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Urban Development and the Rise of China

The monocentric urban model has long generated conclusions about the correlations between urban expansion and the fundamental building blocks of economies. As the past few decades have been accompanied by the rapid evolution of developing countries, economists have relied heavily on the monocentric model to uncover trends in these urbanizing landscapes. In particular, the scale of urbanization in China is without precedent in history. Sixty years ago, merely 15% of people in China lived in cities. Today, urban settlers comprise of 45% of the overall population, with a projection of 60% by 2030. China's economic boom has led to a drastic transformation in its urban landscape, and with a bright economic future ahead, there is no doubt that further transformations must take place in order for China to continue its journey towards becoming a developed country.

Introduction

In examining the evolution of urban landscape in China, I will focus on three studies that explore the topic from different perspectives. In the first study, *Land and residential property markets in a booming: New evidence from Beijing*, Siqi Zheng and Matthew E. Kahn use the urban monocentric model to examine Beijing, additionally exploring how the capitalization of local public goods contributes to urban development. In the second study, *Growth, Population and Industrialization and Urban Land Expansion of China*, Xiangzheng Deng, Jikun Huang, Scott Rozelle and Emi Uchida, adapts the basic empirical monocentric model to urban China, determining some of the key variables driving the country's urban expansion. Both studies introduced above conclude that the monocentric model does align with the urban development of cities throughout China. Finally, the last paper I refer to explores the rise of "megacities," such as Beijing, and the necessary path towards polycentricity in order to achieve continued and balanced urban development. In *Beijing-the Forming of a Polycentric Megacity*, Dong Zhi and Kong Chen provide a thought-provoking analysis of the problems of a monocentric Beijing, and leave us with suggestions of how rapid urban development

in China can be sustained without negative effects if Beijing becomes a polycentric megacity through the inclusion of its neighbors Tianjin and Tangshan.

1.1. Urban Expansion in Beijing

China's economic boom has sparked explosive growth of new reconstruction in Beijing's housing market. As the capital city of China, as well as the political and cultural hub of the nation, Beijing's population grew by 40.6% between 1991 and 2005. Consequently, this steep rise in demand for housing in Beijing has sparked escalating real estate development, instigated by long-term leases from the government (urban land is owned by Chinese government), both through negotiations as well as rigorous auctions (Zheng et al., 744). Having been born in China and personally experienced what it was like before the real estate policy changes that took place in 1988, traditionally, Beijing's urban land was assigned through a central planning system, where housing units were built in accordance to the location of workplaces, to provide subsidized housing for employees. After the reforms, old homes in Beijing were taken down to make way for more luxurious housing and commercial projects, significantly increasing the spread of the Central Business District, which represents the area surrounding the historic TianAnMen Square. In addition, it is important to note that after the implementation of the open-door policy, the structure of the Chinese economy transformed from an agriculture-based sector to a predominantly manufacture/service-based sector, which evidently affected urban land development.

Another critical factor that needs to be taken into consideration to clearly understand the role of Beijing is that it is one of four cities (known as municipalities) in China that act as provincial entities, with the autonomous right to govern all social and economic development within their jurisdictions. Furthermore, recent reforms promoting urbanization have resulted in the implementation of trial areas known as "Special Economic Zones," where cities like Shenzhen and Tianjin receive privileges such as tax exemption, infrastructure construction and international trade. Since the 1980s, the gradual expansion of SEZs in China has created "windows" for foreign direct investment, generating foreign exchanges through exporting products and importing advanced technologies, ultimately accelerating the process of inland economic development.

1.2 Data Sets used in Beijing

Zheng and Kahn use three data sets to test the monocentric city model. The first is a housing project data set that contains a record of 920 new housing projects, with an average of 791

housing units in each, between 2004 and 2005. The second is a land parcel data set, which includes information about land parcel auctions from 2004 to 2006 (Zheng et al., 746). Both of the data sets above are used to analyze the prices of Beijing's land and housing projects as a function of distance to the CBD. The third data set contains information on housing projects and their proximity to local public goods such as public transportation, educational institutions, crime levels and environmental sustainability, depicting how public goods capitalize housing prices. The results of the study conclude that the monocentric model is a good representation of Beijing's urban development.

1.3 Testing the Monocentric Model in Beijing and Variable Specification

$$\begin{aligned} \text{Log}(\text{Price}_{jqt}) = & B * \text{Distance to City Center}_{jqt} \\ & + \text{controls} + U_{jqt}. \end{aligned} \quad (2)$$

The empirical analysis is done through estimating hedonic pricing regressions. For housing projects, j represents a project at location q in year t . For land parcels, j represents a parcel at location q in year t (Zheng et al., 751). The regressions are controlled for the region of Beijing in which the land is located, partitioning the city center into four quadrants, with TianAnMen Square as the point of origin. This ensures that the differences in the various regions that result from factors aside from distance to CBD are captured. The estimation equation run for the land parcel data found that an extra kilometer of distance from TianAnMen Square decreases the price of residential and commercial land by 4.8%. When the regression was run for residential housing, the land price gradient dropped to 4.3%, indicating a higher value of land for commercial purchases. The second estimation run for housing projects predicted a 2% decrease in price per kilometer away from the CBD (Zheng et al., 751).

Furthermore, Zheng and Kahn's inclusion of local public goods in determining housing prices is advantageous because the location of public goods is determined exogenously in China, due to the former central planning system. After running multiple regressions, it was found that the explanatory power increases when controlling for distance to local public goods, where air quality, parks, universities and schools have an impact on home prices, while transit and crime have no significant effect (Zheng et al., 754). Since this paper was published in 2005, it would be interesting to see whether the transformation of the public subway system, which has expanded to 14 lines and now ranked fourth in the world, would be significantly relevant today.

2.1 Monocentric Model of China and Measures of Urbanization

Deng et al. tested the hypotheses of the monocentric model throughout China, through a unique three-period panel data set of high-resolution satellite imagery data and socioeconomic data for entire area of coterminous China. The testing of the model utilizes four key determinants: income, population, agricultural rental, and transportation costs. Included is also a time trend variable to control for five decades worth of data to capture the time-variant unobservable factors. Methodologically, the study relied on the OLS estimator (Deng et al.,6).

The unit of measure in the study is the *county*, which is the third level in the administrative hierarchy in China, below province and prefecture. With over 2000 counties in China, this analytical unit can be regarded as both an administrative and economic region, which has the power to determine its own land usage (Deng et al., 8). Within the county, areas are broken up in the urban core, rural settlements and other built-up areas, where counties with more than one urban settlement make up the urban core. Further, the expansion of the urban core throughout time is defined as the built up area. Rural settlement refers to built-up areas in small villages (Deng et al., 9).

The focus of analysis is on the urban core, and to overcome the administrative shifts in county boundaries, two counties that had been subject to border shifts would be combined into a single unit. China's four provincial municipalities would encompass all cities within its administrative region, which resulted in a total of 2,348 analytical units (Deng et al., 11). Two key control variables are the measure of distance in kilometers from a county to the provincial capital, and the measure of distance between a county and the nearest port city. Data showed that changes in urban core was significantly associated with changes in GDP, as well as the rate of growth in industry and rate of growth of the service sector, which is consistent with the monocentric model (Deng et al., 15).

2.2 Empirical Model and Variable Specification

$$UrbanCore_{it} = f(GDP_{it}, Population_{it}, AgriInvest_{it}, DensityHwy_i, GDP2_share_{it}, GDP3_share_{it}, DistPort_i, DistProvCapital_i, SharePlain_i, Rainfall_i, Slope_i, Temperature_i, Elevation_i, UrbanCore_{1988,i}) \quad (4)$$

The equation above models the differences in the spatial scale of cities across space and over time, where *UrbanCore* is the total area found in the i^{th} county in year t . The explanatory variables include *GDP*, *Population*, *AgriInvest* (measure of investment allocated to agriculture is proxy for rent) and *HnyDensity* (proxy for commuting costs). The measure of industrialization is constructed as the value of GDP from the industrial sector divided by total GDP (*GDP2_share*), and the same measure

was created for the service sector (*GDP3_share*). Control variables include climate, elevation, terrain and distances from provincial capitals and port cities (Deng et al., 23).

The results of the multivariate analysis show that growth in GDP is highly correlated to the expansion of the urban core, with a coefficient of 0.397, representing at 3.97% expansion of the urban core for every 10% growth in GDP. Population is significant and positive with a coefficient of 0.057 while *AgriInvest* is negative, which is in accordance with the monocentric model. The coefficient on transportation cost is also positive, indicating that when transportation networks are well developed and commuting costs are low, the urban core should expand more. Further, when geophysical factors are included in the model, the coefficients of the variables retain their same signs (Deng et al., 26). Ultimately, the paper concludes that when the monocentric model is applied to cities in China, there is fairly high explanatory power, highlighting that if China wants to continue growing at high rates, urban expansion is essential.

3.1 Beijing's Path to Polycentricity

In contrast to the studies above, Dong and Kong examine the transformation of Beijing into a “megacity,” an emergent concept that falls under a subgroup of a metropolitan region with over ten million people (Dong & Kong, 13). In the recent decades, the emergence of Asian megacities have surpassed the growth rate of those in developed regions, with an average population density of 8,800 persons per km², double that of developed countries. The paper delineates the advantage of transforming Beijing from a monocentric megacity with a primary CBD, to a polycentric region comprised of Beijing, Tianjin and Tangshan (BTT) (Dong & Kong, 10). The monocentric Beijing megacity model has many flaws, including the capital city's unique restrictions on development, the intensification of traffic jams, decreased quality of life due to high population density, and the destruction of historical monuments (Dong & Kong, 48). The polycentric transformation of Beijing is a natural advantage that will increase the quality of labor force, release traffic congestion, create access to more raw resources, halt the urban development contaminating the vicinity of the historic center, and ultimately balance urban growth through each region's specializations. The original plan of transforming Beijing into an international exchange center aligns with the development of a polycentric city, where economic functions can be transferred to areas within the polycentric Beijing and ease the excessive functional pressure within the city (Dong & Kong, 53). The urbanization of many Chinese regions similar to the BTT will also have to adopt a polycentric model in order to achieve balanced development.

Conclusion

In an age of rapid growth and expansion in the developing world, it is imperative to evaluate the efficacy of smart growth conditions to ensure sustainable urban development. After two decades of rapid economic growth, urbanization in China threatens to produce damage to the environment, shortage of land resources, and social inequality. Through the investigation of the various studies presented above, I aim to uncover some of the fundamental factors that impact urban growth in Chinese cities, in accordance to classical urban economic models. To further this discourse, I have touched upon some of the concerns illuminated by Dong & Kong, regarding the sustainability of the monocentric model in megacities such as Beijing, and the benefits of moving towards a polycentric model. As large megacities such as Beijing continue to expand, polycentric urban development seems to be a natural transition, improving commuting patterns, reducing congestion, lowering development costs and increasing administrative efficiency.

Works Cited

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