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Growth, population and industrialization, and urban land expansion of China

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Abstract

China is experiencing urbanization at an unprecedented rate over the last two decades. The overall goal of this paper is to understand the extent of and the factors driving urban expansion in China from the late 1980s to 2000. We use a unique three-period panel data set of high-resolution satellite imagery data and socioeconomic data for entire area of coterminous China. Consistent with a number of the key hypotheses generated by the monocentric model, our results demonstrate the powerful role that the growth of income has played in China's urban expansion. In some empirical models, the other key variables in the monocentric model—population, the value of agricultural land and transportation costs—also matter. Adapting the basic empirical model to account for the environment in developing countries, we also find that industrialization and the rise of the service sector appear to have affected the growth of the urban core, but their role was relatively small when compared to the direct effects of economic growth. We also make a methodological contribution, demonstrating the potential importance of accounting for unobserved fixed effects.
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Economists in urban economics have long been interested in understanding the process of urbanization. In one of the earliest theoretical efforts, researchers defined and identified theoretically a number of the causes and consequences of the expansion of urban land [1,20,23]. Among other things, the monocentric urban model generates hypotheses linking the changes in urban land area to some of the fundamental building blocks of economies: income, population, agricultural land values and transportation costs. In subsequent years, empirical economists have tested these hypotheses with increasingly large data sets and increasingly precise measures. Many of them—from Brueckner and Fansler [2] to McGrath [18]—find support for the prediction of the monocentric city model.

Interestingly, although perhaps unsurprisingly, almost all large, systematic studies of the determinants of urban area have been done in developed countries. This is in spite of an argument that an understanding of urbanization is even more important in the developing world since cities are growing faster in developing countries, problems related to the conversion of land into built-up area are more severe and the scope for intervening (as well as the potential gains from good policies) may be greater. That is not to say that there have not been efforts to study the process of urbanization in developing countries and its causes [10,27,29,30]. But, most likely due to data limitations, large, nationwide econometric studies using high quality data are rare.

In response, the overall goal of this study is to provide empirical-based evidence that will help answer several key questions on the extent and causes of urban land expansions in the developing world—focusing in our case on China. Specifically, this study will begin with a conceptual framework from the urban economics literature and test a series of hypotheses from the monocentric city model using a China-wide dataset on the expansion of urban area in more than 2000 "metropolitan regions" over time. In the pursuit of this objective, we will seek to answer several fundamental questions about China: During the reform era, what has been the extent of urban land expansion of China? What are the main determinants that explain urban land expansion during the reform era? Which factors have been the *most important* in terms of their impact on the expansion of urban land? Taken together, we hope that we can provide information to policymakers about the extent and main causes of urbanization in China so that urban land use policy will have a more empirical basis. More generally, we also will show that when urban economists have access to data over time the choice of methodology that can control for many of the unobserved factors which affect the expansion of a region's urban area will affect the findings.

The rest of this paper is organized as the follows. The next section reviews the urban economic literature—both theoretical and empirical—and motivates the hypotheses to be tested. The third and fourth sections introduce the data used in this study and review the record of urban land expansion across China and how it correlates with some of the key variables that we are interested in. The fifth and sixth sections present the empirical model and describe the findings of the two main parts of our analysis: the determinants of urban expansion (in the econometric analysis) and measurement of the importance of the different determining factors (in the decomposition analysis). The final section concludes.

1. Spatial scale of cities: theoretical and empirical background

The fundamental theory in urban economics relevant to spatial expansion of urban areas is the monocentric urban model [1,20,23].[1] In the model x denotes the distance from the central

[1] More recent studies have argued that the monocentric urban model is inadequate to explain the more complex, polycentric structure of the metropolitan regions in the US (e.g., Fujita and Ogawa [7], Garreau [8], McDonald [17]).

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