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'Drivers of Urban Development in China: Measuring Development and Comparing Models'

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Abstract

This study uses data from 99 Chinese cities covering the decade from 2000 to 2010 to look at factors that drive urban development in China. There are data available to test standard measures of development like housing price. However, there are fundamental problems with doing so due to a Chinese housing market shaped by factors like planned construction with waiting lists, housing as the best and most viable option for the typical Chinese with savings to invest, and the still-growing phenomenon of ghost cities.

This study considers using housing price, regional gross production, GDP, employment, population, and disposable income to capture the reality of urban development over the past decade in China, settling on three models using regional gross production, GDP and disposable income. In particular, the study asks whether traditional economic factors, development of the new economy, the creative class model, or the rising power of cultural development is most associated with urban development in the major cities of China in the past decade.

Using regression models, the study finds that tourism income was significantly positively related with all three measures of development, and fixed cultural investment was significantly positively related with regional gross production and GDP, though cultural policy spending did not. This provides some support for the role of cultural factors in development in China. Urban sprawl (measured by residential area/population) was found to be significant positively correlated to disposable income but not RGP or GDP, suggesting rise in disposable income also gives rise to empty housing used for investment. Change in the number of university students was significantly negatively related to GDP, implying that, without other controls for the cost of education, an increase in the current number of

university students shifts resources away from economic activity.

Key words: urban development factors, urban development in China, housing price, cultural factors in development

Introduction

China has been the latest nation to follow a course of remarkable rapid economic growth that is unique for being on a scale much larger than that of the so-called Asian tigers that preceded it in the 1970s and 80s. Though the current worldwide slowdown has impacted its growth as well, the People's Republic of China has developed to a point in recent years that its huge exports, its latent market potential, and even its impact on the global environment make it a major regional and world player on almost every issue. China has already achieved a significant amount on a previously unknown scale, whether the end of the world economic troubles return China to its previous rate of growth or whether it has encountered more fundamental difficulties that will take more time to work out, as some have suggested.

One legacy of the rapid economic growth following marketization has been urban development on a massive scale as urbanization has returned to a pattern more typical of developing nations. Cities of millions have sprung up virtually overnight and, while there are typically a handful of cases to compare in the case of most developing countries, China presents the opportunity to take a look at factors associated with different measures of urban development in dozens of cities in a single country. In contrast to an earlier emphasis on manufacturing Chinese cities have differentiated local policies, have significant variation in local conditions, and have even pursued different development approaches as the market has been gradually liberalized, with the city of Dalian, for instance, driving growth through development of the cultural industry (Lee and Wang 2013).

This variation is critical as there have been numerous criticisms of urban growth in general and this Chinese growth in particular. Anti-growth critics point to the lack of human factors (Clark 2004, Lee et al 2012: 47-49, Wu 2008; 2012a) and the destruction of the natural environment and the consumption of finite resources (Lee et al. 2012:290-293). All of these are important considerations in China where people are crowded into tall buildings that blot out traditional architecture, sprawl eats up the countryside, and pollution destroys the air and rivers and scars the land. Finding methods that answer the critics and delivers the benefits of urban development without creating new problems can point the way for policies and

approaches that respect the needs of people while developing the urban economy.

This study uses data from the top 99 Chinese cities covering the decade from 2000 to 2010 to look at the factors that drive urban development in China. In particular, the study asks whether traditional economic factors, new economy development, human resource development, the creative class model, or the rising power of cultural development is most associated with urban development in the major cities of China in the past decade. The study hopes to provide an answer, in the contemporary Chinese context, to the question of what drives urban development. Further, this study also considers a variety of measures of development to determine what available measures are most suitable in the Chinese case.

Literature Review

The most traditional models of urban development stressed “land, labor, and capital” as factors in urban development (Clark 2004). These kinds of models suggest that development is made possible through the development of unused land, the application of labor to build on the land, and the investment of capital to pay for the labor and the developments on the land.

Concerning land and location factors, Moses (1958) advanced the idea of the role of location in relation to production, considering in particular the effect of factors on the selection of location for a firm. The effect of location on urban development is a location triangle that constrains urban development according to land price and transport costs. At the same time, another way location may promote urban development is through the benefits of economies of scale created through the location of industry. Likewise, Meng (2006) stresses the need of a convenient transportation system for a city. The growth and scale of development is restricted by the cost of transportation. Apart from transportation cost, location also further affects urban development through the convenience of transportation networks in promoting industry and industrial effects.

Tiebout (1956) is famous for his hypothesis about the movement of people between urban areas. He asserted that people could "vote with their feet" by leaving an area they did not like and moving to an area they do like. Though he was addressing questions of choice among urban policies and urban services, this movement may be done in order to satisfy individual preferences in terms of work opportunity, or any of the different features or amenities offered by the city. This hypothesis supports a number of the theories listed below

by giving people agency in their relationship to the city.

More recent versions of the application of labor in development have involved the concept of investments in skilled labor in the form of human capital. The successive and deepening effects of reform and the opening of the economy in China and increasing marketization have led to the typical problems of a market economy, including inequality and the need for specialized division of labor for leading the market economy. There is still a great difference and gap in urban development among the different regions in terms of motivated skilled labor. However, there has been more discussion of the role of human capital in this process outside of China. Theodore William Schultz (1990) considered that how to attract high-value labor is the key to urban development by increasing the value of the labor input into the equation, not through numbers, but through quality. The rapid growth of human capital leads to an increasing share of the national income and the corresponding drop in the share of property. On top of that, Lucas (1988) found that human capital development has strong positive externalities, as the communication between hi-tech employees and high-quality ordinary workers leads to the spread of innovation that plays a role in increasing the efficiency of production.

A newer trend has stressed the role of culture in contributing to the development of human capital (in particular the creative class of innovative workers) through the mediating effect of social capital (Florida 2002, 2006) along the lines of Jane Jacobs' ideas of cities as engines of innovation (1969). Bin Hu (2003) argued that the regional integration of urban networks had played an important role during the urbanization process. Urbanization is not only propelled by manufacturing industry but still more by innovation in the service industry. Others have further pushed the role of non-market amenities and collections of amenities, scenes, in developing social capital on the path to developing human capital (Clark 2004, Silver et al 2006).

One of the motives for urban development is to make the city self-financing through the development of industry. Northam (1975) found a positive correlation between urban development and urban populations through research on the proportion of the urban population out of total population in a country. Changes in the city population are due to industrial development. There are both push and pull factors moving people to the city. As technology is developed and shared on farms, not as many farmers are needed, so they go to cities to search for jobs and a place to live. At the same time, city life has many advantages that are attractive that draw rural citizens. Meanwhile, Simon Kuznets (1966) found that

changes in the consumption structure on the basis of the industrial structure encourage urbanization with different industrial attributes causing different impacts of industrial structural changes on urbanization. Yinxing Hong (2000, 2003) advocated that the thrust of urbanization should shift from secondary industry to tertiary industry. Producer services will play an important role during the urbanization process.

Industrial development in industry need not be provided by domestic capital. Fengxuan Xue and Chun Yang (1995) asserted that foreign direct investment (FDI) has a different effect on urbanization in different cities, but that it is an important factor for promoting urban development, particularly in the absence of scarce domestic capital, which may not be accompanied by the expertise that may come with FDI.

A final factor worth mentioning is information technology. Dengchao Hui and Guangpeng Li (2012) highlighted the close relationship between urbanization and the increase in information communications technology use and ICT infrastructure. They found that for every 1% increase in ICT business volume alone when controlling for other factors, the rate of urbanization increases 0.07%. Castells (1996) put forward information city theory, making up the so-called “information mode of development,” analyzed the influence of high technology industry on socioeconomic activities. The world economy is asserted to be changing from being rooted in the dynamics of place to being rooted in the dynamic of flows.

Methodology

This study employs data from 99 Chinese cities from the years 2000 and 2010 to determine the factors that were most closely associated with urban development over this period. The cities were selected as the top cities on the basis of housing price. The factors associated with development are investigated through regression analysis. The first question to address is how to measure urban development. Six measures were available to serve as dependent variables to represent development during the period: change in housing price, change in total registered population, change in total employment, change in disposable income, change in regional gross production, and change in gross domestic product (all except housing price and population were per capita variables in order to control for the size of different cities). While all of these variables might be applicable outside of China, there are some particular limitations in employing them in China.

Housing Market in China

Housing price is frequently employed as a market-based dependent variable in a hedonic regression model as it includes factors like demand driven by population movement, demand driven by rising wages, and increased value associated with increased regional economic opportunities that indicate development (Lee 1997, Clark 2004). However, there are several factors distorting housing price as a measure of development in China, including the registration system, government planning, non-market land allocation and transaction, and the development of the phenomenon of ghost cities.

The household registration system in China requires that citizens are counted as residing where they are registered, though this is not always the case. There have been large numbers of people from rural areas who were previously not authorized to move and so ignored the registration in the new city. Most of these people would be moving into cities where they would not be able to buy a house, but only those buying houses (not those renting) register and enjoy the same public service such as medical care, and education for their children (Wu 2010; 2012a; 2012b; 2012c). There is also the issue of multiple residences where the same family will buy a house at a high price near a good school just so their children can attend, though they do not really live there. Some couples work in different cities and buy houses in each city they live (which may even be in addition to a separate house where their children study). Through all of this process, many people hold on to houses to maintain the rights to government services they would lose if they sold the property. This is one reason for the phenomenon of housing vacancy.

The local government provides different policies to provide housing for all citizens. Housing price caps exist in some cities, but not in others, tending to increase the sales activity for houses in cities that have no restrictions. Meanwhile, to slow down the housing market, there have been limits placed on the number of houses owned in some areas and new rules require a levy of 20% tax on secondary housing caused by the strong market demand for new houses. Finally, there is always a gap between commercial housing and affordable housing, no matter the location or construction quality of the latter.

With all land state-owned, land is supplied in China for use through administrative allocation or transfer with compensation (the latter has already been administratively allocated land or leased). Administrative allocation is more common, as many local governments transfer land in order to raise revenue for the local government. Land sales

become a way to boost value. This has led to excessive competition among cities prompting further non-market cooperation and coordination. A great deal of rural land is being developed for residential use to attract investment, rather than to provide public services for the new residents, such as compulsory education, employment, medical, affordable housing and other fields.

Finally, housing price itself is very distorted by a split market for housing with low rents for average people renting versus high prices for investment housing. Lower rents make it uneconomical to buy house just for renting out space. In fact, those who own two or three houses do not usually let out their extra house for rent so the housing vacancy rate is very high in China. People buy extra houses mainly for the soaring prices, due to low interest on other investments. Housing has historically outpaced other investments, which are often not available to the middle class family with savings in any case, making the purchase of an extra house seem like a sure thing in spite of signs of a housing bubble. With ownership of two houses prohibited in some cities, this investment housing, which is not rented out, is often concentrated, accounting for the phenomenon of ghost cities.

For similar reasons, population figures and employment figures are not ideal as measures of development. They are affected by some of the features, like household registration restrictions and government planning (in this case, planning for full employment) that does not necessarily take into account unauthorized population movements.

The remaining three possible dependent variables, regional gross production, gross domestic product, and disposable income were used. Table 1 shows the results of a Pearson correlation of the possible dependent variables in order to indicate the compatibility between the selected dependent variables. Change in regional gross production per capita showed a significant 0.602 correlation with change in per capita GDP, indicating a substantial overlap between the territory covered by the two variables, while change in per capita disposable income had significant relationships of 0.443 with the RGP variable and 0.440 with the GDP variable. These were the strongest relationships among the variables, except for a 0.459 significant relationship between housing price and disposable income. This may suggest that the relationship between disposable income and housing price either provides some justification for employing housing price as a variable or for excluding changes in per capita disposable income. The problems noted above with the housing market were determined to be serious enough to continue the exclusion of housing price as a dependent variable while the much stronger significant relationship of disposable income with RGP and GDP as

compared to those variables' relationship with housing price (0.263 and 0.275 respectively) determined the retention of change in per capita disposable income as a dependent variable.

Table 1: Correlation of Dependent Variables

	Population	Housing Price	Per Capita Regional Gross Production	Per Capita GDP	Per Capita Employment	Per Capita Disposable Income
Population Significance N	1 99					
Housing Price Significance N	0.329** 0.002 90	1 90				
Regional Gross Production Significance N	0.031 0.760 99	0.263* 0.012 90	1 99			
GDP Significance N	0.074 0.468 99	0.275** 0.009 90	0.602** 0.000 99	1 99		
Employment Significance N	-0.0125 0.221 97	0.075 0.487 89	0.036 0.727 97	0.236* 0.020 97	1 97	
Disposable Income Significance N	0.082 0.0418 99	0.459** 0.000 90	0.443** 0.000 99	0.440** 0.000 99	0.198* 0.052 97	1 99

** significant at the 0.01 level

* significant at the 0.05 level

Models

With the selection of the dependent variables, the models were selected following the following formula:

$$DV = \text{constant} + b_1\text{aging} + b_2\text{student} + b_3\text{museum} + b_4\text{tourism} + b_5\text{foreign investment} + b_6\text{financial investment} + b_7\text{cultural investment} + b_8\text{high tech investment} + b_9\text{hospital bed} + b_{10}\text{cultural expenditure} + b_{11}\text{urban sprawl index} + e$$

Where

aging	=	change in the proportion of the population over 65
student	=	change in the proportion of university students to the population
museum	=	change in the number of museums per capita
tourism	=	change in per capita tourism income
foreign investment	=	change in per capita foreign investment
financial investment	=	change in per capita fixed (capital) financial sector investment
cultural investment	=	change in per capita fixed culture, arts, and education investment
high tech investment	=	change in per capita fixed (capital) high tech investment
hospital bed	=	change in per capita hospital beds
cultural expenditure	=	change in per capita government cultural and arts expenditure
urban sprawl index	=	change in urban sprawl (residential area/population)

An aging variable is included because aging population is predicted to be a serious problem in some areas as imbalances in social development lead to regional differences, requiring higher levels of social spending to support an older population. Cities with more serious aging population in the future are predicted to slow down, or even stop or reverse development. The aging population of central and Western regions is not so serious, but with a great deal of population moving to the Eastern coastal regions, the actual aging population extent of western region is more pronounced than in the East (Ma 2004, Li 2007).

The university student variable is used in the absence of other measures as a proxy for education. Foreign investment is used to test the importance of foreign capital inflows to development, while investment in the various sectors is used to test the importance of their industries. Museums are used to stand in for cultural amenities whereas cultural expenditure directly measures local government involvement in culture for its own sake, not as part of support for the cultural industry.

Table 2: Per Capita Regional Gross Production as Dependent Variable

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Significance Level
	B	Std. Error	Beta		
Constant	0.459	1.052		0.436	0.671
Per Capita Aging Population	31.318	23.789	0.208	1.316	0.213
Per Capita Student	-26.690	17.75	-0.258	-1.504	0.159
Per Capita Museum	-13.405	9.935	-0.191	-1.349	0.202
Per Capita Tourism Income	6.659	1.414	0.690	4.709	0.001**
Per Capita Foreign Investment	-3.109	13.482	-0.044	-0.231	0.822
Per Capita Fixed Financial Investment	0.001	0.003	0.058	0.339	0.741
Per Capita Fixed Cultural Investment	0.002	0.001	0.610	3.934	0.002**
Per Capita Fixed High Tech Investment	0.000	0.002	0.052	0.326	0.750
Per Capita Hospital Bed	55.223	427.735	0.020	0.129	0.899
Per Capita Cultural Exp	-99.382	237.731	-0.059	-0.418	0.683
Urban Sprawl Index	0.009	0.039	0.033	0.238	0.816

R Squared=0.837 n=99 *=significant at the 0.05 level **=significant at the 0.01 level

Regressions

Regressions were estimated for the three models with the results appearing in Table 2 (For Regional Gross Product), Table 3 (For GDP), and Table 4 (for Disposable Income). The regression for change in per capita regional gross production showed significant results for the change in per capita tourism income and change in per capita fixed cultural investment variables (Table 2). The regression for change in per capita GDP produced significant results for the change in per capita tourism income and change in per capita fixed cultural investment variables, as well as for change in proportion of university students, though at the 0.05 level (Table 3). The change in per capita disposable income also produced significant results for the change in per capita tourism income as well as for the constant, while the urban sprawl index was significant at the 0.05 level (Table 3).

The signs on all but one of the significant variables were positive, meaning that they increased in proportion to the dependent variable. The exception was the significant result for

the proportion of university students, which was negatively related to per capita GDP, meaning that as the change in per capita GDP increases, the change in the proportion of university students relative to the population falls.

Table 3: Per Capita GDP as Dependent Variable

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Significance Level
	B	Std. Error	Beta		
Constant	15086.164	8731.941		1.728	0.110
Per Capita Aging Population	167090.51	197494.19	0.136	0.846	0.414
Per Capita Student	-371333.83	147363.90	-0.439	-2.520	0.027*
Per Capita Museum	-127279.69	82483.895	-0.222	-1.543	0.149
Per Capita Tourism Income	52580.960	11740.631	0.667	4.479	0.001**
Per Capita Foreign Investment	55434.094	111925.35	0.097	0.495	0.629
Per Capita Fixed Financial Investment	6.200	28.832	0.037	0.215	0.833
Per Capita Fixed Cultural Investment	20.610	5.011	0.648	4.113	0.001**
Per Capita Fixed High Tech Investment	13.846	12.517	0.178	1.106	0.290
Per Capita Hospital Bed	-2627911.354	3551055.7	-0.119	-0.740	0.474
Per Capita Cultural Exp	-1758585.8	1973642.1	-0.127	-0.891	0.390
Urban Sprawl Index	17.217	326.894	0.007	0.053	0.959

R Squared=0.832 n=99 *=significant at the 0.05 level **=significant at the 0.01 level

Table 4: Per Capita Disposable Income as Dependent Variable

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Significance Level
	B	Std.Error	Beta		
Constant	11469.940	1924.783		5.959	0.000**
Per Capita Aging Population	4279.172	43533.66	0.017	0.098	0.923
Per Capita Student	-22413.35	32483.440	-0.132	-0.690	0.503
Per Capita Museum	-6172.144	18181.93	-0.054	-0.34	0.740
Per Capita Tourism Income	12934.667	2587.988	0.817	4.998	0.000**
Per Capita Foreign Investment	14491.657	24671.72	0.126	0.587	0.568
Per Capita Fixed Financial Investment	-6.983	6.355	-0.21	-1.100	0.293
Per Capita Fixed Cultural Investment	1.773	1.105	0.278	1.605	0.135
Per Capita Fixed High Tech Investment	2.411	2.759	0.155	0.874	0.399
Per Capita Hospital Bed	846163.47	782759.55	-0.191	-1.080	0.301
Per Capita Cultural Exp	569772.59	435050.12	-0.206	-1.310	0.215
Urban Sprawl Index	176.029	72.057	0.378	2.443	0.031*

R Squared=0.797 n=99 *=significant at the 0.05 level **=significant at the 0.01 level

Discussion

The regression results were highly consistent for the three dependent variables and were reasonable. All three models had high r squared values, suggesting good fit. The signs were all going in the same direction from model to model, even for the variables that were not significant. The only variable that was significant for all three models was change in per capita tourism income. The standardized coefficient is great in magnitude in each case, suggesting a meaningful influence. This follows the stress that Clark (2004) placed on tourism as one of the top industries in the world. These results suggest that tourism promotion is playing an increasingly effective role in contributing to urban economic development, at least on an adjusted per capita basis. This means that the major tourism trade around the famous sites in Beijing is not the only source of the effect through its magnitude, but that tourism is having a meaningful effect in relating to growth across a range of the top 99 cities

in China. This study cannot speak to tourism as causing urban development, but the results are suggestive. The variable includes both domestic and foreign tourism so the effect is for the whole industry and not just open to the famous international trade but to the whole range of tourism, even for those travelling for local holidays.

The next variable with the most widespread effect was the change in capital investments in culture and the arts. The variable was significant in both the RGP and GDP models and, like tourism also had a standardized coefficient with a positive sign and a large magnitude. The non-significant result for the disposable income model also had a positive sign. This reinforces the tourism results in that this investment will be providing much of the tourism infrastructure in providing things for people to see and do when they visit. This provides reinforcement for the amenity/scenes argument for the role of culture and non-market factors in development. However, the three models all shared non-significant results with a negative sign for local government culture/arts expenditures. Rising government cultural spending may be negative because it may represent cultural welfare funding that does not go beyond specific cultural events that go beyond limited programming to compensate for weaknesses in the local market for cultural goods. On the other hand, fixed investment means the creation of the basis for an ever-expanding cultural industry and experience as opposed to temporary entertainments.

Next, the GDP model contained significant results for the variable representing the change in the proportion of university students in the population, but with a negative sign, meaning that as the per capita GDP increased, the proportion of university students decreased. While the university student variable was meant as a proxy for education (as data on the number of college graduates and other measures were unavailable for this study), the literal meaning of the relationship between an increasing proportion of university students in the population and a decrease in per capita GDP could be that an increase in current students represents an investment in the future but a cost in the present as less of the population is involved in generating production in the workforce. While this is the only significant result for the variable, the variable had the same sign and a similar magnitude, suggesting that it may be more probable than its significance would indicate across the models.

The least dependable result was the positive relationship between the change in the urban sprawl index and the disposable income variable. Not only was it only significant in this model but it had a very small magnitude in the other two models. Further, it only appears in the disposable income model, the one with the lowest correlation with the other two

dependent variables, suggesting the effect may be most related to disposable income. The increase in disposable income related to decreasing sprawl may be related to greater investment in empty housing when the population has greater savings. Alternately, a population with greater income may be able to demand lower-density living arrangements with more open space and more parks.

Conclusion

Housing price is not a good measure of urban development in the case of China in the way that it is in most capitalist markets without the unique features of the Chinese housing market. This study first emerged from attempts to parallel Korean studies using housing price as an indicator of development. Population and per capita employment figures share similar defects as measures of urban development in the People's Republic of China, though they may be more easily fixed than the multiple problems with housing price and thus may be viewed skeptically when viewed as comparative variables.

Other measures or a combination of measures that take into account vacancy rates may help to paint a more complete picture of the dynamics of the Chinese housing market, along with more detailed hedonic studies to paint a picture of the component parts of housing price in China. On the other hand, the difficulties of the market may bring about a collapse in prices as increasing marketization brings the Chinese housing market more in line with market patterns.

Controlling for the size of population, tourism contributed to regional gross production, GDP, and individual disposable income and thus to urban development in the 99 cities considered over the ten years. This suggests that continued tourist development that does not sacrifice other features of the city but that builds on and enhances those features as suggested by amenity/scenes studies to develop the tourism market to benefit local residents as well as foreign and domestic tourists. This is consistent with the trend finding the importance of such elements as important factors in Korean cities

Fixed cultural investment may help develop this process and contribute to development as well, at least in terms of RGP and GNP, if not disposable income. Local government cultural spending should be focused on developing and attracting such capital investments from both public and private sources. The typical orientation of such spending on cultural events does not appear to be related to development. The wise investment, even when

creating short-term projects, would seem to be to build an infrastructure for future events so that capital investments today can be the basis for future cultural events.

The issue of the apparent inverse relationship between GDP and proportion of university students should be investigated further to confirm its meaning and better variables should be found to represent education to make the education contribution clearer..

The relationship between increasing sprawl and increasing income suggests that there may be a trend towards increasing land use in line with development, a finding that follows from Lee (2012). That study also looked at a large number of Chinese cities and found a relationship between accelerating land use and urban development. It is possible that further detailed studies of the housing market, breaking it down into its components may provide more definitive answers to the relationship. The looming issue of the high vacancy rate in major Chinese cities and the inability of government at any level to curtail the phenomenon calls for more study because the issue is not likely to go away unless it is brought to a sudden end by economic calamity. Considering, on the other hand, that accelerating land use may come from causes like increasing affluence and more roads along the lines of US sprawl, then compact urban design would be solution, though more human designs with more access to open space and parks and nature and that pay attention to quality of life are more important than simple building straight up to save space.

China has been undergoing a very rapid phase of development that has left it with striking accomplishments alongside the usual problems of urbanization, including congestion, pollution, loss of natural resources, and a less human urban environment. Other nations, such as South Korea have moved from a period of rapid development to a model of more balanced growth in a more livable environment. The results of this study suggest that China may be moving in such a direction of combining urban development with some of the factors that make the urban environment better for its residents.

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