Stages of Urbanization:

Is China's Urbanization Poised to Take Off?

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Abstract

In contrast to the literature, we argue that the urbanization-GDP growth relationship as characterized by their elasticity evolve in three stages. When the level of per capita income increases, the elasticity should be first low and then very high and then low again. Utilizing a panel data set of 38 country and 50 years covering 1975 to 2004 panel data set, we support this theory. We further find that China's urbanization process has followed this pattern and is now in the second stage, although at each stage, China's urbanization ratio is below comparable economies. By implication, China's urbanization is poised to take off now.

1. Introduction

Arguably, one of the most important elements or key ingredients of economic development is urbanization. Urbanization is not only a consequence of economic development; it is also an effective means to increase the living standards of the population. In addition, urbanization is often the catalyst of structural change of a developing economy, which according to many students of economic development, is the essence of economic modernization. Given the importance of urbanization, it is natural to study the process of urbanization in China. It is often argued that China's urbanization process is behind its overall economic development, which is often used as the explanation of many structural problems of the Chinese economy, including the diminishing share of consumption in Chinese GDP and the large income gaps between the rural and urban population. China doubtless needs to find ways to speed up its process of urbanization. In fact, one may argue that faster urbanization in China is not only one of the best ways to improve economic efficiency and to reduce income inequality at the same time. In other words, faster urbanization is one of the rare economic growth mechanisms that promote both efficiency and equity.

The purpose of this paper is to address two related questions. First, has China's urbanization been slower than comparable countries of economic development? Second, is China poised for urbanization given that its per capita income after two and a half decades of reform, is now entering the ranks of lower-middle income countries? In order to address these two questions, we go back to the literature of urbanization, and in this study, we try to

understand the process of urbanization. Specifically, we try to understand whether there are stages of urbanization in a country's economic development. In doing so, we try to compare different countries urbanization process in history by utilizing a dataset of 38 medium to large countries urbanization and economic development data. Among the 38 countries, we also include China, and treat it as potentially different in the process of urbanization.

The main findings of this study are as follows. First, we find that the process of urbanization indeed can be characterized by three stages. In the first stage, when per capita income is lower that 1,600 USD (by purchasing power parity calculation), the relationship between urbanization and GDP growth is relatively loose. When the per capita income level is higher than 1,600 USD but below 25,000 USD, the pace of urbanization significantly speeds up relative to the growth rate of per capita GDP. And when per capita income is higher than 25,000 USD, the pace of urbanization slows down as a result of GDP growth. That is, there is a significant pattern of urbanization as correlated with per capita GDP growth. Furthermore, we find evidence indicating that there is a strong causality from per capita GDP growth to urbanization.

Second, we find that the pattern of China's urbanization so far has been consistent with that of other economies. More specifically, we find that the correlation between China's urbanization and per capita GDP growth has been the same as that of numerous other countries in history. By implication, taking into account the fact that China's per capita GDP is beyond 1,600 USD, China's urbanization process ought to quicken, given that China's per capita GDP is widely projected to continue growing, as has been the trend over

the past decade. We call this mechanism the “natural force” driving China’s urbanization.

The third finding is that even though the correlation between urbanization and GDP growth in China is consistent with other countries, the level of China’s urbanization at each level of per capita GDP is below that of other countries. That is, the curve of China’s urbanization and per capita GDP is parallel to those of other economies, but is below. The difference is between 11 to 12%. We further try to explain why China’s level of urbanization has been below that of other economies, controlling for per capita GDP growth, by regressing the gap on various economic variables, including size of population, per capita arable land, and population density, as well as a dummy indicating socialist or former socialist economies. Even controlling for these variables, China’s downward shift in urbanization is still 2-3% below other countries with comparable characteristics. We call this parallel downward shift of China’s urbanization the X-factor, and furthermore, behind this X-factor is a set of institutional factors and policies, including the Chinese government’s continued control of population control such as the *hukou* (domicile control) system, and China’s continued insistence on grain self-sufficiency through careful watch of the diminishing of arable land due to urbanization. By implication, if China can eliminate these policy restrictions behind this X-factor, China can further accelerate its urbanization process.

There are two intensive contributions of this paper in comparison to the literature. First, our paper is meant to contribute to the existing long literature on urbanization in general. The existing literature on urbanization predominantly centers on the seminal contribution of Chenery and Syrquin (1975), which studies the relationship between urbanization and per capita GDP growth. Their study showed that there is a positive correlation between per

capita income and urbanization, but it diminishes uniformly throughout the process with the increase of per capita income. Technically, they used a quadratic form of per capita income in their regression, with the quadratic term being negative and the linear term being positive. In our paper, we hypothesize that there are three stages of urbanization, with low, low-middle, and middle as the dividing indicators. Technically, we used a cubic term of per capita income, and our model describes the Chenery and Syrquin model as a special case. Indeed, the regression shows that there are three stages of development. After observing the time series data of different countries, Northam(1975) concludes that the process of urbanization follows a flat S shape with time as the horizontal axis and can be divided into 3 stages. Davis and Golden (1954), Graves and Sexton (1979), and WDR (2000) also assert that there is an S-shaped process in urbanization. Mills and Beck(1986), Davis and Henderson(2003) have failed to find evidence supporting the “S-shaped” assertion.

Another line of research following Chenery and Syrquin is a sequence of studies trying to find out more determinants of urbanization. For example, Moomaw and Shatter (1996) have found the positive relationship between urbanization and GDP per capita, industrialization, export orientation, and foreign assistance. David and Henderson also found that political or politically determined variables will affect Urban concentration. Fay and Opal (2000) focus their study on African countries’ urbanization. Among these studies, Fay and Opal, Davis and Henderson have utilized the fixed effect model to their estimation. The former use a quadratic model as Chenery and Syrquin, the latter failed to find a S-shaped relationship and use a linear model instead. But the relationship David and Henderson have estimated is the one between urban population growth rate and income, different from ours.

Also, we find that socialist and former socialist countries, such as Eastern European countries and China, actually still demonstrate a phenomenon which can be called under-urbanization, due to control of population flow under a legacy of central planning. This

finding is consistent with Fallenbuchl (1977) and Ofer (1977).

The second contribution is to the literature studying China's urbanization. There are basically two types of this type of research. The first type shows that China demonstrates a gap in urbanization with other economies. Chang and Brada (2006) showed this gap has increased in a recent paper. There are also many other papers which show that although China's level of urbanization is behind countries of comparable economic development, the gap has been narrowing since the reform. Li and Chen (2001), as well as many others, fit into this group of literature. Although these papers have used the cross-country data, they only make the cross-sectional comparison omitting the time series effect. Our paper differs from these two groups in that we take into account the nature of multiple stages of urbanization, and we also conduct a cross-country comparison across different time series. It is relying on cross-country comparison that enables us to take advantage of urbanization experiences in other countries and permits us to study China's history and potential evolution of urbanization. Our findings and the policy implications also make contributions to this line of literature.

2. The Data

Our study uses the World Development Indicators (WDI) dataset complied by the World Bank. The latest version of the WDI is from 2006, and consists of over 150 countries and regions, and with data between 1960 and 2004. There are more than 300 variables in the dataset.

For our purpose, we make careful selections among the countries. First, we did not

include those economies small in population. Specifically, we excluded countries with population less that 10 million in 1960. The argument is that these small economies are likely to demonstrate significantly different behavior of urbanization that larger economies. Kuznets (1971, pp105) argued that small countries are most likely to be dependent on foreign economies and therefore their economic structure tends to be irregular. Also, it is likely that countries with smaller population are much more likely to be dependent on international trade, which may be disproportionately concentrated in cities. Therefore, small countries may urbanize faster than larger ones. Second, some of the time series data are unavailable for countries like Afghanistan, Myanmar, and North Korea. Finally, in order to conduct our study, we need variables such as urban ratio, arable land, percentage of industry in service, and population density, but many countries do not have complete observations of these variables. In the end, we have 38 countries (including China) that have data for years from 1975 through 2004. Thus our dataset utilizes these 38 countries and 30 years of complete data.

3. The Econometric Model

Following the long literature of urbanization, we implement a two-stage econometric model in our study. First, we run fixed-effect panel data regressions for our economies, including a China dummy. The regression is as follows:

$$Urban_{it} = u_i + \sum_{m=1,2,3} \alpha_m \cdot (\ln GDPPC_{it})^m + \sum_{m=1,2,3} \gamma_m \cdot (\ln GDPPC_{it})^m \cdot Dummy\_CN + \beta \cdot X_{it} + \phi \cdot X_{it} \cdot Dummy\_CN + \varepsilon_{it} \quad (1)$$

where urban refers to the ration of urban population to total population, u_i is the fixed effect coefficient, lnGDPPC means GDP per capita, *Dummy_CN* refers to the China dummy (1 for

China, 0 for other economies), X_{it} includes variables such as ratio of industry in the economy, ratio of service, percentage of expenditure in GDP, and percentage of exports in GDP.

Obviously, this panel regression establishes a potential correlation between urbanization and per capita GDP and other variables. Causality cannot be fully established. While finding appropriate instrumental variables for per capita GDP is difficult, we tried to assemble the model in order to explore the potential causality from per capita GDP to urbanization. Zhang(2002) have found the Granger causality from economic growth to urbanization using China time series data. That is, we used five-year lagged per capita GDP to replace the contemporaneous per capita GDP. This formed another set of regressions. In the second stage, we calculate the fixed-effect coefficient for each economy and then regress it on a few variables, such as the natural log of population, population density, per capita arable land, and a dummy for former socialist economies.

$$u_i = \alpha + \eta_1 \cdot \ln(popu) + \eta_2 \cdot popdens + \eta_3 \cdot aralandpc + \varepsilon_{it} \quad (2)$$

The purpose is to try to understand which countries tend to have higher urbanization curves. The specific purpose is to understand why China's urbanization curve might be lower than others.

4. Findings

Table 1 lists the countries included in our study, including population, initial urbanization ratio in 1975, and ending urbanization ratio in 2004. Table 2 is summary statistics of other relevant variables. Table 3 lists six regressions of urban population ratio. Regression 1

and Regression 2 are the baseline regressions of urbanization on the log of per capita GDP and the square and cubic terms of that version as well. The table shows that all the log per capita GDP terms are significant, with the linear term negative, the square term positive, and the cube term negative, which implies a three stage pattern between urbanization and the log of per capita income. Figure 1 and Figure 2 illustrate this pattern.

Regression 3 and Regression 4 add to the baseline regression industry share and service share, as well as central government expenditure as a share of GDP and exports as a share of GDP. Interestingly, the industrial share itself is either insignificant or slightly negative and statistically significant. This indicates that industrialization may not be correlated with urbanization when we take into account per capita income, whereas the coefficient of the service share is significant and positive. This indicates that it is the service sector which is highly correlated with urban population. For every 1% in the share of the service sector in GDP, Regressions 3 and 4 show there is roughly a 0.13% increase in the urbanization ratio. The central government's budget as a percentage of GDP is also positively correlated with urbanization. One possible explanation is that more urbanized economies tend to have more government services, therefore having higher government expenditure. Interestingly, the share of exports in GDP is also positive and significant. We would explain this coefficient as reverse causality, that is, the more urbanized an economy is, the more likely it is to be exposed to the outside world, therefore having more exports. In all these examples, the Chinese dummy is not statistically significant, which signifies that the pattern of China's urbanization is the same as all other economies, although for each level of per capita income, it is significantly below other economies, with a magnitude of between 11 and 12.5%.

Table 4 (?) reruns these regressions with 5-year lags, and the results are the same, except the government expenditure becomes either insignificant or slightly negative. We interpret this result as meaning that government expenditure is unlikely to cause urbanization, but rather urbanization causes higher government expenditure. Meanwhile, all other variables preserve their sign and significance. This gives us some confidence to argue that per capita GDP, service share, and exports are all important for pushing faster urbanization. The dummy for China remains insignificant, demonstrating China's urbanization overall appears similar to that of the rest of the world. Table 5 (?) shows the regressions of the fixed effect term on various variables. Overall, the regressions show that population has a negative impact on urbanization: the larger the population, the smaller the urbanization. Arable land per capita is positively significant and population density is not significant. This is counter-intuitive, as it means more favorable conditions for agriculture mean more population would live in cities. Reverse causality from urbanization to arable land per capita, we argue, is unlikely. [add explanation]

It is interesting to note that even taking into account various variables to explain the fixed effect, China's level is still below the rest of the world, by a degree of 7.7 to 8%. This indicates that there are special Chinese institutions or policies pushing down the level of urbanization for each given level of per capita GDP. Table 5 (?) further elaborates the model but including dummies for socialist and former socialist economies. Consistent with our conjecture, these countries have lower urbanization ratios. This indicates that population control that accompanies central planning has an impact on urbanization. Very surprisingly, even controlling for socialist dummies, China's urbanization level is still 2 to

3% below that of other economies.

In summary, we find that there are three stages of urbanization. In the first stage, it is a slow pace of urbanization with per capita income below 1,600 USD. In stage two, with per capita income between 1,600 and 25,000 USD, the urbanization is faster. In stage three, with per capita income over 25,000 USD, urbanization is slower. These critical levels were calculated using the base regression (Regressions 1 and 2). Our second finding is that China has been following the same trends of urbanization that other countries in the world have had. In the Chinese case, 1989 is a critical year, when per capita income was roughly 1,600 USD, and by implication, China's urbanization ratio began to quickly rise. The third finding is that even though China's pattern is the same, its level, controlling for GDP growth, is significantly lower than other countries by 11-12%. Even taking into account many factors such as population, population density, and arable land, China is lower by 7-8%. Furthermore, also accounting for a central planning legacy such as former socialist economies like the Soviet Union, China's urbanization level is still lower by 2-3%.

5. Concluding Remarks and Policy Implications

Our findings indicate that although China follows the general pattern of urbanization and is currently in the second stage of urbanization, China is actually poised for faster urbanization, since its GDP is now beyond 1,600 USD. We call this a "natural factor" of urbanization, as in most other economies, urbanization is faster. The implication is that the Chinese government and economic decision-makers might be positioned to go through the faster pace of urbanization.

The other finding is that China is significantly low in urbanization level for each level of per capita income in other countries. Behind what we termed the X-factor, we argue there are two important institutions. One is China's remaining control over the *hukou* system, which prevents farmers from being fully assimilated into cities. Farmers are allowed to work in certain sectors, such as construction, but they cannot bring their families along, and are denied the right to be full citizens of cities. The other institutional argument that is important, we argue, is China has maintained very careful control of arable land, preventing many urban areas from rapidly increasing their size and incorporating their suburbs into the cities. The institutional root of control of arable land is due to the policy of grain self-sufficiency. We argue that if China can gradually move away from these two institutions, China's urbanization pace can go even faster.

In other contexts, we have argued that China should adopt a system of cross-country immigration to gradually abolish the domicile control system. That is, first allow migrant workers to hold green cards, and after a period of holding this card with no criminal or poor employment record, they can be granted residence. Furthermore, when granted the urban resident's permit, the household should give away its land ownership in its hometown, which prevents a counter force to prevent flooding into cities and will resolve the problem of mega-cities in other countries, where slums are an epidemic problem.

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Table 1 The List of Sample Countries

ISO code	Country	population (Million) 1975	urban population ratio(%),1975	population (Million) 2004	urban population ratio(%),2004	Observations In equations (1)(2)(7)(8)	Observations In equations (3)-(6),(9)-(12)
ARG	Argentina	26.0	80.97	38.4	90.34	1975-2004	1975-1979 1987-2004
AUS	Australia	13.9	85.92	20.1	92.28	1975-2004	1975-2003
BGD	Bangladesh	73.2	9.86	139.0	24.63	1975-2004	1980-2004
BRA	Brazil	108.0	61.15	184.0	83.63	1975-2004	1975-2004
CAN	Canada	23.2	75.61	32.0	80.76	1975-2004	1975-2001
CHN	China	916.0	17.4	1300.0	39.58	1975-2004	1975-2004
COL	Colombia	25.4	60	44.9	76.9	1975-2004	1975-2004
DEU	Germany	78.7	81.17	82.5	88.29	1975-2004	1975-2004
DZA	Algeria	16.0	40.33	32.4	59.39	1975-2004	1975-2004
EGY	Egypt	39.3	43.45	72.6	42.24	1975-2004	1975-2004
ESP	Spain	35.5	69.57	42.7	76.58	1975-2004	1975-2004
ETH	Ethiopia	33.0	9.5	70.0	15.91	1981-2004	1981-2004
FRA	France	52.7	72.93	60.4	76.49	1975-2004	1975-2004
GBR	UK	56.2	82.67	59.9	89.17	1975-2004	1975-2004
IDN	Indonesia	133.0	19.32	218.0	46.7	1975-2004	1975-2004
IND	India	613.0	21.31	1080.0	28.53	1975-2004	1975-2004
IRN	Iran	33.2	45.82	67.0	67.33	1975-2004	1975-2004
ITA	Italy	55.4	65.64	57.6	67.46	1975-2004	1975-2004
JPN	Japan	112.0	56.83	128.0	65.57	1975-2004	1975-2003
KOR	Korea, Rep.	35.3	48.03	48.1	80.54	1975-2004	1975-2004

MAR	Morocco	17.0	37.83	29.8	58.1	1975-2004	1975-2004
MEX	Mexico	59.1	62.76	104.0	75.76	1975-2004	1975-2004
NGA	Nigeria	58.9	23.4	129.0	47.46	1975-2004	1975-2004
NLD	Netherlands	13.7	56.93	16.3	66.32	1975-2004	1975-2004
PAK	Pakistan	71.0	26.4	152.0	34.46	1975-2004	1975-2004
PHL	Philippines	42.0	35.56	81.6	61.77	1975-2004	1975-2004
POL	Poland	34.0	55.4	38.2	61.95	1990-2004	1990-2004
ROM	Romania	21.2	42.83	21.7	54.66	1990-2004	1990-2004
RUS	Russia	134.0	66.43	144.0	73.29	1989-2004	1989-2004
SDN	Sudan	17.1	18.94	35.5	39.85	1975-2004	1975-1987 1996-2004
THA	Thailand	41.3	23.76	63.7	32.22	1975-2004	1975-2004
TUR	Turkey	40.0	41.6	71.7	66.77	1975-2004	1975-2004
TZA	Tanzania	16.0	10.07	37.6	36.45	1988-2004	1989-2004
UKR	Ukraine	49.0	58.27	47.5	67.3	1987-2004	1989-2004
USA	US	216.0	73.65	294.0	80.43	1975-2004	1975-2003
VNM	Vietnam	48.0	18.89	82.2	26.24	1989-2004	1989-2004
ZAF	South Africa	24.7	47.97	45.5	57.39	1975-2004	1975-2004
ZAR	Congo, D.R.	23.9	29.5	55.9	32.26	1975-2004	1975-2002

Table 2: Summary Statistics of Variables

	industry(% of GDP)	service(% of GDP)	service share in non-agri	gov't expdt share(% of GDP)	export share (% of GDP)	GDP per capita	ln(GDP capita
1975	34.44	46.79	58.09	14.31	17.02	7500.05	8.43
	10.04	9.02	9.58	5.50	10.77	6361.94	1.12
1985	32.64	49.06	60.30	14.49	18.78	8746.53	8.54
	8.82	10.09	8.17	5.01	11.28	7842.19	1.16
1995	31.70	51.72	62.02	14.50	24.29	9621.47	8.62
	9.33	13.46	10.11	4.98	11.65	9084.97	1.17
2004	32.92	53.69	61.99	14.81	33.94	11603.92	8.83
	10.15	12.59	11.23	5.29	15.39	10675.41	1.16
Total	32.86	50.41	60.69	14.53	23.54	9488.89	8.62
	9.52	11.70	9.85	5.13	13.86	8806.36	1.15

Note: In each box, the above is the mean, with standard deviates below.

Table 3 Regressions with Contemporaneous Variables

	urban population share(% of total)

	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)
ln(ppp GDP per capita)	-185.357	-212.682	-278.543	-301.647	-260.264	-277.746
	(40.014)**	(43.159)**	(40.323)**	(43.770)**	(40.266)**	(43.546)**
[ln(ppp GDP per capita)]_sq	22.829	25.987	34.401	37.199	32.094	34.305
	(4.803)**	(5.150)**	(4.870)**	(5.241)**	(4.849)**	(5.217)**
[ln(ppp GDP per capita)]_cu	-0.869	-0.989	-1.356	-1.467	-1.259	-1.349
	(0.190)**	(0.202)**	(0.194)**	(0.207)**	(0.192)**	(0.206)**
industry share(% of GDP)			-0.097	-0.098		
			(0.047)*	-0.05		
service share(% of GDP)			0.127	0.131		
			(0.041)**	(0.044)**		
serv share in non-agri VA(%)					16.386	17.15
					(2.470)**	(2.545)**
central gov't expdt (% of GDP)			0.134	0.129	0.15	0.145
			(0.046)**	(0.046)**	(0.045)**	(0.045)**
export share(% of GDP)			0.202	0.201	0.207	0.207
			(0.019)**	(0.019)**	(0.018)**	(0.018)**
ln(ppp GDP per capita)_CN		239.601		88.192		156.512
		(507.23)		(835.14)		(670.91)
[ln(ppp GDP per capita)]_sq_CN		-29.189		-8.984		-18.412
		(68.3)		(110.66)		(88.89)
[ln(ppp GDP per		1.171		0.28		0.705

capita)]_cu_CN		(3.05)		(4.86)		(3.92)
indu_CN				-0.095		
				(0.67)		
serv_CN				-0.083		
				(0.5)		
[serv share in non-agri VA(%)]_CN						-2.511
						(40.36)
[central gov't expdt (% of GDP)]_CN				-0.007		-0.046
				(0.57)		(0.56)
[export share(% of GDP)]_CN				-0.106		-0.121
				(0.27)		(0.27)
Observations	1051	1051	1019	1019	1019	1019
Time span	1975-2004	1975-2004	1975-2004	1975-2004	1975-2004	1975-2004
Number of countries	38	38	38	38	38	38
R-squared	0.34	0.35	0.47	0.47	0.46	0.46
Prob>F statistics(H0: CN_dummies=0)		0.4077		0.8596		0.7705

The number in parentheses are the standard errors; * significant at 5%; ** significant at 1%. Constant is omitted in the results.

Table 4 Regression Results with 5 years lagged independent variables

	urban popu share(% of total)

	Equation(7)	Equation(8)	Equation(9)	Equation(10)	Equation(11)	Equation(12
lngdppc_00ppp_L5	-78.43	-141.24	-270.2	-328.3	-249.6	-288.1
	(44.660)	(50.28)**	(44.43)**	(49.07)**	(44.06)**	(48.63)**
lngdppc_00ppp_L5_sq	10.20	17.23	33.73	40.16	31.10	35.51
	(5.390)	(5.99)**	(5.40)**	(5.88)**	(5.33)**	(5.83)**
lngdppc_00ppp_L5_cu	-0.388	-0.649	-1.349	-1.585	-1.237	-1.403
	(0.214)	(0.235)**	(0.216)**	(0.232)**	(0.212)**	(0.230)**
indu_L5			-0.153	-0.108		
			(0.047)**	(0.050)*		
serv_L5			0.167	0.207		
			(0.043)**	(0.045)**		
serv2nagr_L5					0.251	0.250
					(0.026)**	(0.027)**
govexpd_L5			-0.052	-0.076	-0.036	-0.047
			(0.047)	(0.048)	(0.046)	(0.047)
expt_L5			0.202	0.191	0.208	0.205
			(0.021)**	(0.022)**	(0.020)**	(0.020)**
lngdppc_CN_L5		280.9		517.6		678.0
		(829.5)		(1887.2)		(1551.5)
lngdppc_CN_L5_sq		-34.80		-66.29		-89.02
		(114.4)		(258.7)		(214.0)

lngdppc_CN_L5_cu		1.441		2.839		3.892
		(5.24)		(11.75)		(9.78)
indu_CN_L5				-0.057		
				(0.638)		
serv_CN_L5				-0.167		
				(0.521)		
serv2nagr_CN_L5						-0.125
						(0.428)
govexpd_CN_L5				0.135		0.042
				(0.799)		(0.708)
expt_CN_L5				-0.084		-0.073
				(0.447)		(0.440)
Constant	222.4	385.9	736.9	867.9	670.4	730.2
	(121.7)	(146.9)**	(120.4)**	(189.3)**	(119.1)**	(170.6)**
Observations	861	861	837	837	837	837
Number of count	38	38	38	38	38	38
R-squared	0.26	0.27	0.41	0.41	0.40	0.40
Prob>F statistics(H0: CN_dummies=0)		0.041		0.281		0.622

The number in parentheses are the standard errors; * significant at 5%; ** significant at 1%. Constant is omitted in the results.

Table 5: Regressions of the Fixed Effect

	u_i1			u_i2		
	(13)	(14)	(15)	(16)	(17)	(18)
arable land per capita	8.43	8.934	7.201	8.425	8.997	7.198
	(2.086)**	(2.55)**	(2.068)**	(2.116)**	(2.60)**	(2.109)**
lnpop		-0.144	0.69		-0.059	0.761
		(1.741)	(1.898)		(1.767)	(1.930)
popdens		-0.012	-0.012		-0.012	-0.012
		(0.009)	(0.016)		(0.009)	(0.016)
dummy for ex-socialism			-8.016			-7.959
			(4.872)			(4.944)
Constant	-3.936	0.811	(13.33)	-3.908	-0.748	(14.52)
	(2.392)	(31.81)	(33.57)	(2.403)	(32.31)	(34.15)
Observations	35	38	35	35	38	35
R-squared	0.15	0.20	0.20	0.15	0.19	0.20
CN_residual	-7.80	-7.97	-3.32	-7.65	-8.01	-3.43

The number in parentheses are the standard errors; * significant at 5%; ** significant at 1%. Constant is omitted in the results.

Table 6 Prediction son China's Urbanization

Regression (3)					
Scenario 1					
Growth rate of GDPPC		2005-2015		8%	
		2016-2025		7%	
Year	2005	2010	2015	2020	2025
GDPPC	5852	8599	12635	17721	24855
urbpop	43.80	49.38	54.23	57.66	59.85
Scenario 2					
Growth rate of GDPPC		2005-2015		7%	
		2016-2025		6%	
Year	2005	2010	2015	2020	2025
GDPPC	5798	8132	11406	15264	20426
urbpop	43.69	48.77	53.34	56.78	59.40
Scenario 3					
Growth rate of GDPPC		2005-2015		6%	
		2016-2025		5%	
Year	2005	2010	2015	2020	2025
GDPPC	5744	7687	10287	13129	16756
urbpop	43.58	48.14	52.36	55.67	58.48

Regression (5)					
Scenario 1					
Growth rate of GDPPC		2005-2015		8%	
		2016-2025		7%	
Year	2005	2010	2015	2020	2025
GDPPC	5852	8599	12635	17721	24855
urbpop	44.15	50.30	55.81	59.99	63.06
Scenario 2					
Growth rate of GDPPC		2005-2015		7%	
		2016-2025		6%	
Year	2005	2010	2015	2020	2025
GDPPC	5798	8132	11406	15264	20426
urbpop	44.04	49.66	54.84	58.94	62.32
Scenario 3					
Growth rate of GDPPC		2005-2015		6%	
		2016-2025		5%	
Year	2005	2010	2015	2020	2025
GDPPC	5744	7687	10287	13129	16756
urbpop	43.92	49.00	53.79	57.69	61.15