court *(Dijishi Zhongji Renminfayuan Yuanzhang)*
地市级中级人民检察院院长	Chief Procurator of Intermediate People's Procuratorate *(Dijishi Zhongji Renminjianchayuan Yuanzhang)*

A county party secretary is "transferred laterally" if he/she ends up with one of the following positions upon the end of term:	
县委书记	County Party Secretary *(Xianwei Shuji)*
县级市市委书记	County City Party Secretary *(Xianjishi Shiwei Shuji)*
区委书记	District Party Secretary *(Quwei Shuji)*
地市级市委统战部部长	Minister of Party Committee United Front Department *(Dijishi Shiwei Tongzhanbu Fubuzhang)*
地市级市委组织部副部长	Vice Minister of Party Committee Organization Department *(Dijishi Shiwei Zuzhibu Fubuzhang)*
地市级市委宣传部副部长	Vice Minister of Party Committee Propaganda Department *(Dijishi Shiwei Xuanchuanbu Fubuzhang)*
地市级纪委副书记	Vice Secretary of the Discipline Inspection Commission *(Dijishi Jiwei Fushuji)*

市政府市长助理	Assistant Mayor *(Shizhengfu Shizhang Zhuli)*
市政府巡视员	Prefectural Government Counselor *(Shizhengfu Xunshiyuan)*
地级市政府副秘书长	Vice Secretary-General *(Dijishi Zhengfu Fumishuzhang)*
地市级市公安局副局长	Deputy Chief of Public Security Bureau *(Dijishi Gonganju Fujuzhang)*
地市级中级人民法院副院长	Deputy Chief Justice of Intermediate People's Court *(Dijishi Zhongji Renminfayuan Fuyuanzhang)*
地市级中级人民检察院副院长	Deputy Chief Procurator of Intermediate People's Procuratorate *(Dijishi Zhongji Renminjianchayuan Fuyuanzhang)*
地级市政府各局局长（如教育局局长等）	Department Head of Prefectural Functional Bureau (e.g. Head of Education Bureau) *(Juzhang)*

A county party secretary is "retired" if he/she ends up with one of the following positions upon the end of term:	
地市级市人大常委会主任，副主任	Chairman and Vice-Chairman of the Standing Committee of the People's Congress *(Dijishi Shirenda Changweihui Fu/Zhuren)*
地级市市政协主席，副主席	Chairman and Vice-Chairman of the People's Political Consultative Conference *(Dijishi Zhengxie Fu/Zhuxi)*
地级市市总工会主席	Chairman of Prefectural Trade Union *(Dijishi Shizhonggonghui Zhuxi)*
地级市市妇联主席	Chairman of Prefectural Women's Federation *(Dijishi Fulian Zhuxi)*

† The coding of Political Turnover is based on the administrative rank of the positions to which the county party secretary was subsequently appointed.

III   Other Supporting Figures

Figure A1. A County Party Secretary's Vita in *Baidu Encyclopedia*

Note: This example serves to illustrate how the county party secretaries' dataset is constructed based upon their curriculum vitae in *Baidu Encyclopedia*. The curriculum vitae in turn are obtained from the pertinent Chinese government websites.

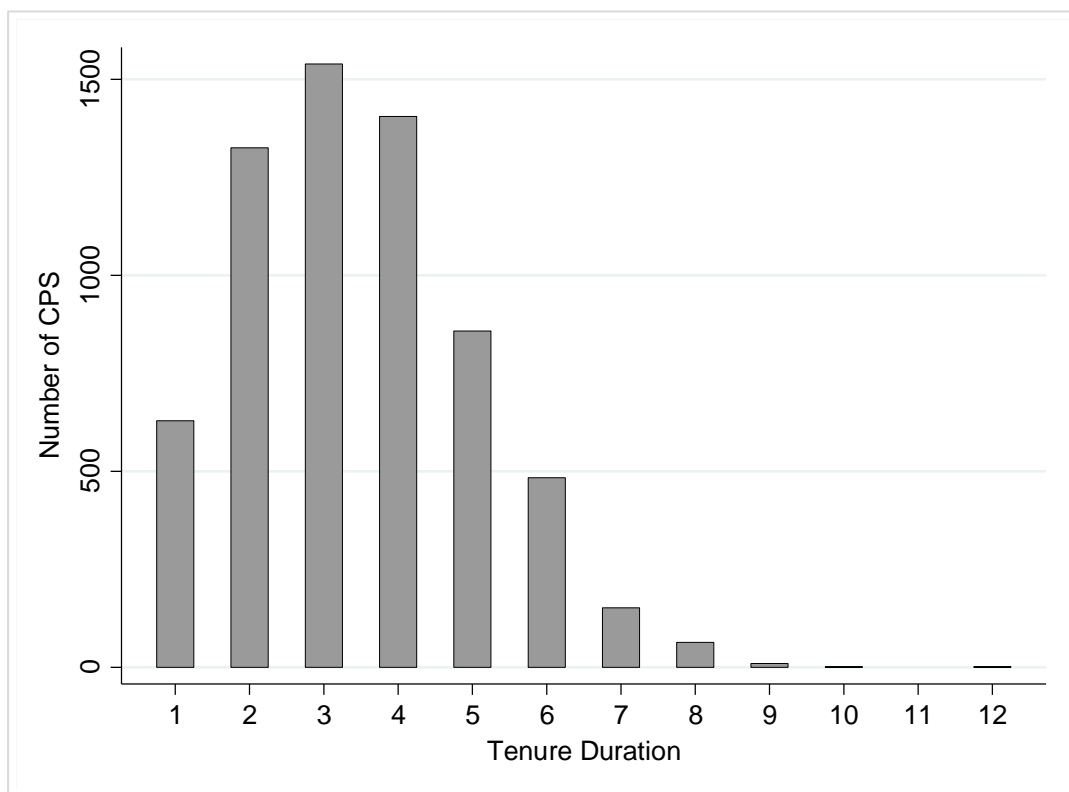Figure A2. The Distribution of Tenure Duration of County Party Secretaries, 1999-2008.
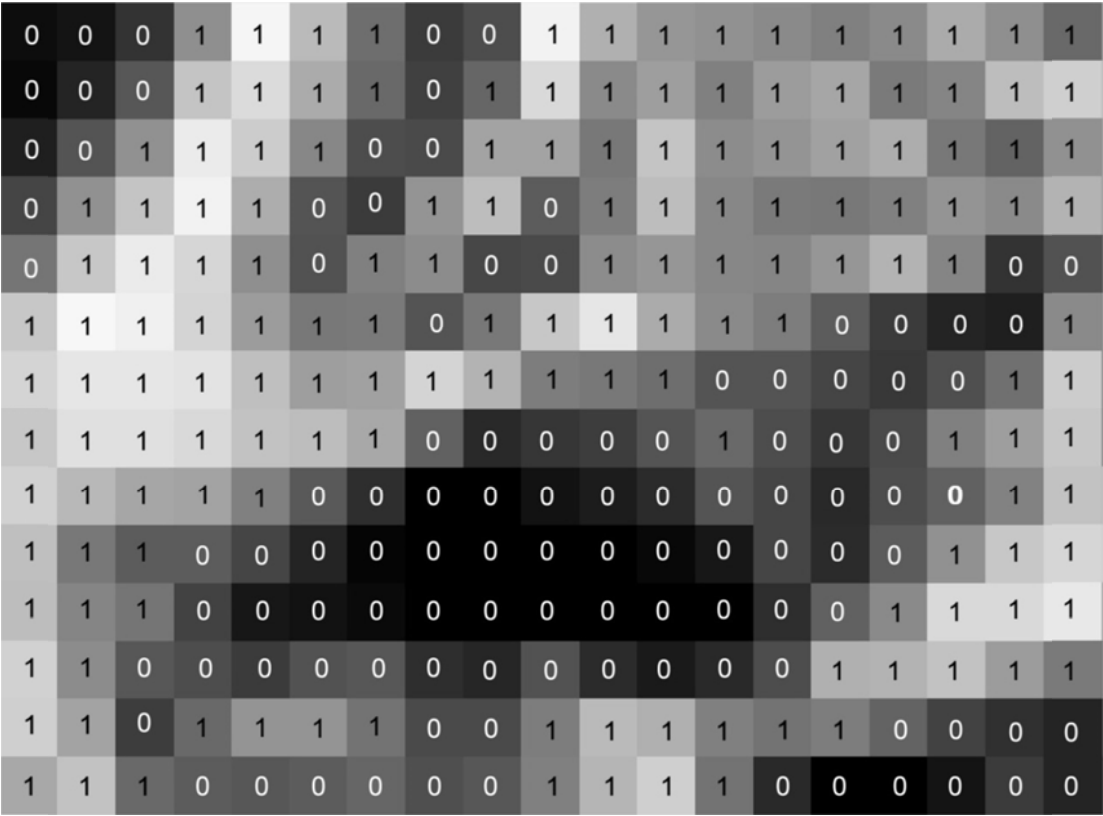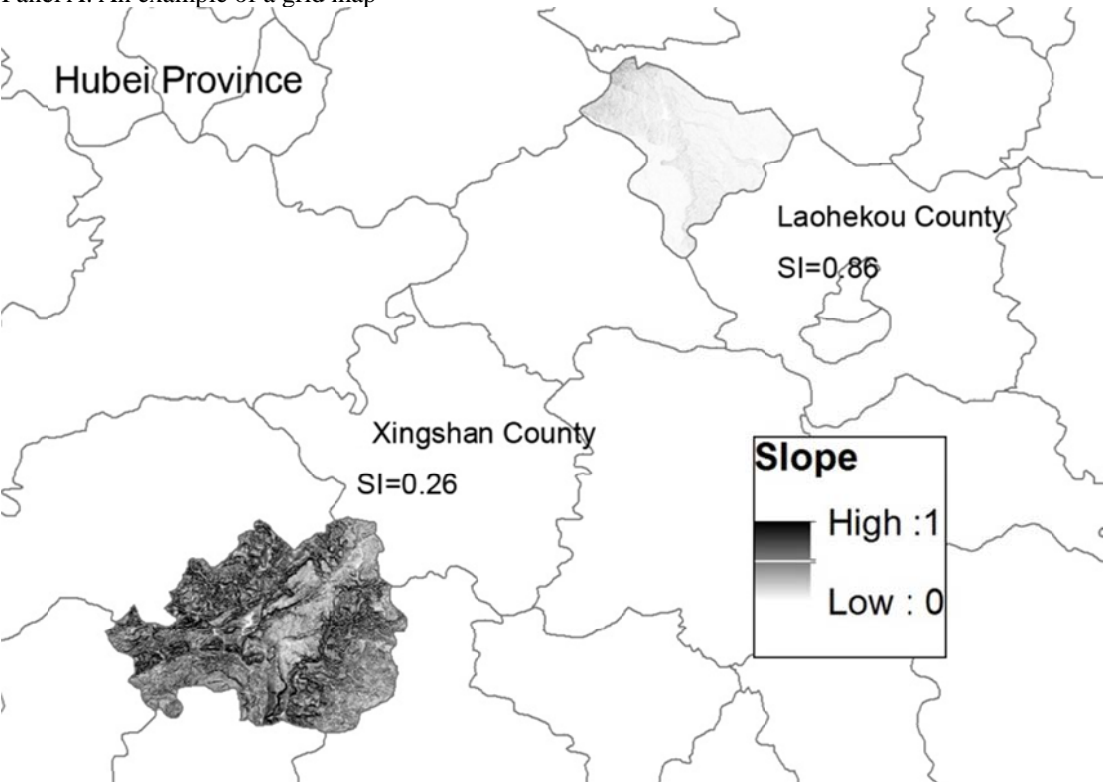
Figure A3 Construction of the Unsuitability Index (of the Instrumental Variable)

Panel A: An example of a grid map

Panel B: Examples of two sample counties with extremely high and extremely low unsuitability