What Can We Learn from Urbanization Policy:

Evidence from County-to-City Upgrading in China *

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Abstract

It has been argued in the literature that China is under-urbanized in large because of restrictions on migration. While the presence of migration barriers can help explain why existing cities fail to achieve their optimal size, it cannot explain the lack of cities. Although migration has become much easier over time, the number of cities in China has been rather stagnant. In this paper, we argue that lack of appropriate mechanisms of creating new cities is another reason of under-urbanization. Under China's hierarchical governance structure, the only way to create new cities is the centralized policy of upgrading existing counties or prefectures into cities. However, the implementation of the county-to-city upgrading policy was more complicated than thought in practice. Based on a county-level panel dataset, this paper shows that jurisdictions that were upgraded to cities prior to 1998 do not perform better relative to their counterparts that remain to be counties in terms of both economic growth and providing public services. The policy was retracted in 1997, freezing the number of county-level cities since then. This in turn contributes to the observed under-urbanization.

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1. Introduction

It has been argued in the literature that China is under-urbanized, both from the perspective of international comparison and judged by the efficiency standard.[1] One popular explanation is that China has various explicit and implicit restrictions on migration, which have delayed urban agglomeration (Au and Henderson, 2006a; 2006b).

However, migration has become much easier over time. In fact, many cities, especially small and medium ones, have loosened the household registration (*hukou*) system since the early 1990s (Rawski, 2003). The ease of migration should have helped the urbanization process. This suggests some other forces in play. We propose an alternative explanation for China's under-urbanization – the lack of a viable way of setting up new cities. In a democratic governance structure, cities will emerge and evolve in responding to the pressure of population growth and industrial agglomeration.[2] China has a hierarchical governance structure, under which neither the citizens nor the local governments have the discretionary power to create new cities. It is up to the central government to decide which jurisdictions can achieve the urban administrative status. Without a democratic governance structure in place at the local level, the central government is not willing to grant local governments the discretionary power to create cities for fear of losing control. However, in practice, a centralized process of awarding city status has proved to be more complicated than thought.

From 1983 to 1997, the central government granted city status to more than 400 counties and prefectures. Although the central government set some minimum requirements to regulate upgrading, these official requirements were not enforced in the practice of county-to-city upgrading (Li, 2007). Instead, the most important determinant of city status and the associated political and fiscal benefits was local economic growth rate. Thus, upgrading mainly serves as an incentive mechanism for local officials to develop the local economy. However, because the upgrading process

[1] Chan (1994), Zhang and Zhao (1998) describes in detail China's urban population and urbanization level. Zhou and Ma (2003) compare China's urbanization level with other countries. Sridhar and Wan (2007) find that China's urbanization rate is 10 percentage points lower than its industrialization level. Lu et al. (2007) use the fact that there is a great bulk of non-agriculturally employed people with dependents who are unable to live in cities to show that urbanization lags behind industrialization in a real sense. For international comparisons on urbanization level, see World Bank (2008b).

[2] For example, in the U.S., a new city could be created by adopting a home rule charter. While in Brazil, new municipalities are established through local voting.

is irreversible, once a city status being awarded, the role of using upgrading as an incentive instrument will not be applicable anymore.

Based on county-level data collected from a series of local public finance statistics and the China 1990 and 2000 Population Censuses, we compare the performance of newly upgraded cities with their counterparts that remain to be counties using difference-in-differences and propensity-score matching methods. Although fiscal revenue and the number of public employees increased more quickly in these newly established cities, the economic growth rates dropped from a high level to a normal level after upgrading. More importantly, these new cities did not perform any better than those non-upgraded counties in terms of educational achievement, public health outcomes, living conditions, and urban employment. In summary, the centralized system of city creation did not achieve the goal of promoting urbanization. In large because of these problems, the policy of "county-to-city upgrading" was called off in 1997. Since then, new cities only appear at the prefecture level and the total number of cities has remained rather stable (Figure 1). In this paper, we argue that not only is the size of existing cities depressed by the centralized system of city creation, but also the number of potential cities. Without a viable way of creating cities, the urbanization process would be slowed down, even with the relaxation of migration policy.

The relationship between urbanization and economic development is attracting increasing attention. The recent World Development Report emphasizes the necessity of increasing economic density, shortening economic distance and reducing economic division (World Bank, 2008b). Specific to China, Anderson and Ge (2005) and Chen and Fu (2006) study the size distribution and growth pattern of Chinese cities. Au and Henderson (2006a, 2006b) and He and Zhou (2006) try to estimate the optimal size of cities. Deng et al. (2008) examine the driving forces behind China's spatial urban expansion. However, none of these studies has investigated the causes of under urbanization from a political economy point of view. [3] Our study makes a contribution in this regard.

Unlike the decentralized fiscal system, the administrative and political systems have remained fairly centralized in China (Blanchard and Shleifer, 2001; Zhang, 2006). The hierarchical governance structure could create conflicts between economic

[3] See Henderson and Becker (2000) for a general discussion of the political economy of city sizes and formation.

development and underlying government institutions (North et al., 2008). For example, Luo and Zhang (2006) observe that there is almost zero elasticity between the size of local governments and the level of economic development. By relating governance structure and urbanization, this paper also sheds light on the political governance literature in the context of urbanization (see Yang, 2004).

The remainder of this paper is organized as follows. Section 2 introduces the background of granting city status in China and its incentive role. Section 3 describes the data and provides some descriptive analysis. Section 4 discusses the empirical strategy. Section 5 reports the results. Section 6 concludes.

2. County-to-city upgrading in China

There are mainly three levels of local administrative entities in China: province, prefecture (*diqu*), and county. At each level, jurisdictions are classified either in a normal form, or in a form with the name "city".[4] For example, a province and a Municipality Directly under the Central Government (*zhixiashi*) are both at the provincial level; a prefecture and a prefecture-level city are both at the prefecture level; a county and a county-level city are both at the county level. “Upgrading” thus refers to the reclassification from a county/prefecture into a city at the same level. In this paper, we focus on the county-to-city upgrading. After upgrading, an entire county is labeled “city”.[5] From 1983 to 1997, 430 county-level cities were established, and most of them were created through upgrading. Only 25 cities were created by separating out a relatively urbanized area from a county as a new government. Since 1983, nearly 15 percent of counties have obtained city status. By raising the number of cities and giving them more authority, the policy goal of upgrading is to speed up the economic growth and urbanization process. Furthermore, it intends to give local governments more leverage to provide better public services.[6]

The official rule to regulate county-to-city upgrading first appeared in 1983, when the demand for city status increased in the coastal provinces associated with rapid economic growth after economic reforms. Under some rough requirements proposed

[4] For a detailed description of the Chinese city system, see Chung (1999).
[5] Similarly, during the prefecture-to-city upgrading, the entire prefecture is labeled "city". From 1983 to 2001, more than 160 prefectures were upgraded to prefecture-level cities.
[6] In the “Report on the Sixth Five-Year Plan” made in 1982, Premier Zhao Ziyang states that “Except for special cases, the administrative power of enterprises should be decentralized to cities, bypassing the central ministries and provinces. We should change cities, especially big cities, into open, multi-functional, modern economic centers and form an economic network that is based on big cities while including surrounding small cities and towns.” (Available at http://www.people.com.cn/zgrdxw/zlk/rd/5jie/newfiles/e1170.html)

by the Ministry of Personnel and Ministry of Civil Affairs, nearly 100 counties received city status during 1983-1986. The number of cities continued to rise and the central government raised the minimum requirements for city status in 1986 and 1993, respectively. Table 1 summarizes the main minimum requirements on industrialization level, population engaged in nonagricultural activities, and fiscal strength announced in 1993. It is apparent from the table that the standard varies by population density. The entry barriers for counties with lower population density were set lower than those more densely populated counties.

As will be shown in the next section, these formal requirements are not enforced in practice. Many counties that meet none of these requirements nonetheless gained city status. In addition, the newly established cities did not perform any better in terms of economic development than their counterparts that remained to be counties. In fact, large-scale upgrading has masked China's true urbanization level (Zhang and Zhao, 1998; Zhou and Ma, 2003). In large because of these problems, the central government eventually stopped the policy of county-to-city upgrading in 1997, freezing all applications in hand without any public announcement until 2000. Since 1997, no new cities have been created at the county level and the total number of cities has remained stable (Figure 1).However, stopping the upgrading policy may slow down China's urbanization process by depressing the number of cities.[7]

A city status awards a locality many benefits as shown in Table 2. For example, a newly upgraded city is granted more quotas to convert land from agricultural to non-agricultural use. Local governments capture most of the rising land values after the land is reclassified (Ping, 2006). These lucrative benefits enable the central government to use upgrading as an effective incentives instrument to reward localities with higher economic growth (Li, 2007). The additional incentive consideration makes the process of granting city status more complicated than we normally thought. However, since upgrading is irreversible and it only provides a one-time incentive rewards to localities for their past economic performance, once granted, the role of city status as an incentive instrument will not be applicable anymore. Its long-term effects need to be examined.

[7] The governor of China's central bank, Zhou Xiaochuan, noted that "Ten or more years ago, the Chinese central government resisted urbanization, which the authorities thought was too rapid. This deserves to be on the list of 'bad ideas' because it ignores the importance of agglomeration efficiencies (World Bank, 2008a, p. 59)."

3. Data and descriptive analysis

Many of our outcome variables are from the two recent population censuses that were conducted in 1990 and 2000, respectively. Assembled at the county level, they provide rich information on education, health, migration, urbanization and employment in different sectors. Merging the two censuses together, we have a panel data set with observations in 1990 and 2000 (henceforth "census dataset"). Information on economic conditions and government activities, such as GDP, fiscal revenues and expenditures are from the annual series of *Public Finance Statistical Materials of Prefectures, Cities and Counties 1993-2004* (henceforth "public finance dataset"). Since it only starts in 1993, we drop cities that were upgraded before 1994 because we lack data in their pre-upgrading period.[8] We keep all counties in the sample as the control group. Jurisdictions that were counties before 1994, but got upgraded to cities during 1994-1997 form the treatment group (upgrading policy stopped in 1997).

We first check whether the requirements as outlined in Table 1 are strictly met in practice. As shown in Table 3, among the 99 cases of upgrading that took place during 1994-1997, only 6 meet all three requirements, 39 meet two, 30 meet only one, and 24 meet none. On the other hand, there are 36 counties that met all three requirements but were not upgraded. This clearly demonstrates that the official requirements are not strictly enforced in practice.[9] Given the large regional variation in development, it is important to know whether the degree of enforcement varies by region. To do this, we divide all counties into three geographical regions (coastal, central and western) and compare the degree of enforcement in Table 4. Two major findings emerge. First, despite only 3/5 of total number of counties in the western region, the coastal region has more than twice upgrading cases. This suggests that the upgrading quota is not distributed in proportion to the total number of counties in each region. Instead, economic growth might have played a key role in deciding upgrading. Second, non-enforcement seems to be ubiquitous, but it is more severe in the western region, suggesting that the chance of receiving a city status for counties in the under-developed provinces may exceeds what their economic performance deserves.[10] This is consistent with the fact that counties with lower population density, in particular in

[8] To estimate the propensity scores of getting an upgrade in year t, data in year t-1 is used.
[9] For a formal test on the non-enforcement of upgrading requirements, see Li (2007).
[10] Li (2007) provides more evidence that upgrading policy may be biased in favor of western provinces.

the western regions, were given lower upgrading requirements, suggesting that the central government has taken regional disparity into consideration in making upgrading decisions.

Most outcome variables from the public finance dataset are continuously available from 1994 to 2004. Table 5 lists the mean values for the treatment and control groups in 1994 and 2004, respectively. In total we have 1,537 counties and 99 cities being upgraded during 1994-1997. Growth rate is not listed in this table because we do not have a continuous measure from 1994 to 2004. While GDP data is not available before 1997, Gross value of industrial and agricultural output (GVIAO) is not available after 2000. Table 5 reveals several interesting observations. First, the number of public employees increases much more quickly in the cities relative to counties. Second, the increase in the share of productive expenditure (basic construction expenditure plus expenditure supporting agricultural production) in total public expenditure seems to be slower in cities. Third, cities have much more extra-budgetary revenues and land revenue than counties in 2004[11].

Table 6 lists the 1990 and 2000 mean values of variables from the census dataset. We restrict the sample to those that will appear in the empirical tests. In total, there are 95 cities and 1,001 counties.[12] It is apparent from the simple means that population with urban household registration, immigrants and employment in the manufacturing and service sectors grow faster in cities relative to counties. In contrast, for public service outcomes, such as education and crude death rate, there seems to be little difference in the change from 1990 to 2000 between cities and counties.

Because of the irreversible nature of city status, the role of city status as an incentive instrument will be abdicated once it is granted.[13] The weakening of incentive after upgrading could result in slowing growth. We use a graph to compare the average growth rate of cities with counties (Figure 2). Since GVIAO is not available after 2000, we use the growth rate of GDP to show the trend of 2000-2004.

[11] Extra-budgetary revenues consist of all resources managed by administrative branches of the government outside the normal budgetary process, such as various fees, charges, and revenues from land leasing. They are controlled by the local government and are not subject to treasury management or budgetary oversight (Wong and Bird, 2008).

[12] These observations are a subset of those appearing in Table 3. We drop those observations that lack of full information to estimate their propensity score of being upgraded to cities during 1994-1997.

[13] No city has been downgraded to a county so far.

It is easy to see that the growth rate of cities that were just upgraded dropped sharply after 1997 and became normal relative to counties in following years.

Figure 3 further depicts the trend of growth rate for jurisdictions that experienced upgrading. The sample of this graph is larger than the treatment group defined before. All the cities that were upgraded in as early as 1985 are included. Observations are re-grouped according to how long away they are from the year when upgrading occurred. While negative numbers on the horizontal axis represent years before upgrading (during which they were still counties), positive numbers mean years after a city status is awarded. It is apparent that in years right before and during upgrading, the average growth rate of these jurisdictions were at a high level; after upgrading, it started to drop; two years after upgrading, it fell below the national average. After that, the average growth rate returned to the national average and stayed around there. In sum, after receiving city status and the accompanied benefits, cities did not sustain a higher growth rate than counties. This figure also shows that counties that eventually got an upgrade were not born with higher growth rates. Instead, higher growth rates are closely associated with the opportunity of getting an upgrade, suggesting that incentives play an important role in explaining the fluctuation of growth rates before and after upgrading.

To explore the heterogeneity in the process of upgrading and examine the impact of initial conditions on performance, Figure 4 compares the average growth rate of cities that met at least two requirements with those that did not at the time of upgrading. It is not surprising to see that during the policy-affected period, meeting more requirements is positively correlated with higher growth. But after 1997, these two groups did not show much difference in terms of economic growth. Having an initial higher industrialization level and more urban population does not guarantee a higher growth later on.

The implementation of upgrading policy may vary over time. For example, local lobbying may become stronger over time, making it harder to enforce the requirement of upgrading. Thus, in addition to those that do not meet requirements, counties with less growth potential may also be upgraded. To look at whether the timing of upgrading matters to later economic performance, Figure 5 compares the average growth rate of cities that were upgraded during 1994-1995 and those during 1996-1997. No significant difference is observed in the figure. Instead, the growth rate of

both groups decreased after upgrading. In sum, all these figures display a common trend that a region's economic performance becomes lackluster after upgrading.

4. Empirical strategies

4.1 Difference-in-differences model

Assuming that cities and counties have a parallel time trend for outcome *Y*, then a straightforward way to estimate the effect of city status on *Y* is a difference-in-differences (DID) model,

$$(1)\ Y_{it} = \beta_0 + \beta_1 * Upgrade_i + \beta_2 * Post_t + \beta_3 * Upgrade_i * Post_t + \varepsilon_{it}$$

Where $Upgrade_i$ is a dummy for upgrading which equals to one if the county is upgraded to the city, otherwise equals to zero, $Post_t$ is a dummy for post-upgrading period which equals one for the years after the county is upgraded and zero otherwise, and the interaction term, $Upgrade_i * Post_t$, equal one for upgraded cities in their post-upgrading years. Since each upgrading case happens in different years, $Post_t$ varies across cities, and it is not even defined for counties. Thus, equation (1) needs to be modified before we can actually estimate the equation. We use a full set of year dummies to substitute $Post_t$. This, however, will not affect the definition of $Upgrade_i * Post_t$. So the actual empirical model is

$$(2)\ Y_{it} = \beta_0 + \beta_1 * Upgrade_i + \beta_2 * Year_t + \beta_3 * Upgrade_i * Post_t + \varepsilon_{it}$$

In equation (2), β_3 measures the average effect of city status on outcome Y_{it} after controlling for pre-upgrading differences. This model could be applied to evaluate outcomes from both the public finance dataset and the census dataset, as long as they are available in both pre- and post-upgrading periods. For the public finance dataset, since we have annual data from 1994 to 2004, we can decompose the average effect of city status into dynamic effects of post-upgrading years. To do this, we replace the $Upgrade_i * Post_t$ dummy with ten dummies: $Upgrade_i * Post0_t$, $Upgrade_i * Post1_t$, … , $Upgrade_i * Post9_t$. Among them, $Upgrade_i * Post0_t$ equals to one for cities in the year they were upgraded, $Upgrade_i * Post1_t$ equals to one for cities in the first year after upgrading, etc. The model is

$$(3)\ Y_{it} = \beta_0 + \beta_1 * Upgrade_i + \beta_2 * Year_t + (\beta_{30} * Upgrade_i * Post0_t + \beta_{31} * Upgrade_i * Post1_t + \ldots + \beta_{39} * Upgrade_i * Post9_t) + \varepsilon_{it}$$

where β_{30} measures the average effect of city status for the year of upgrading, β_{31} measures the average effect of city status for the first year after upgrading, etc. Equation (3) allows us to detect the time pattern of the effect, such as immediate vs. gradual and temporary vs. permanent.

4.2 Propensity score matching

Some important outcome variables are available only in post-upgrading years. For example, land revenue is available in 2000-2004 in the public finance dataset, and housing condition is only available in 2000 in the census dataset. For these outcomes, we cannot perform DID estimation. In order to control for the pre-upgrading differences between counties and cities, we use propensity score matching to evaluate the effect of city status (Rosenbaum and Rubin, 1983; Dehejia and Wahba, 1999, 2002). Based on the analysis on the determinants of upgrading in Li (2007), we use a logit model to estimate the propensity score of upgrading during 1994-1997

$$(4)\ \Pr(Upgrade_{it}=1) = \exp(\beta_0 + G_{it}\beta_1 + Z_{it}\beta_2) / (1+\exp(\beta_0 + G_{it}\beta_1 + Z_{it}\beta_2))$$

where *Upgrade* is dummy representing whether upgrading happens, *G* represents growth rate, and *Z* is a vector that includes lagged values of variables appearing in the upgrading requirements, such as urban population, industrial output and fiscal revenue.

Then we combine counties and cities with different observed characteristics but same propensity scores using matching. The matching estimator is

$$(5)\ \hat{\alpha}_{Matching} = \frac{1}{n} \sum_{i \in county \to city} \left\{ Y_i - \sum_{j \in county} W(i,j) Y_j \right\}$$

where *i* represents those that were upgraded from counties to cities during 1994-1997, *j* represents those that remain to be counties. The match for each upgrading case *i* is constructed as a weighted average over the outcome of control group – counties. The weight, $W(i,j)$, depends on the distance between the propensity scores for *i* and *j*. In this paper, we construct the weights using a kernel function that is standard in the literature (Smith and Todd, 2005).

4.3 Difference-in-differences propensity score matching

For outcomes from the census data and are available in both 1990 and 2000, we also conduct the difference-in-differences propensity score matching (Heckman et al., 1997; Heckman et al., 1998). The estimator is defined as

$$(6)\ \hat{\alpha}_{DID} = \frac{1}{n} \sum_{i \in county \to city} \left\{ (Y_{i,2000i} - Y_{i,1990}) - \sum_{j \in county} W(i,j)(Y_{j,2000} - Y_{j,1990}) \right\}$$

The difference of this DID propensity score matching estimator from the matching estimator in the previous subsection is that it allows for systematic differences between upgrading and non-upgrading outcomes after conditioning on observables. According to Smith and Todd (2005), DID matching estimator generally performs better than cross-sectional matching estimators. It is analogous to the standard DID regression estimator defined in Section 4.1, but it does not need to impose a linear functional form on the model and it re-weighs the observations according to the weights used by the matching estimators.

5. Results

5.1 Difference-in-differences estimation

Table 7 shows the DID estimation results based on equation (2). The outcome variables are from the public finance dataset, including growth rate, fiscal revenue, number of public employees, fiscal revenue per public employee, share of productive expenditure in total expenditure, and share of agricultural tax in total revenue.[14] Table 8 further decomposes the average effect into effects in different post-upgrading years based on equation (3).

Column (1) and (2) show the results for the growth rate of GVIAO of growth rate of GDP. Since GVIAO is not available after 2000, we can only decompose the post-upgrading effect into the 6th year after upgrading. GDP data is not available during 1993-1996, so we impute these values based on a linear approximation. [15] The results are consistent with what is shown in Figure 2 and 3 –growth rate decreases after a county was awarded city status.

Column (3) of Table 7 shows that the average effect of city status on fiscal revenue is positive, with a magnitude of about 15% of the average value. The decomposed effects shown in column (3) of Table 8 display an interesting dynamic

[14] It is possible that fiscal revenue and public employee follow log normal distributions, so that their log values are better dependent variables. We have conducted robustness checks using their log values as dependent variables and the findings are very similar. Since these variables are more meaningful in their levels, here we only report estimates using their levels as dependent variables.

[15] We regresses GDP on GVIAO and industrial output value using data from 1997 to 2000, when both GDP and gross output value are available. Based on the estimated coefficients, we compute GDP for early years. See Yao (2006) for detailed explanation.

pattern over time. The effect is negative in the first three years after upgrading and then become positive starting in the fourth year.

As Luo and Zhang (2006) point out, under the centralized governance structure in China, the size of local government is largely in proportion to local population, unless there is a change in the governance structure. Column (4) of these two tables confirms the effect of such a change. There is an immediate increase in the number of total public employees right after upgrading, and it continues to grow in the post-upgrading period. The average increase is as large as twenty percent relative to counties.

The increase in fiscal revenue and public employees is consistent with the fact that local governments gain more administrative independence and discretionary power through upgrading. Analogous to firm managers who maximize their control rights, local officials prefer a larger government. A city status provides local governments more discretionary power to expand government size.

Fiscal revenue per public employee is used to measure the fiscal dependent burden (Zhang, 2006). Lower fiscal revenue per public employee represents a weaker ability of the local government to support its employees, and thus a heavier fiscal dependent burden. With a huge increase in the size of public employees, it is interesting to know whether this burden becomes heavier after upgrading. In column (5) of Table 7, we do not find any significant difference in revenue per public employee between cities and counties. But once decomposed into different years (Table 8, column 5), it appears that the fiscal dependent burden actually becomes more severe in the first seven years after upgrading, suggesting that the expansion of the number of public employees overshadows the increase in revenue, at least in the short term.

Column (6) of both tables examines how the expenditure is distributed into productive investment in agriculture and basic construction. We label this part of expenditure "productive" and classify the remaining part as administrative costs of the government. The negative estimate suggests that cities spent a smaller proportion on this part. Again, this may be largely due to the quick expansion of government size that leads to the increase in administrative costs.

Finally, column (7) of both tables shows a negative effect of city status on the share of agricultural tax in the total revenue. This suggests that the focus of local

government has shifted away from agriculture. In sum, Table 7 and 8 are consistent with the proposition that a city status enables local governments to generate more revenues and inflate their size but does not guarantee a sustained high growth rate.

5.2 Propensity score matching results

The results for the logit estimation of the propensity score could be found in Li (2007). Figure 6 shows the histograms of the estimated propensity scores for counties (upper panel) and cities (lower panel). Following Smith and Todd (2005), we match on the odds ratio of propensity score, P/(1-P), rather than on the propensity score P itself, so that the estimates are robust to choice-based sampling. The histograms of the log odds ratio are shown in Figure 7. These two figures give us a graphical assessment of the extent of common support. It seems that the propensity scores have large overlap for cities and counties. In fact, only two cities do not have support in the counties, and they will be excluded in matching.

In order to check whether the conditioning variables used to construct propensity score in equation (4) satisfy the conditional independence assumption, we need to perform a balancing test. The general idea is to test whether or not there are differences in these variables between cities and counties after conditioning on the propensity score. In this paper, we follow Smith and Todd (2005) to conduct a regression-based balancing test for each conditioning variable. For example, for growth rate *G*, we run the following regression

$$(7)\quad \begin{aligned} G_{it} &= \beta_0 + \beta_1 \hat{P}_{it} + \beta_2 \hat{P}_{it}^2 + \beta_3 \hat{P}_{it}^3 \\ &+ \gamma_0 Upgrade_{it} + \gamma_1 Upgrade_{it} \hat{P}_{it} + \gamma_2 Upgrade_{it} \hat{P}_{it}^2 + \gamma_3 Upgrade_{it} \hat{P}_{it}^3 + \varepsilon_{it} \end{aligned}$$

where $\hat{P}$ is the estimated propensity score. Then we test H_0: $\gamma_0 = \gamma_1 = \gamma_2 = \gamma_3 = 0$. Failing to reject H_0 means that conditional on the polynomials of the propensity score, interactions of the treatment dummy with these polynomials have no additional impact on the conditioning variable. This suggests that the balancing condition is satisfied. The F-statistics for these tests are generally small, with p-values all above than 0.1, suggesting that we cannot reject H_0. In sum, both the histograms and the balancing tests indicate that the conditional independence assumption and common support conditions are satisfied.

In estimating the logit model (4) using data of 1994-1997, we obtain one propensity score for each jurisdiction-year observation. Thus, each county or city has multiple propensity scores. For a city, it is straightforward to keep the propensity score corresponding to the treatment (i.e., the year when it was upgraded). For a county, we keep propensity scores in all four years and treat them as independent control observations in the actual matching. This allows us to use all the information from the control group about the probability of receiving treatment in any of these years.

Table 9 shows the propensity score matching results for three variables that are available only in the post-upgrading period. The first variable, floor space per person, comes from the census dataset. The estimate is not significant, suggesting that cities do not outperform counties. The other two variables come from the public finance dataset.[16] We find that extra-budgetary revenues are significantly higher in cities relative to counties. Given that under a city status, local governments have more discretion over revenue collection, it is not surprising that they extract more revenues from sources out of the budget.

Another outcome variable is the revenue from land. According to Zhang et al. (2004) and Ping (2006), industrialization and urbanization have driven up the demand for land and dramatically increased land value since 1990s. Thus, local governments have a strong incentive to convert agricultural land into non-farm usage in order to generate more revenues. The result on land revenue shows that increased administrative authority brought by city status was indeed accompanying by more revenues from land.

5.3 Difference-in-differences propensity score matching results

For outcome variables from the census dataset, we perform a DID propensity score matching to estimate the effect of city status on the change of their values from 1990 to 2000. Together with the DID propensity score matching, we also perform a regression-adjusted matching, which controls for the same set of conditioning variables as in matching, but uses a linear functional form. To do this, we run an OLS regression of the difference between 2000 and 1990 values on the $Upgrade_i$ dummy and all the conditioning variables used to construct propensity score in logit model.

[16] The findings on extra-budgetary revenue and land revenue are also robust to the using of their log values as dependent variables.

Table 10 shows the estimated coefficients and corresponding t-ratios. The outcomes are grouped into four categories: public goods and services, urbanization, immigration, and employment. For level variables, we present the estimates on their log values.

In terms of the provision of public goods, we generally do not find much difference between counties and cities. The attending rate in secondary and above-level schools, the crude death rate, and the number of disabled population are not significant. In terms of (the reduction in) illiterate ratio, cities are doing even worse than counties, which could be caused by a low initial value.

For immigration indicators, the increase in the size of immigrants into cities is larger, but the ratio of immigrants in total population is not significant. Thus, the growth of immigrants in cities is mainly due to their big population base. The urbanization indicator, percentage of population with an urban household registration status (*hukou*), grows faster during 1990-2000 in cities. This reflects an expanded quota of urban household registration in cities. To shed light on the urbanization level, we need to examine the urban employment, especially those in the service sectors. We find significant results in the employment size of banking and insurance, real estate, health, education, and government sectors. However, in most other sectors such as manufacturing, construction, transportation and commerce, cities did not have a significantly larger increase in employment.

6. Conclusions

Using county-to-city upgrading as an example, this paper proposes an important reason for the under-urbanization in China – the lack of a viable way of creating cities. We employ several empirical methods to estimate the effect of city status, including difference-in-differences, propensity score matching, and difference-in-differences propensity score matching methods. Our results confirm the expansion of government revenue and public employees after localities achieve city status. However, economic growth rate falls in newly upgraded cities. Moreover, city status does not improve the provision of local public goods and services, and fails to generate an agglomeration effect in promoting urbanization. The reason could be lack of appropriate local government incentives after awarding city them status.

The upgrading policy was called off by the central government in 1997. Since then, no more county-level cities have been established. Tens of thousands of small towns below the level of county thus bear the responsibility of providing non-agricultural employment. Certainly, urbanization can occur in this way. But this type of urbanization may not be the best in terms of efficiency, equity and environment.

Without a viable way of creating cities, China's urbanization process has been slowed down. On one hand, making migration more convenient is a way of shortening economic distance and overcoming economic division (World Bank, 2008b). On the other hand, the central government should also reform the local governance structure to allow for a more natural emergence of new cities, which serves to increase economic density. The recent practice of allowing local governments to exchange some entitlements, such as staff quota of policy officers, between the developed and lagging regions, is one of such examples (Luo and Zhang, 2006). Given the strong need of urbanization, more indigenous institutional innovations are needed to figure out a viable way of creating cities, which also provides compatible incentives to local governments.

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Figure 1. Number of cities in China

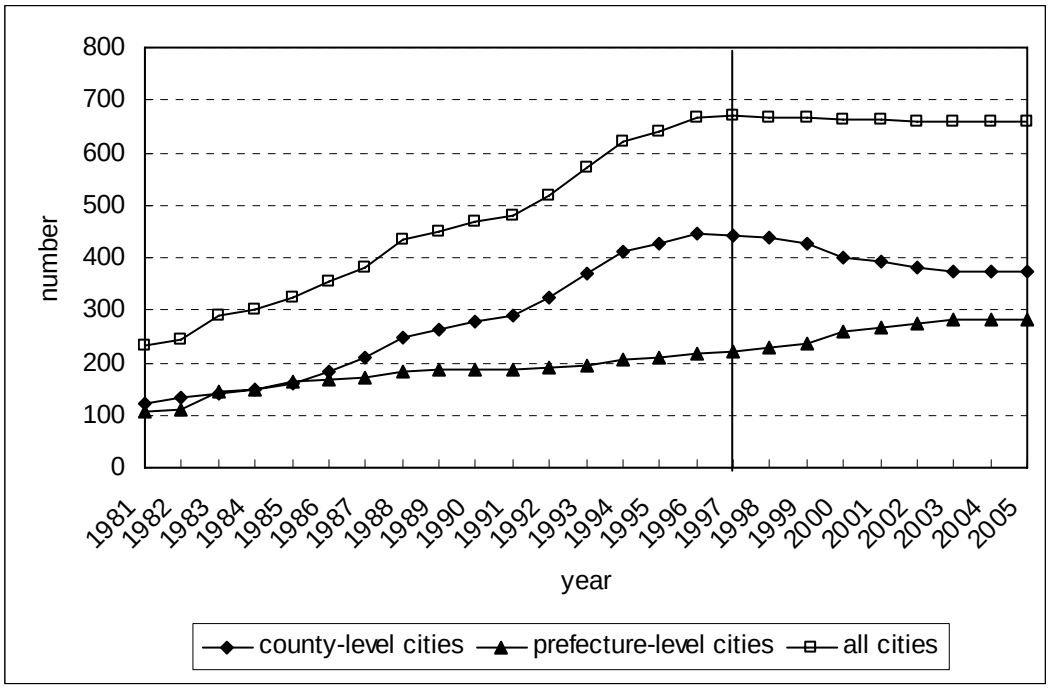
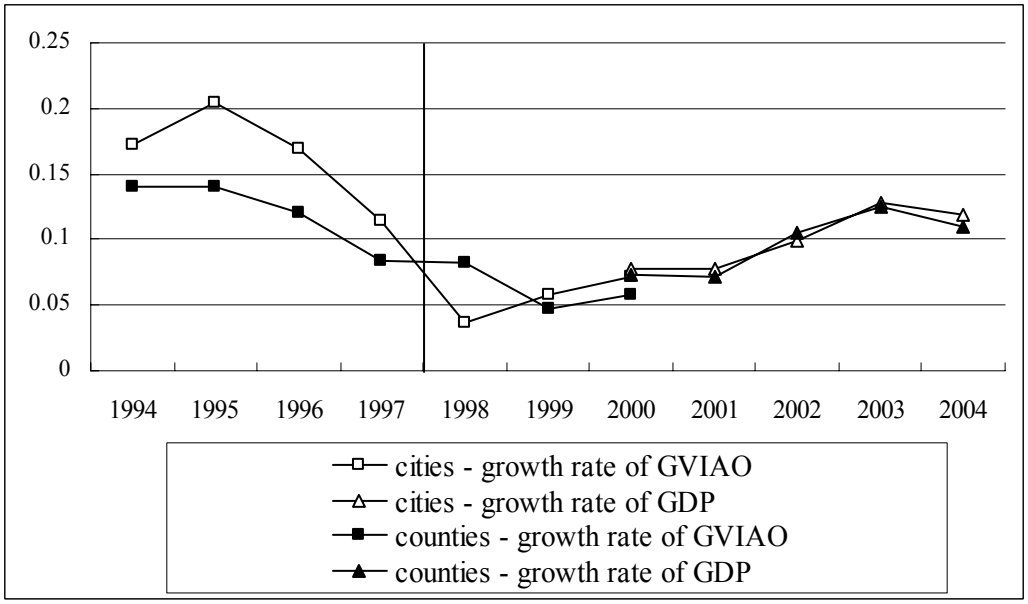


Figure 2. Comparison of growth rates: cities vs. counties

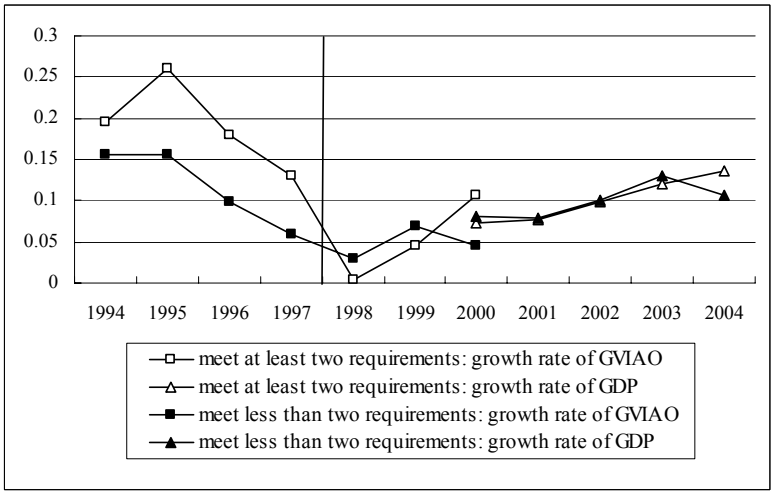


Note: This graph compares the average growth rate of the treatment group (jurisdictions those that were upgraded from counties to cities during 1994-1997) and the control group (counties). GVIAO means the gross value of industrial and agricultural output, which measures the total economic activity when GDP data is not available.

Figure 3. Growth rates of upgraded cities before and after upgrading

Note: The horizontal axis represents number of years since upgrading took place. "0" means the year of upgrading, "-1" means the year right before the upgrading year and "1" means the year right after.

Figure 4. Growth rates of upgraded cities by number of requirements



Note: This graph divides the jurisdictions that were upgraded to cities during 1994-1997 into two groups according to whether they met at least two minimum requirements of city status (see Table 1) at the time of upgrading. GVIAO means the gross value of industrial and agricultural output, which measures the total economic activity when GDP data is not available.

Figure 5. Growth rates of upgraded cities with different upgrading years

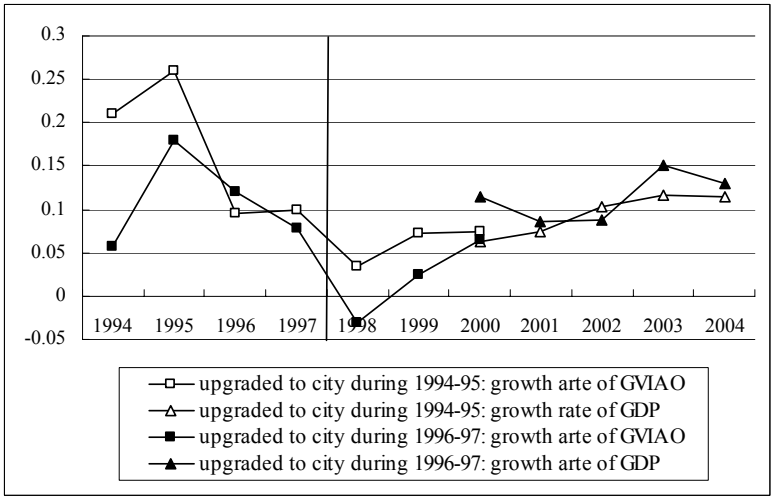


Figure 6. Histogram of propensity score

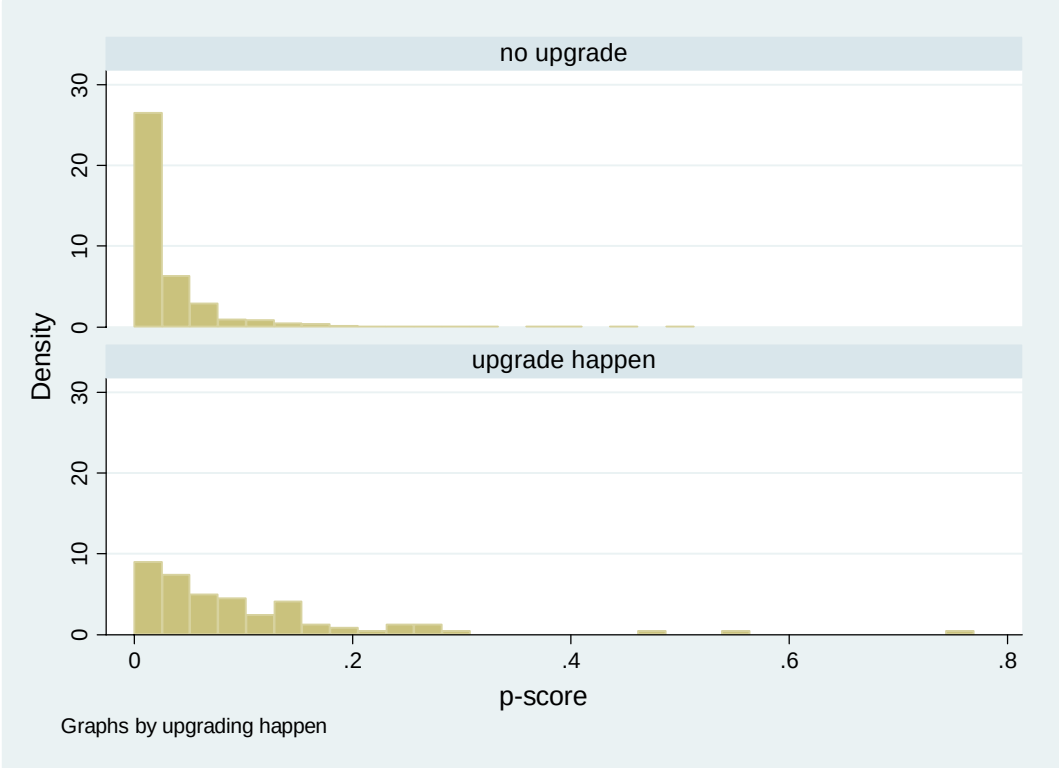


Figure 7. Histogram of log-odds ratio of propensity score

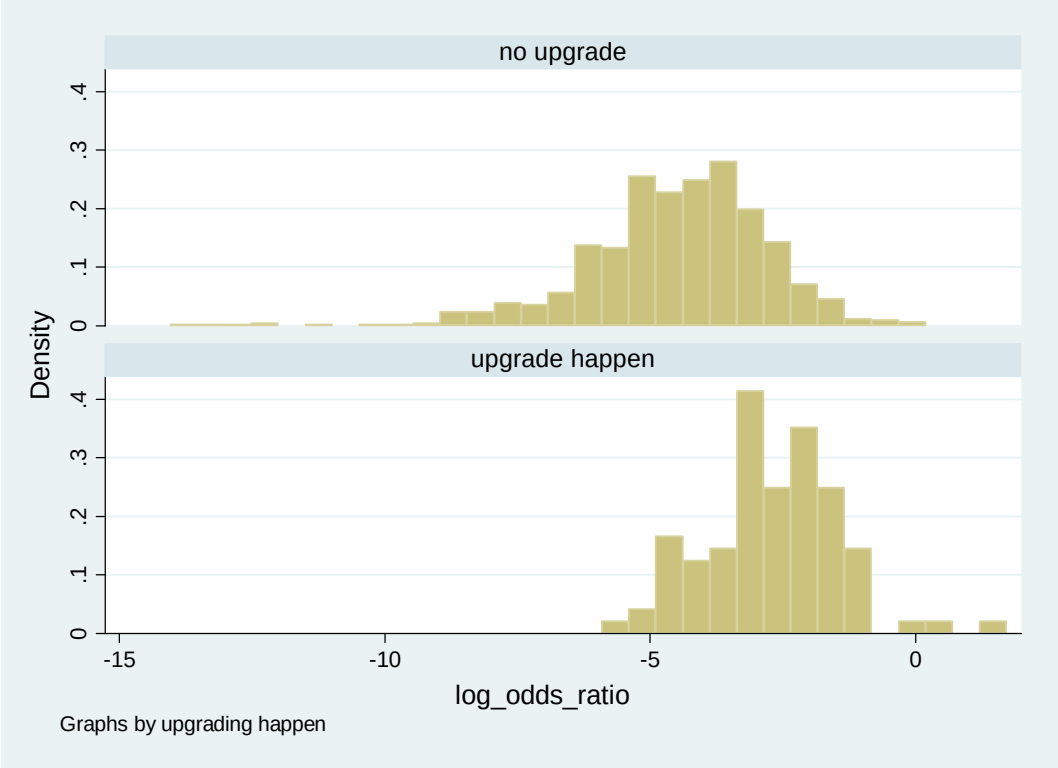


Table 1. Minimum requirements for county-to-city upgrading

Population density (person/km^2)		>400	100 - 400	<100
Percentage of counties in this category		25%	45%	30%
Industrialization level	Industrial output value (*yuan*)	1.5 billion	1.2 billion	0.8 billion
	Share of industrial output value in gross value of industrial and agricultural output	80%	70%	60%
Population engaged in nonagricultural activities	Size of urban population (engaged in non-agricultural production	150k	120k	100k
	Share of urban population in total population	30%	25%	20%
Fiscal strength	Fiscal revenue (*yuan*)	60 million	50 million	40 million
	Per capita fiscal revenue (*yuan*)	100	80	60

Source: "The Report on Adjusting the Criteria for the Designation of New Cities." Ministry of Civil Affairs, 1993. Available in English in Zhang and Zhao (1998).

Table 2. Benefits of being a city: an incomplete list

Category	Benefits	Source
Tax and fee	Cities enjoy a higher urban construction tax (7% compared to 5% for counties); could collect the surcharges levied on the issuing of motorcycle registration. In Liaoning province, cities could get 1 to 2 million yuan additional subsidies each year after upgrading.	Chung and Lam (2004) Zhang and Zhao (1998)
Land transfer	Cities generally convert more land to non-farm use and retain larger share of revenue from land sale.	Zhang (2006) Ping (2006)
Favorable policy	After achieving the status of "line item under province" (*Shengji Jihua Danlie*), cities could report directly to the provincial administration to ask for investment project	Su (2000) Zhang and Zhao (1998)
Administrative power	Cities have more authority on foreign trade and exchange management; gains authority over police recruitment and vehicle administration; could establish the branch of custom and large State-Owned banks; could approve projects with higher cap of investment.	Chung and Lam (2004) Du (1993)
Government size	Cities could establish more branches of government and have a larger size of government employees	Ren and Wang (1999)
Rank and salary	Sometimes the bureaucratic rank and salary of officials are raised after upgrading.	Liu (2005)
Reputation	Cities generally carry greater prestige and are more attractive to investors from outside.	Gu (1997) Chung and Lam (2004) Wang et al. (1998)

Note: Given the volatility of Chinese policies, the benefits are continuously changing overtime, and benefits listed are not necessarily effective during the same period.

Table 3. Number of county-year observations by upgrading status and number of requirements satisfied (1994-1997)

Number of requirements satisfied	total	0	1	2	3
Non-upgrading cases	6,395	4,583	1,313	463	36
Upgrading cases	99	24	30	39	6

Table 4. Number of upgrading cases that satisfied each requirement by region

Region	Total cases	Industrial level		Urban population		Fiscal strength	
		Yes	No	Yes	No	Yes	No
Coastal	49	31	18	34	15	8	41
Central	30	15	15	14	16	5	25
Western	20	5	15	11	9	3	17

Table 5. Mean value of variables from public finance dataset

	treatment group: city		control group: county	
N	99		1537	
Year	1994	2004	1994	2004
Fiscal revenue (10,000 RMB)	6,355	15,720	2,358	5,683
Public employee	13,112	17,263	9,010	1,1847
Public employee per 100 people	2.2	2.8	2.8	3.5
Fiscal revenue per public employee (10,000 RMB / person)	0.49	0.98	0.25	0.49
Industrial and business tax (10,000 RMB)	6,522	9,337	2,294	3,470
Industrial and business tax rate	5.11%	4.63%	7.83%	7.18%
Agricultural tax rate	3.20%	3.30%	2.80%	3.10%
Share of agricultural tax in total revenue	27.3%	18.5%	37.2%	26.5%
Productive expenditure per capita (RMB)	22.7	76.8	188.4	126.8
Share of productive expenditure in total expenditure	8.36%	9.07%	7.97%	10.96%
Extra-budgetary revenues (10,000 RMB)		3,373		1,049
Revenue from land (10,000 RMB)		1,465		542

Note: All the output and revenue measures have been adjusted to 1993 constant prices using the annual GDP deflator.

Table 6. Mean value of variables from population census dataset

	treatment group: city		control group: county	
N	95		1001	
year	1990	2000	1990	2000
population (1,000 people)				
Total	629	658	412	421
> 6 yrs	555	615	360	393
> 15 yrs	455	502	292	320
Educational achievement				
% illiterate (among > 15yrs)	19.7%	8.1%	24.9%	11.2%
% illiterate (male, among > 15yrs)	10.6%	3.9%	15.4%	6.5%
% illiterate (female, among > 15yrs)	29.2%	12.4%	35.0%	16.1%
% illiterate (among > 6yrs)	18.2%	8.7%	22.9%	11.6%
% primary (among >6yrs)	44.8%	40.5%	44.4%	41.6%
% middle school (among >6yrs)	28.2%	38.3%	24.9%	35.7%
% high school (among >6yrs)	8.1%	10.5%	7.3%	9.3%
% above secondary(among >6yrs)	0.7%	2.0%	0.6%	1.8%
Health condition				
# of children born alive per woman	2.15	1.42	2.25	1.49
# of surviving children per woman	2.02	1.40	2.07	1.45
Crude death rate (deaths per 1000)	6.16	6.18	6.47	6.27
disabled population	16.6k	21.9k	11.6k	14.5k
disability rate	3.7%	4.3%	4.0%	4.5%
Living condition				
floor space per person (sq. meters)		24.4		22.4
Urbanization				
% with urban household registration	14.7%	19.8%	13.1%	16.1%
Immigration				
total immigrants (1,000 people)	12.4	57.1	6.5	23.1
immigrants from other province	4.7	18.4	2.3	4.7
immigrants / total population	2.49%	9.24%	2.25%	6.89%
Total employment rate (among >15yrs)	78.5%	79.8%	78.9%	82.4%
by occupation:				
technician	3.5%	3.4%	3.5%	3.4%
government agencies	1.1%	1.0%	1.0%	0.9%
office workers	1.1%	1.7%	1.1%	1.4%
sales and service	4.2%	6.1%	2.9%	4.5%
agriculture	56.3%	46.5%	63.1%	55.9%
production	12.3%	12.0%	7.3%	7.3%
Employment size by sector (1,000 people)				
agriculture	275	237	197	183
mining and quarrying	5.1	3.7	2.3	1.8
manufacturing	39.7	50.9	13	15.5
electric, gas, water supply	1.25	1.87	0.57	0.92
construction	5.5	11.3	1.98	4.3
geology and water	0.63	0.37	0.36	0.21
transportation and storage	5.8	8.8	2.8	4.3
commerce	12.7	21.3	6.2	10
banking and insurance	0.95	1.48	0.57	0.78
real estate	0.32	0.29	0.14	0.12
social service	1.70	5.70	0.86	2.50
health, sports	2.10	3.10	1.30	1.78
education and culture	6.69	7.82	4.40	4.84
research	0.18	0.18	0.09	0.10
government	5.19	6.89	3.32	4.20

Table 7. Difference-in-differences estimation results

	GVIAO growth rate	GDP growth rate	Fiscal revenue	Public employee	Fiscal revenue per public employee	Productive expenditure share	Agricultural tax share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Upgrade	0.025	0.025	6,023***	3,600***	0.406***	1.487**	-0.068***
	(0.027)	(0.021)	(909)	(615)	(0.077)	(0.734)	(0.014)
Upgrade *Post	-0.027	-0.018	761*	1896***	-0.073	-2.862***	-0.047***
	(0.030)	(0.022)	(390)	(457)	(0.058)	(0.777)	(0.016)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.015	0.017	0.14	0.06	0.11	0.07	0.17
Obs	11,183	16,312	20,215	20,195	20,190	11,412	19,985

Note: Standard errors clustered at the prefecture level are in the parenthesis. Significance levels of 10%, 5% and 1% are represented by *, ** and ***.

Table 8. Difference-in-differences estimation results after decomposition

	GVIAO growth rate	GDP growth rate	Fiscal revenue	Public employee	Fiscal revenue per public employee	Productive expenditure share	Agricultural tax share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Upgrade	0.025	0.025	6,023***	3,600***	0.406***	1.487**	-0.068***
	(0.027)	(0.021)	(908)	(615)	(0.077)	(0.739)	(0.014)
Upgrade *Post0	.0023	0.031	-1,688***	944***	-0.173***	-1.643***	-0.049***
	(0.034)	(0.029)	(515)	(313)	(0.067)	(0.596)	(0.015)
Upgrade *Post1	-0.012	0.039	-1,381***	805**	-0.160**	-2.663***	-0.072***
	(0.036)	(0.031)	(488)	(404)	(0.067)	(0.684)	(0.016)
Upgrade *Post2	-0.12**	-0.11**	-1,352**	1,537***	-0.178***	-2.228***	-0.069***
	(0.052)	(0.045)	(654)	(419)	(0.063)	(0.815)	(0.019)
Upgrade *Post3	-0.054	-0.040	-385	1,968***	-0.151**	-2.358***	-0.061***
	(0.039)	(0.032)	(440)	(478)	(0.059)	(0.805)	(0.019)
Upgrade *Post4	0.012	-0.021	331	2,015***	-0.112**	-2.635***	-0.052***
	(0.044)	(0.032)	(432)	(470)	(0.048)	(0.860)	(0.017)
Upgrade *Post5	-0.019	0.002	688	1,977***	-0.073	-3.156***	-0.028*
	(0.054)	(0.027)	(831)	(492)	(0.064)	(0.937)	(0.017)
Upgrade *Post6		-0.041*	1,704*	1,924***	-0.027	-3.160***	-0.036**
		(0.023)	(941)	(525)	(0.061)	(0.918)	(0.015)
Upgrade *Post7		-0.018	2,321**	2,164***	0.029	-3.461***	-0.028*
		(0.022)	(1055)	(587)	(0.069)	(1.006)	(0.017)
Upgrade *Post8		-0.024	2,673**	1,954***	0.065	-3.163***	-0.044**
		(0.024)	(1115)	(614)	(0.080)	(1.029)	(0.020)
Upgrade *Post9		-0.022	4,060***	3,422***	0.059	-3.950***	-0.046*
		(0.031)	(1503)	(928)	(0.078)	(1.075)	(0.027)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.016	0.020	0.15	0.06	0.11	0.07	0.17
Obs	11,183	16,312	20,215	20,195	20,190	11,412	19,985

Note: Standard errors clustered at the prefecture level are in the parenthesis. Significance levels of 10%, 5% and 1% are represented by *, ** and ***.

Table 9. Propensity score matching results

	Coefficient	t-ratio
Floor space per person in 2000	0.296	0.37
Extra-budgetary revenues (1999-2004)	970	6.0
Revenue from land (2000-2004)	333	2.4

Table 10. Difference-in-differences propensity score matching estimation

	difference-in-differences (regression-adjusted matching)		difference-in-differences propensity score matching	
	coefficient	t-ratio	coefficient	t-ratio
Public goods and services				
Illiterate ratio (above 15yrs)	0.00525	0.81	0.0155	2.71***
Ratio of attending secondary and above education (among > 6yrs)	-0.00086	0.58	-0.00026	0.14
Crude death rate	0.01	0.11	0.1	1.16
Log(disabled population)	0.020	0.66	0.039	1.43
Disability rate	-0.00102	0.86	0.00037	0.33
Urbanization				
Urban population ratio	0.0048	1.15	0.0104	1.76*
Immigration				
Log(total immigrants)	0.111	1.79*	0.127	2.01**
Log(immigrants from other province)	0.223	2.45**	0.195	2.09**
Ratio of immigrants in population	0.00579	1.34	0.00477	0.79
Employment				
Percentage employed	0.0158	1.06	-0.00253	0.18
Percentage of people working in office	0.00074	1.36	0.00079	1.32
Percentage of people working in sales or service	0.00011	0.08	0.00054	0.33
Percentage of people working as farmers	-0.00096	0.11	-0.0139	1.51
Employment size by sector (1,000)				
Log(employment in agriculture)	-0.029	1.31	-0.044	1.55
Log(employment in mining)	-0.22	1.64*	-0.11	0.99
Log(employment in manufacturing)	0.069	1.26	0.066	1.24
Log(employment in electricity and water supply)	-0.063	1.06	-0.070	1.27
Log(employment in construction)	-0.026	0.30	0.025	0.29
Log(employment in geology)	0.14	1.19	0.056	0.45
Log(employment in transportation and storage)	-0.014	0.30	0.026	0.60
Log(employment in commerce)	0.006	0.17	0.018	0.48
Log(employment in banking and insurance)	0.034	1.4	0.087	2.8***
Log(employment in real estate)	0.21	2.1**	0.089	1.05
Log(employment in social service)	0.036	0.68	0.055	1.14
Log(employment in health and sports)	0.071	2.5***	0.102	4.1***
Log(employment in education and culture)	0.027	1.0	0.057	2.83***
Log(employment in research)	-0.015	0.13	-0.077	0.67
Log(employment in government)	0.067	2.14**	0.092	3.02***

Note: Significance levels of 10%, 5% and 1% are represented by *, ** and ***.