Using Land to Promote Urban Economic Growth in China

by

Chengri Ding and Erik Lichtenberg

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Department of Agricultural and Resource Economics
The University of Maryland, College Park

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Chengri Ding
Department of Urban Studies and National Center for Smart Growth
University of Maryland
College Park, MD 20742

and

Erik Lichtenberg
Department of Agricultural and Resource Economics
University of Maryland
College Park, MD 20742

Abstract

This paper investigates the economic incentives for urban spatial expansion in China by estimating the value of urban land using an econometric model applied to data from the 220 largest Chinese cities for the period 1996-2003. The results are consistent with the proposition that the rapid rate of urban spatial expansion resulted from a combination of fiscal pressure on local governments and governance reforms that gave local governments greater control over land and investment policies. The estimated parameters of the model indicate that urban land generates far more than income per unit area than agriculture in eastern and central China, suggesting that local governments can profit substantially from conversion of farmland to urban use. The value of urban land in those regions increased in the period after 1999, an outcome that could be attributable to increased demand for land to accommodate economic growth, delayed development of land set aside speculatively into economic/industrial development zones, and/or implementation of stricter administrative controls on farmland conversion that restricted the supply of land for urban uses. Urban land appeared to have a low economic value in western China, a region that, taken as a whole, has lagged in terms of economic growth. The estimated parameters of the model are consistent with findings of previous studies regarding returns on foreign direct investment, domestic Chinese investment, and labor productivity.

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1. Introduction

China has been urbanizing rapidly—as, indeed, one would expect in a country experiencing rapid industrialization and economic growth. Between 1978 and 2004, while China's GDP was growing at an average annual rate of 9.4 percent in total and 8.1 percent per capita, the urban share of China's population increased to from 18 percent to 42 percent. China cities have expanded spatially almost as rapidly as the country has grown economically: Between 1986 and 2003, urbanized land grew from10,161 km^2 to 28,308 km^2, an annual average growth rate of about 6 percent, almost double the average annual rate of population growth of 3.15 percent (China Statistical Yearbook, various years).

As these latter figures suggest, urban growth in China has been characterized by a bias toward suburbanization, that is, expansion into the surrounding countryside (Zhou and Ma 2000). Case studies of Shanghai, Beijing, Guangzhou, Guangdong, and other cities have documented this preference for spatial expansion over redevelopment of the existing urban core to higher density uses (Wu and Yeh 1997, Wu 1998, Gaubatz 1999, Yeh and Li 1999, Fu et al. 1999, Lin 2001, Cartier 2001, Wu 2002a, Xu 2003, Tan et al. 2005, Lin 2007). This bias toward spatial expansion can be attributed to forces unleashed by a series of economic and political reforms. While nominally subject to the strictures of urban planning guidelines promulgated by the central government, land allocation decisions are increasingly driven by political-economic incentives facing municipal government and Communist Party officials (often one and the same persons). Land is a major source of political and economic power; decentralization reforms of the 1990s devolved much of that power in the hands of local governments (Wu and Yeh 1997, 1999; Hsing 2006 Li and Zhou 2005; Lin and Ho 2005; Lin 2001, 2007). Under China's system of public

land ownership, acquisition of rural land for urban growth is under the sole control of municipal officials while control over existing urban land is not (Hsing 2006, Ho and Lin 2003). Acquisition of new land for urban expansion is also less costly than redevelopment of the existing urban core (Hsing 1999, Ho and Lin 2003, Fu et al. 1999, Zhou and Ma 2000, Ding 2003, Lin 2007).

How large are the gains from urban land expansion? Information on land values is highly fragmentary. Data on real estate transactions are available only for a few cities and only for a few select years, making it impossible to assess the contribution of land to the urban economy (and hence the strength of incentives for urban spatial expansion) in any systematic fashion. Given the lack of direct information on real estate prices, this paper attempts to obtain systematic estimates of the value of urban land in China using an econometric model of the contribution of land to economic growth in the 220 largest Chinese cities over the period 1996-2003. The paper begins with a brief description of China's allocation system (Section 2) and then discusses the incentives for urban spatial expansion generated by that institutional and legal framework for acquiring land for urban growth, with an emphasis on the impacts of economic and political reforms (Section 3). Section 4 discusses the conceptual framework underlying the econometric model, the specification of the model, and data used in this analysis. Section 5 presents the estimation results and discusses their implications. Section 6 concludes.

2. Institutional and Legal Framework of Land Allocation in China

Changes in the institutional and legal framework governing land were a key component of China's economic reforms. All land in China is publicly owned. During the 1980s, China implemented two key reforms to provide land for expanding private sector activity. First, it set aside land in economic development zones and industrial development zones to provide space

for foreign direct investment and other private sector economic activity. Enterprises in these zones were granted tax exemptions and readier access to credit in addition to land. Second, based on the experience of Hong Kong, China developed a system of long-term leases for use-rights that gave private investors secure tenure and control over land, albeit for a limited period of time.

These institutional innovations accommodated expanding private sector utilization of land while maintaining fundamental public ownership (Ho and Lin 2003; Lin and Ho 2005; Zhu 2005, 2006). Public ownership dominates primary land use allocations. Land in cities, infrastructure, and mineral sites belongs to the state. Some of that land is allocated directly to schools, infrastructure, and other public uses. Some is controlled by state-owned enterprises under grants made primarily during the pre-reform period. The bulk, however, is under the control of local officials, subject to some oversight by higher level officials at the prefectural, provincial, and central government levels.

Rural land belongs to and is administered by village collectives, again subject to oversight by higher level government bodies. These village collectives have authority to allocate land for limited kinds of housing, public works, and village enterprises in addition to agriculture. Allocation of rural land to uses other than the limited kinds designated for rural land requires conversion from ownership by the collective to state ownership. Thus, development of land for most residential, commercial, and industrial uses is allowed only after a change in ownership status, accomplished by a requisition of rural land by urban government officials.

Urban spatial expansion, then, requires conversion of land status. The first step involved in converting land from rural to urban use is a process of requisition in which ownership is changed from collective to state land. Compensation is required. Since there are no markets for

rural land, the Land Administration Law established an administrative formula for determining compensation for farmers whose land is requisitioned. The compensation package is based largely on agricultural productivity and includes payments for land, crops currently under cultivation, attachments to land, and land improvements plus subsidies for resettlement. Farmland that has been requisitioned and converted to urban status may be set aside in economic/industrial development zones. Alternatively, local officials may lease it out use rights to that land to private entities under long term (40-70 year) contracts in a system modeled after Hong Kong's that separates ownership from use rights. Transactions in this secondary market involve payment of an up-front conveyance fee, which is set by negotiation, public tender, or auction (Ding 2007).

Urban expansion into the countryside has created problems ranging from traffic congestion and pollution due to urban sprawl to social unrest in rural villages and central government concerns about food security due to farmland loss. Alarmed over the rapid rate at which agricultural land was being requisitioned for urban uses, especially in the fast-growing coastal areas that contain the most productive farmland (and have experienced the most social unrest in the countryside), the central government imposed strict administrative controls designed to protect farmland and slow down land conversion (Lichtenberg and Ding 2008). One such measure requires each jurisdiction to designate a fixed share of its agricultural land as basic farmland, whose conversion into urban uses is prohibited without explicit permission or approval from the state council. A second measure is the so-called dynamic balance (no net loss) policy, which requires that any conversion of farmland to urban uses be exactly offset by conversion or reclamation of other land to agricultural use. These measures are implemented via a process in which governments of provinces, cities, counties, and townships develop land use plans

documenting farmland protection targets, land conversion quotas, and amounts and locations of land that will be designated as basic farmland. According to the 1998 Land Administration Law, these plans must be approved by higher level of governments (i.e., municipal land use plans must be approved by provincial governments while provincial land use plans must be approved by the State Council).

Despite the legal and administrative safeguards established by the Land Administration Law, conversion of farmland to urban uses has continued to be rapid. Between 1998 and 2004, the area of China's 220 largest cities expanded at an average annual rate of 2.6 percent, compared to 4.1 percent during 1996-1998. During 2000-2001, for example, three quarters of the land used for urban expansion was obtained through farmland acquisition while over half of urban construction occurred on converted farmland (Investigating Group of Land Acquisition Reform of Ministry of Land and Resources 2003). The area occupied by China's 220 largest cities was almost one-fourth larger in 2004 than in 1996.

3. Decentralization, Fiscal Reforms, and Urban Spatial Expansion

The rapid rate at which China's cities have expanded into the countryside—and the apparent limited effectiveness of stringent regulations aimed at curbing this process—can be attributed to a series of political and economic reforms made to effect a transition from a planned to a market economy. Beginning in the mid-1980s, China decentralized its fiscal system, substituting taxation for remittance of enterprise profits. At the same time, the central government devolved authority for investment decisions and growth management at the local level to local governments. These reforms have given rise to what some have termed the "local developmental state", referring to local governments that actively promote both public and private investments aimed at achieving greater economic growth (Zhu 2005).

Promoting economic growth is among the highest priorities of the Chinese government, which counts on a rising standard of living generated by growth to ensure social stability and strengthen the nation. Industrial development is widely seen as the key to economic growth and a rising standard of living for municipalities as well as for the nation as a whole. Performance in fostering economic growth is thus a key to advancement for local officials (Li and Zhou 2005). Local government investment activity also gives officials access to sources of wealth and power within their local communities (Hsing 2006).

Land plays an essential role in the promotion of economic growth. Land is of course necessary to accommodate economic growth by providing space for expanded economic activity. The availability of land for both private investment and public infrastructure development thus has a direct effect on the rate of economic growth. Also important in the Chinese case is the prospect that the provision of land may be a means of attracting new investment that would otherwise have located elsewhere, either in China or abroad. In other words, local officials in China may view the provision of land as an accelerant rather than a means of simply accommodating economic growth or as a means of competing against other localities for outside investment. Newly-created economic development zones have been popular means of attempting to use land to spur investment for local officials and for the provincial and state level officials overseeing them (Cai 2003, Ho and Lin 2004).[1]

[1] Such behavior is hardly unique to China. In the United States, for instance, it is not uncommon for state and local governments to offer packages of tax exemptions and infrastructure development (and, in some cases, exercise of eminent domain) in order to attract major industrial or commercial investments investment. Most empirical evidence about the effectiveness of these strategies is fragmentary and anecdotal; the few econometric studies that exist for the United States suggest that these incentive packages may not have much influence on firms' location decisions (Edmiston and Turnbull 2003). There is evidence suggesting that provision of land is frequently ineffective as an attractor for investment in China as well. For example, by 1996 there were roughly 116,000 hectares of idle undeveloped land in economic development zones (Cai 2003, Ho and Lin 2004). In 2004, China's Ministry of Land and Resources found that 70

The process of decentralization begun in the mid-1980s essentially placed Chinese local officials in the role of land developers. Additional fiscal reforms introduced in the mid-1990s increased pressure on local officials to exploit that role. Prior to 1993, the central government ran small but persistent budget deficits while provincial and local governments ran small but persistent surpluses (Figure 1). In 1993 and 1994, the central government introduced fiscal and tax reforms designed to increase tax revenues as a share of the economy, to increase the central government's share of tax revenues, and to eliminate distortions and improve transparency in tax structure (Wong and Bhattasali 2003, Zhang and Martinez-Vazquez 2003, Zhang and Liu 2003). Government revenues as a share of GPD had fallen steadily in the years following the introduction of economic reforms in the late 1970s, dropping from 24.5 percent in 1980 to 10.7 percent in 1995. The reforms of the mid-1990s increased the central government's share of tax revenues (from 22 percent in 1993 to 56 percent in 2001) at the expense of provincial and local governments (Zhang and Martinez-Vazquez 2003, Wong and Bhattasali 2003).

While these reforms reduced provincial and local governments' tax revenues, they did not alter their expenditure obligations nor did they lessen the pressure on local governments to invest in infrastructure and otherwise promote economic growth. As a result, provincial and local governments have experienced large and growing fiscal deficits while the central government has experienced large and growing surpluses (Figure 1). In 1993, provincial and local governments ran a surplus of 6.1 billion RMB. By 2003, they were running a deficit of 738 billion in 2003 (Xie, Long, and Ding 2005). That deficit has been growing at an annual rate of about 17.5 percent.

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percent of the 6866 locations set aside for industrial or economic development zones contained land that was either acquired illegally or remained vacant. Over 13 million hectares—almost 65 percent of the land planned for these development zones—was ordered returned to agricultural use (Cao 2004, Lin 2007).

Local officials have increasingly turned to land transactions as a means of financing both investment and the provision of public services. The requisition process is structured in a way that lets local governments capture the rents from converting rural land to urban use. While compensation must be paid for farmland requisitioned for conversion to urban use, that compensation tends to be much lower than the conveyance fees local governments receive as up-front payments for use-right leases, at least in rapidly growing urban areas. Anecdotal evidence suggests that conveyance fees are frequently 10-20 times farmland compensation. For example, land compensation and resettlement subsidies in the Jianggan district of Hangzhou were 120,000 RMB per *mu* from 1997 to 1999 and 160,000 RMB per *mu* after 1999, compared to conveyance fees for land use rights for housing projects averaging 2-4 million RMB per *mu* (Xu 2003). In 1992, the Pudong Development Commission paid farmers 20,000 RMB per *mu* and then resold the land to developers and investors for at least 300,000 RMB per *mu* (Chen 2002). In one village in Fujian province, the local government paid about 10,000 RMB per *mu* to farmers for land that was subsequently leased to private sector developers in return for conveyance fees for 200,000 RMB per *mu* if zoned industrial and over 750,000 RMB per *mu* if zoned residential (Investigating Group of Land Acquisition Reform of Ministry of Land and Resources 2003).[2]

The same profit opportunities are not usually available for redevelopment of existing urban land. A considerable share of existing urban land belongs to state-owned enterprises that prefer to appropriate the gains from redevelopment themselves rather than share them with municipal officials (Hsing 2006). Redevelopment of existing urban land under local government control tends to be quite expensive: The costs of resettling and compensating existing tenants usually eat up most of the potential profits from redevelopment. For example, resettlement costs

[2] Profits from land development are counted as extrabudgetary revenue and are thus not included in official budgetary revenue statistics.

amounted to 60-70 percent of land lease revenues in Shanghai between 1992 and 1994 (Fu et al. 1999). In Beijing, the cost of land for urban development was 120 times greater in the inner city than on the urban fringes (Lin 2007). In Shenyang, it was 14 times greater, in Xi'an, three times as much (Zhou and Ma 2000, Lin 2007).

Profits from land transactions belong to local governments. As a result, profits from conversion of rural land to urban uses can be a significant source of revenue for local governments that have few alternative fiscal instruments (Wu and Yeh 1997, Ho and Lin 2001, Lin 2007, Ding 2007). During the 1990s, land-related revenues accounted for 30-70 percent of local government revenue (Ho and Lin 2001). In many jurisdictions, land conveyance fees account for 20-50 percent of total revenue and as much as 80-100 percent of the funds needed to finance urban expansion (Yang and Wu 1996, Liu 2005). Between 1992 and 1995, Shanghai City collected more than 10 billion RMB annually from the sale of land use rights while Guangzhou Province collected more than 20.5 billion RMB (Yang and Wu 1996). Hangzhou City, the capital of the Zhejiang Province, collected over 6 billion RMB in 2002, accounting for over 20 percent of total municipal government revenues. Nationwide, revenue from land leasing accounted for an estimated 27 percent of total local government revenue in 2004 (Ping 2006).

4 Econometric Model and Data

In a competitive market economy, the price of land equals the present value of rents the land is expected to generate and is thus a good indicator of the role of land in fostering economic growth. Land prices are also good indicators of potential returns from converting land from rural to urban uses. In the Chinese context, they are also thus good indicators of the contribution of land transactions to local governments' extrabudgetary revenue. Unfortunately, information on land prices in China is quite fragmentary, available only for a few select cities over a limited

number of (non-overlapping) time periods. Li (1999), Fu et al. (1999), and Wu (2002) for instance, utilize data on real estate transactions in Shanghai during the early 1990s. Walker and Li (1994) and Li and Walker (1996) utilize data on leasing of land use rights in Guangzhou Province during 1991-1992. Ding (2004) utilizes records on leasing of land use rights in Beijing during the period 1992-2000. Lin and Ho (2005) report the numbers of transactions in the primary (conversion of rural land to urban uses) and secondary (leasing of land use rights) markets throughout China during 1995-2002 but not prices.

In the absence of systematic countrywide data on real estate transactions, we estimate the value of land in major Chinese cities econometrically using a standard revenue function approach, an approach that has been used widely in studies of urban economic growth (for examples of applications to urban growth in China see Zhang 2001, Demurger 2001, Lin and Song 2002, Anderson and Ge 2004). In contrast to previous studies examining urban economic growth in China, we use panel data rather than cross-sectional data, which allows us to control for unobserved heterogeneity among cities and across time periods.

Let T denote the feasible technology set and

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\begin{aligned}
Y_{jt} &= F(L_{jt}, N_{jt}, K_{jt}, H_{jt}, G_{jt}, A_j) \\
&= \max_{x_{jt}} \{ p_{jt} \cdot q_{jt} - w_{jt} \cdot x_{jt} \mid (q_{jt}, x_{jt}, L_{jt}, N_{jt}, K_{jt}, H_{jt}, G_{jt}, A_j) \in T \}
\end{aligned} \tag{1}
$$

denote the maximum value added in city j in period t that can be produced with fixed amounts of land L_{jt}; labor N_{jt}; stocks of physical and human capital, respectively, K_{jt} and H_{jt}; the stock of infrastructure G_{jt}; and other fixed factors unique to the city A_j plus variable inputs x_{jt} given output and variable input prices p_{jt} and w_{jt}, respectively (Chambers 1988).[3] In a competitive

[3] With the exception of land, these are the fixed factors typically included in econometric models of economic growth.

equilibrium, the market value of each fixed factor equals its marginal contribution to revenue, so that the value of land equals $\partial F(\cdot)/\partial L$.

Now consider a first-order approximation to equation (1) around the preceding period's input levels:

$$\Delta Y_{jt} = \frac{\partial F}{\partial L}\Delta L_{jt} + \frac{\partial F}{\partial N}\Delta N_{jt} + \frac{\partial F}{\partial K}\Delta K_{jt} + \frac{\partial F}{\partial H}\Delta H_{jt} + \frac{\partial F}{\partial G}\Delta G_{jt} + u_{jt} \quad (2)$$

where u_{jt} is the approximation error. Note that in this specification ΔK_{jt}, ΔH_{jt}, and ΔG_{jt} are, respectively, current investment in physical, human, and infrastructure capital. Note also that $\Delta A_j = 0$. This relationship can be rewritten as a linear regression model:

$$\Delta Y_{jt} = a_0 + a_L \Delta L_{jt} + a_N \Delta N_{jt} + a_K \Delta K_{jt} + a_H \Delta H_{jt} + a_G \Delta G_{jt} + v_{jt}\,. \quad (3)$$

Here a_0 is the mean of the approximation and v_{jt} represents deviations from that mean. The coefficients of this regression equation can be interpreted as the marginal values of the fixed factors.

Finally, to correct for potential heteroscedasticity we estimated the regression equation (3) normalized by lagged output ($Y_{j,t-1}$), which recasts the model as one of GDP growth rates:

$$\frac{\Delta Y_{jt}}{Y_{j,t-1}} = a_0 + a_L \frac{\Delta L_{jt}}{Y_{j,t-1}} + a_N \frac{\Delta N_{jt}}{Y_{j,t-1}} + a_K \frac{\Delta K_{jt}}{Y_{j,t-1}} + a_H \frac{\Delta H_{jt}}{Y_{j,t-1}} + a_G \frac{\Delta G_{jt}}{Y_{j,t-1}} + e_{jt}\,. \quad (3)$$

We estimated the parameters of this model using panel data on 220 major Chinese cities during the period 1996-2003, a total of 1540 observations. We focus on the time period beginning in 1996, the first year in which reliable land use data are available. We obtained data from two sources. Data on urbanized land area in each city came from the records of Ministry of Land and Resources (MLR), which document urban spatial expansion measured by land conversion between urban and non-urban areas in detail. Economic and demographic data came

from City Statistical Yearbooks for the years 1997-2004 (containing data for the years 1996-2003). The latter included information on GDP in total and by sector (primary, secondary, and tertiary), measured in RMB 10,000; population (total, agricultural, and non-agricultural) in each year, measured in 10,000 persons; total investment in fixed assets, measured in RMB 10,000; realized foreign direct investment (FDI), measured in US$10,000[4]; the number of students enrolled in universities; and government expenditures, measured in RMB 10,000. Descriptive statistics are given in Table 1.

We used GDP in secondary and tertiary industry to measure urban economic output. We used the size of the non-agricultural population as a proxy for the size of the labor force since reliable employment data were not available for the entire sample period. We expect the coefficient of this variable to equal the marginal value added per worker. We used the number of students enrolled in universities as a measure of current investment in human capital. We expect the coefficient of this variable to equal the marginal value of human capital stocks. We used government expenditure as a measure of current investment in infrastructure. Since this variable also includes social spending in addition to infrastructure provision, its coefficient should be less than the marginal rate of return to infrastructure. The coefficients of land and investment in fixed assets should equal the marginal value of urban land and rate of return on physical capital stocks, respectively, which should exceed the corresponding net or rental values of these inputs. The coefficient of foreign direct investment should equal the rate of return of physical capital, new technologies, and human capital provided by foreign direct investment (Zhang 2001).

The relative impacts of domestic and foreign direct investment are of special interest. FDI is widely believed to have played a dominant role in China's economic growth. Given its

[4] Foreign direct investment was not reported for all (especially earlier) years in some cities. Visual examination of the data showed that foreign direct investment in these cases was quite small in subsequent years, hence foreign

weak domestic demand, international trade has been China's main engine of growth. FDI was directly or indirectly been responsible for almost all of China's export growth during the 1990s (Wei 1995, 1996; OECD 2000). In addition to providing investment funding, foreign direct investment is widely believed to generate spillover effects due to the introduction of new technologies, enhancement of human capital from exposure to more advanced production methods, changes in industry structure due to increased competition, and institutional and infrastructure improvements required to maintain inflows of foreign capital (Perkins et al. 2001, OECD 2000, Graham and Wada 2001). Previous econometric studies have found that the rate of return on foreign direct investment is substantially greater than the rate of return on domestic investment (Zhang 2002, Demurger 2001, Lin and Song 2002, Anderson and Ge 2004).

5. Estimation Results

We estimated the parameters of equation (3) for the years 1997-2003 with year-specific fixed effects to control for changes in the general price level (inflation) and any year-specific economic or institutional shocks.[5] Missing values for university enrollment reduced the number of usable observations.

We estimated separate models for the years 1997-1999 and 2000-2003 to investigate potential changes due to the stringency of land use regulation by the central government. Regulation of urban spatial expansion was less stringent during the first three years of our sample period, that is, during formulation and initial implementation of the 1998 Land Administration Law, which became effective January 1, 1999 and which took some time to be implemented fully nationwide. We also estimated separate models for eastern, central, and western China to investigate differences in the productivity of land in areas experiencing

direct investment was set to zero whenever it was not reported.

[5] First differencing nets out all factors that do not change over time, ruling out the applicability of city fixed effects.

markedly different rates of economic growth: eastern China (comprising the provincial level cities Beijing, Tianjin, and Shanghai and Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, and Hainan Provinces), which has been experiencing very rapid growth; central China (Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan Provinces), which has been experiencing less rapid growth; and western China (Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang Provinces) which has been experiencing the least growth overall. The estimated parameters of these models are given in Tables 2 and 3.

5.1 The Estimated Value of Land

The coefficient of urban land area should equal the marginal value of urban land in urban cities, averaged over all cities in each sample. We transformed this estimate of the marginal value of land from 10,000 RMB per mu to dollars per hectare assuming 15 mu per hectare and 8 RM per US dollar. This procedure gave an estimated value of urban land in China during the entire sample period of about $32,000 per hectare. During the period 1997-1999, the estimated value of urban land was about $22,000 per hectare. During the subsequent period, it rose to over $108,000 per hectare.

The increase in the value of urban land was especially pronounced in eastern and central China (Table 3). The estimated value of urban land was about $20,600 per hectare in eastern China and $27,000 in central China during 1997-1999. It rose to about $177,500 in eastern China and $191,500 in central China during 2000-2003. In contrast, the coefficient of land in western China was also not significantly different from zero in either period, suggesting that land has not been a constraint on growth in this region taken as a whole.

The increase in the value of land between these two periods could be attributable to a number of factors, none of them exclusive of the others. One possibility is an acceleration of

economic growth, with a concomitant increase in the rent generated by land. Alternatively, these results are consistent with the notions that a significant share of the land requisitioned for urban use prior 1999 was set aside in development zones that either was developed profitably or reverted to non-urban uses in later years. A third possibility is that the "dynamic balance" requirements of the 1998 Land Administration Law were effective in constraining further urban expansion, reducing the supply of land for conversion to urban use and thereby increasing its value.

The estimated value of urban land derived from the econometric model reported in the preceding section provides additional evidence regarding land conversion as a source of local government revenue. The marginal value of land implied by the regression coefficients for 2000-2003 is over 50 times the average per hectare value of agricultural output in eastern China and over 100 times the average per hectare value of agricultural output in central China during those same years.[6] These large disparities between the value of urban land and compensation for requisitioned rural land are consistent with data from several localities (Xu 2003, Chen 2002, Investigating Group of Land Acquisition Reform of Ministry of Land and Resources 2003).

5.2 Estimated Rates of Return to Capital, Infrastructure, and Labor

The coefficients of domestic investment in fixed assets and foreign direct investment are both positive and significantly different from zero. The rate of return on domestic investment is about 8.8 percent (urban GDP increases by 0.088 RMB per RMB invested) over the entire sample period. It appears to have increased over time, rising from about 5.0 percent during 1997-1999 to 9.6 percent during 2000-2003, suggesting increasing efficiency in Chinese enterprises.

[6] The difference in the relative values of land in urban uses and agriculture is due mainly to the higher productivity of agricultural land in eastern China.

The rate of return on foreign direct investment is higher, about 17.3 percent (urban GDP increases by 1.38 RMB per dollar or 8 RMB of foreign direct investment) over the entire sample period. It remained roughly the same during both subperiods. Consistent with the notion of decreasing marginal productivity, it was lower in eastern China (12.5 percent during 1997-1999 and 14.3 percent during 2000-2003), which has received the bulk of foreign direct investment, than in central China (31.1 percent during 1999-1997 and 77.0 percent during 2000-2003). Western China has received very little foreign direct investment and the return on the foreign direct investment it has received was not significantly different from zero.

As noted above, foreign direct investment is widely believed to generate greater returns than domestic investment due to spillover effects from new technologies, increased human capital, increased competition, and induced institutional and infrastructure improvements. These results support that notion overall. They indicate that these spillover effects are significant in magnitude: The rate of return on foreign direct investment is about double the rate of return on domestic investment for all of China during the entire sample period, as other studies have also found (Zhang 2001, Demurger 2001, Lin and Song 2002, Anderson and Ge 2004). The gap between returns on domestic and foreign direct investment has narrowed over time, however, indicating increased efficiency of domestic Chinese investment. The gap between rates of return on foreign direct and domestic investment was greatest in central China, especially during 2000-2003. It was relatively small and has narrowed over time (5.6 percent for domestic investment and 12.5 percent for foreign direct investment during 1997-1999 and 11.7 percent for domestic investment versus 14.3 percent for foreign direct investment during 2000-2003) in eastern China during, which has received the bulk of foreign direct investment, suggesting that domestic firms have benefited from spillover effects of foreign direct investment.

The coefficient of government spending is also significantly different from zero and implies a rate of return of about 26.7 percent, suggesting that productive investment in physical and institutional infrastructure accounted for a large share of government spending. It appears that government spending has become more productive over time: The coefficient of government spending during the 1997-1999 period was small (0.07) and not significantly different from zero while the coefficient of government spending during the 2000-2003 period was much larger (0.33) and significantly different from zero. The productivity of government spending appears to have been high and increasing over time in central China. It increased over time but not was not significantly different from zero in eastern or western China.

The coefficient of non-agricultural population, also significantly different from zero, indicates marginal value-added of about $800 per person. The productivity of labor increased modestly over time from $664 during 1997-1999 to $815 during 2000-2003. Differences in the productivity of labor across regions appear to have narrowed over time, suggesting that urban labor markets have become more integrated (and hence closer to equalizing wage rates at the margin) in recent years. Consistent with this interpretation, the marginal value of labor in eastern China, where growth of the urban economy and hence of labor demand has been most rapid, rose over time while the marginal value of labor in slower-growing central and western China decreased over time.

Finally, the coefficient of university enrollment is not significantly different from zero at a reasonable significance level and negative in some instances, most likely because this variable is a poor proxy for human capital.

6. Final Remarks

China has been urbanizing rapidly as it modernizes. Its process of urbanization appears to exhibit a bias toward spatial expansion over redevelopment of existing urban cores, as has been documented in detailed studies of a number of cities. That bias has been attributed to economic and political reforms that have effectively placed urban authorities in the position of land developers. China's system of land ownership combines governmental control over primary land allocation between urban and rural uses with long term leasing of urban land to the private sector. Governance reforms of the 1990s placed acquisition of rural land for urban growth under the control of municipal officials. That control over land allows municipal officials to exercise political and economic power at the local level. Using it to promote economic growth effectively is also a means of obtaining recognition and advancement to higher levels of government. At the same time, fiscal reforms of the mid-1990s that reduced budgetary revenues without reducing fiscal obligations made land transactions an increasingly popular means of funding those fiscal obligations.

This paper examines empirically the incentives for land expansion in China. In the absence of systematic data on real estate transactions, we estimate the value of urban land using an econometric model applied to data from the 220 largest Chinese cities for the period 1996-2003. The estimated parameters of the model indicate that urban land generates far more than income per unit area than agriculture over the entire sample period. The value of urban land in eastern and central China increased in the period after 1999, an outcome that could be attributable to increased demand for land due to economic growth, delayed development of land set aside speculatively into economic/industrial development zones, and/or implementation of stricter administrative controls on farmland conversion that restricted the supply of land for

urban uses. Urban land appeared to have little or no economic value in western China, a region that, taken as a whole, has experienced a relative dearth of growth. The estimated value of urban land in eastern and central China is much higher than the value of land in agriculture, suggesting that local governments' finances can profit substantially from conversion of farmland to urban use.

Consistent with other studies, we find a higher rate of return on foreign direct investment than domestic Chinese investment. We also find that the gap in rates of return has narrowed over time and is lowest in eastern China, suggesting increased efficiency of domestic Chinese investment. Finally, we find evidence suggesting that labor mobility has been sufficient to decrease differentials in urban labor productivity across China.

6. References

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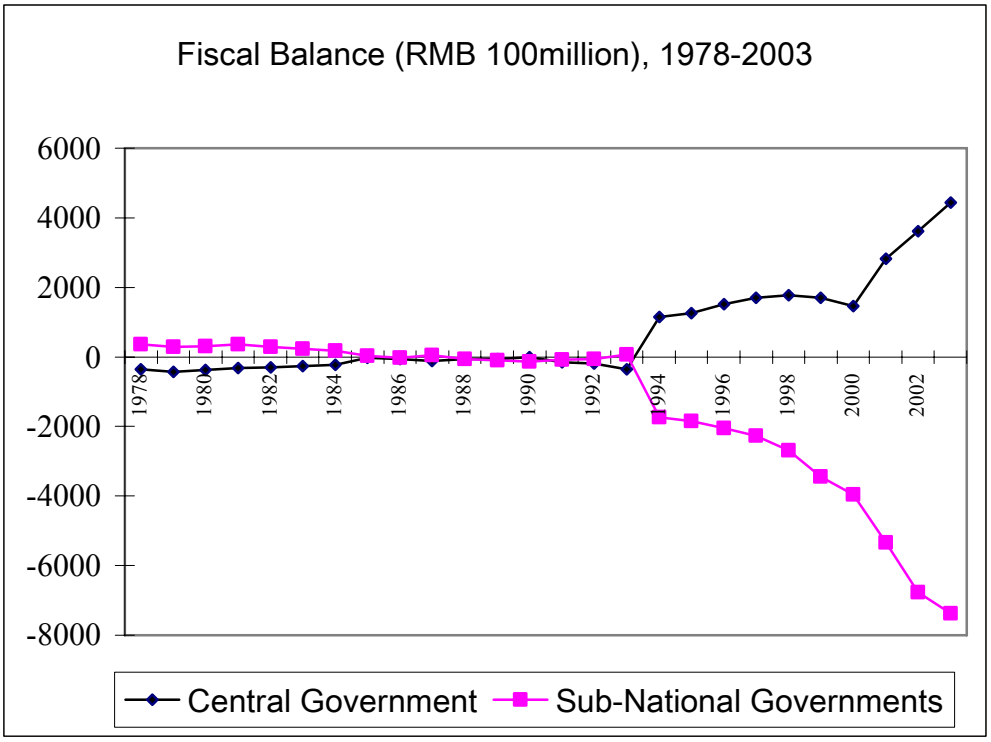

Figure 1: Fiscal Situation of Chinese Government Bodies

(Modified from Xie, Long, and Ding 2005)

Table 1: Descriptive Statistics of the Data Used in the Model of Non-Agricultural GDP Growth in 220 Major Chinese Cities

Variable	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Ratio of Non-Agricultural GDP to Lagged Non-Agricultural GDP	1.131881	0.153758	0.335214	2.651469
Ratio of Change in Urban Land Area to Lagged Non-Agricultural GDP	0.001967	0.009148	-0.0329	0.197109
Ratio of Investment in Fixed Assets to Lagged Non-Agricultural GDP	0.448561	0.259948	0	5.206861
Ratio of Realized Foreign Direct Investment to Lagged Non-Agricultural GDP	0.006298	0.009913	0	0.167559
Ratio of Change in Non-Agricultural Population to Lagged Non-Agricultural GDP	2.14E-06	6.54E-06	-3E-05	0.000148
Ratio of Government Expenditures to Lagged Non-Agricultural GDP	0.107631	0.049642	0	0.44996
Ratio of University Enrollment to Lagged Non-Agricultural GDP	0.0131	0.011638	0	0.07813

Table 2: Estimated Coefficients of Year-Specific Fixed Effects Regression Models of Non-Agricultural GDP Growth in 220 Major Chinese Cities

Variable	*Period*		
	1997-2003	*1997-1999*	*2000-2003*
Change in Urban Land Area	1.706916**	1.160986**	5.763352***
	(0.684458)	(0.5643)	(2.0153)
Domestic Investment in Fixed Assets	0.087696***	0.049954**	0.096095***
	(0.015268)	(0.0221)	(0.0204)
Realized Foreign Direct Investment	1.380701***	1.377384***	1.366324**
	(0.386755)	(0.4464)	(0.5727)
Change in Non-Agricultural Population	6379.333***	5310.081***	6520.468***
	(563.1444)	(1309.0)	(679.6)
Government Expenditures	0.267931***	0.07091	0.329371***
	(0.079155)	(0.1161)	(0.1052)
University Enrollment	0.197906	1.065582**	-0.153
	(0.328179)	(0.5235)	(0.4260)
R^2	0.1755	0.1574	0.1872
N	1452	588	864

Standard errors reported in parentheses.
*** Significantly different from zero at a 1 percent significance level.
** Significantly different from zero at a 5 percent significance level.
* Significantly different from zero at a 10 percent significance level.

Table 3: Estimated Coefficients of Year-Specific Fixed Effects Regression Models of Non-Agricultural GDP Growth in Major Chinese Cities by Region

Variable	*Eastern China*		*Central China*		*Western China*	
	1997-1999	*2000-2003*	*1997-1999*	*2000-2003*	*1997-1999*	*2000-2003*
Change in Urban Land Area	1.09642 (1.4039)	9.465323** (4.2666)	1.442405 (0.9791)	10.21154*** (3.0126)	1.054801 (0.8584)	-2.17025 (2.7904)
Domestic Investment in Fixed Assets	0.055995* (0.0338)	0.116691*** (0.0401)	0.017147 (0.0362)	0.055389** (0.0257)	0.15991** (0.0668)	0.08516 (0.0549)
Realized Foreign Direct Investment	0.997335** (0.4788)	1.147829* (0.7060)	2.487579 (2.2558)	6.162482** (2.8558)	2.63192 (2.6348)	-1.3111 (2.3323)
Change in Non-Agricultural Population	680.9813 (1902.1)	6718.952*** (834.6)	10634.26*** (2632.6)	6920.062*** (2147.5)	10847.6*** (2940.4)	3870.006* (2148.3)
Government Expenditures	-0.11224 (0.1601)	0.191696 (0.1426)	0.474557** (0.1942)	1.013544*** (0.2553)	-0.16848 (0.3450)	0.306667 (0.2348)
University Enrollment	-0.0828 (0.9294)	1.227284 (0.9449)	1.186311 (0.9446)	-0.6104 (0.6381)	1.591048 (1.0290)	-0.34672 (0.6542)
R^2	0.1237	0.2295	0.2684	0.1962	0.2811	0.1321
N	312	410	209	291	107	163

Standard errors reported in parentheses.
*** Significantly different from zero at a 1 percent significance level.
** Significantly different from zero at a 5 percent significance level.
* Significantly different from zero at a 10 percent significance level.