



Polycentric development under public leasehold: A spatial analysis of commercial land use rights

Jin Murakami, Zheng Chang^{*}

Department of Architecture and Civil Engineering, City University of Hong Kong, 6/F, Yeung Kin Man Academic Building, Tat Chee Avenue, Kowloon, Hong Kong Special Administrative Region

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ABSTRACT

This study inspects the urban spatial structure of growing megacities on a polycentric or edgeless development pathway under public leasehold systems using transaction data on commercial land use rights within the Shanghai metropolitan area for 2004–2016. Both zone-level supply and parcel-level demand equations are estimated to address whether the spatial distribution and price formation of commercial land use rights are associated with: (1) existing district centers and/or new employment subcenters; (2) highway and/or metro extensions; and (3) two suburban airports. Three sets of empirical findings describe how the transfers of commercial land use rights from local governments to property developers significantly predetermine the long-term trajectory of polycentric or edgeless development in emerging economies under public leasehold systems.

1. Introduction

Over the last few decades, the polycentric formation of major cities and extensive metropolitan areas has widely been recognized across developed and developing countries (Clark, 2000; Fernández-Maldonado et al., 2014; Hall and Pain, 2006; Liu and Wang, 2016; Liu et al., 2017; Sweet et al., 2017; Taubenböck et al., 2009, 2017). Indeed, many researchers in urban economics and economic geography have paid special attention to the identification and transformation of employment subcenters beyond traditional downtowns and central business districts (CBDs), most noticeably in large US metropolitan areas. The emergence of suburban office and retail clusters around freeway intersections and regional airports for the US's new service economy by the late 1980s was narratively described as “edge cities” and the diminishing cohesiveness of edge cities and the spatial dispersion of office estates in later years were increasingly observed as “edgeless cities” (Cervero, 1986; Garreau, 1991; Lang and LeFurgy, 2003; Lang et al., 2009; Lee, 2007). Theoretical understanding of the growth or decline of such postindustrial employment subcenters has been based mainly on the trade-off between agglomeration economies in production (centripetal forces) and scale diseconomies arising from transportation inefficiency, land use inadequacy, and increased congestion (centrifugal forces). This trade-off can be modeled as dynamic spatial equilibria or a few decades of

change in workplace density and/or land rent at different locations within a metropolitan-wide office market (Anas et al., 1998; Fujita and Ogawa, 1982; Glaeser, 2008; O'Sullivan, 2007; Sullivan, 1986; Zhang and Sasaki, 1997, 2000).

Alongside urban spatial structure hypotheses, several empirical studies have been conducted to clarify the polycentric formation and/or edgeless expansion of large US metropolitan areas (e.g., Chicago and Los Angeles) using employment and property price data during the past few decades (Forstall and Greene, 1997; Giuliano and Small, 1991, 1999; Giuliano et al., 2007, 2012; Gordon and Richardson, 1996a, 1996b; Greene, 2008; McDonald and McMillen, 1990, 2000; McMillen and McDonald, 1998; McMillen and Smith, 2003; Redfean, 2007, 2009a). These urban spatial structure analyses typically have examined the significance of proximity to traditional downtowns, new employment subcenters, highway interchanges, public transit stations, suburban airports, and/or labor market accessibility in determining intra-metropolitan employment distribution and rent capitalization (see also Appold, 2015; Appold and Kasarda, 2013; Matsuo, 2011; Ryan, 2005). While researchers have acknowledged that the key determinants explain private developers' rational behavior for profitability in the U.S. real estate market, less has been ascertained about the influences of local governments' entrepreneurial development policies and land use planning practices on the competitiveness and sustainability of polycentric

^{*} Corresponding author.

E-mail addresses: jin.m@cityu.edu.hk (J. Murakami), zchang@cityu.edu.hk (Z. Chang).

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Table 1
Economic growth and industrial restructuring in Shanghai and whole of China, 2000–2015.

	Shanghai			Whole China		
	2000	2015	2000–15%	2000	2015	2000–15%
GDP billion CNY	477	2512		10,028	68,551	
Employment million	8.28	13.62		720.85	774.51	
Primary million	0.89	0.46	–48.4	360.43	219.19	–39.2
Secondary million	3.67	4.60	+25.4	162.19	226.93	+39.9
Tertiary million	3.72	8.56	+130.2	198.23	328.39	+65.7
Primary %	10.77	3.38	–7.4	50.00	28.30	–21.7
Secondary %	44.30	33.77	–10.5	22.50	29.30	+6.8
Tertiary %	44.91	62.85	+17.9	27.50	42.40	+14.9

Sources: China Statistic Yearbook; Shanghai Statistic Yearbook

metropolitan formation in a transitional economy (Brueckner, 2000; Harvey, 1989; Henderson and Mitra, 1996; McMillen and McDonald, 2002; Pendall, 1999; Tiebout, 1956).

Newly emerging edge cities or industrial parks in the European region and other developing regions of the world, with a higher degree of public sector intervention or public–private partnerships in different institutional backgrounds, cannot be characterized as mere copies of their US counterparts (Bontje and Burdack, 2005; Garcia-López et al., 2017; Hudalah and Firman, 2012; Hudalah et al., 2013; Kloosterman and Musterd, 2001; Musterd et al., 2006; Riguelle et al., 2007). In the context of China, for example, the polycentric formation or edgeless expansion of major cities and large metropolitan areas has been addressed from the viewpoint of economic liberalization, fiscal decentralization, and land marketization along with mega transportation and other capital investments under a public leasehold system (Ding, 2003; Liu et al., 2005; Shen and Wu, 2013; Wu, 1998; Wu and Phelps, 2012; Wu and Yeh, 1999; Yue et al., 2010, 2013; Zhang, 2000).

Recently, empirical research across the major coastal and inland cities of China has begun to show that place-based economic development policies have attracted substantial amounts of foreign direct investment (FDI) into new industrial parks at the edges of large metropolitan areas for accessibility advantages and have generated local spillover effects on manufacturing productivity and housing demand (Huang and Wei, 2014; Huang et al., 2017a, 2017b; Wen and Tao, 2015; Zheng et al., 2017). The findings on China's industrializing or industrialized suburban landscape are certainly associated with the effectiveness of land policy reforms, mega infrastructure projects, and municipal financing schemes. However, there is a lack of empirical research on what manner the polycentric formation and/or edgeless expansion of large metropolitan areas in China has been configured by the state-led distribution and market-driven development of new suburban office towers, shopping malls, and related service facilities under a public leasehold system, especially from the perspective of a postindustrial economy in major coastal city-regions.

Our empirical work builds on the urban spatial structure literature using zone- and parcel-level data on almost all major land use rights transacted for commercial estate development under public leasehold during 2004–2016 within Shanghai—the foremost globalizing economy and greatest coastal metropolis in China. In particular, this spatial data analysis based on the framework of neoclassical economics provides evidence on both the intra-metropolitan spatial distribution (supply) and price formation (demand) of commercial land use rights in China, with respect to locational proximity to existing district government centers, newly designated business subcenters, highway interchanges, metro stations, and two major airports. The findings are compared with the key determinants of polycentric employment growth (decline) or rent capitalization under market freehold examined in large US metropolitan areas (e.g., Chicago and Los Angeles). Shanghai's urban spatial structure analyzed in this study demonstrates the importance of transacting commercial land use rights from entrepreneurial local governments (initial land suppliers) to competitive property developers (intermediate land consumers) in predetermining the long-term trajectory of polycentric

formation or edgeless expansion in developing countries and emerging markets under public leasehold during a short period of economic growth and industrial restructuring.

The remainder of this paper is organized as follows. Section 2 provides a background on Shanghai's economic growth and restructuring, polycentric development strategy, transportation network extensions, and interjurisdictional land administration. Section 3 explains the empirical strategy and data organization for the analysis of interjurisdictional distribution and price formation of commercial land use rights within the Shanghai metropolitan area. Section 4 reports the empirical results, and Section 5 concludes with key findings, international implications, and analytical challenges for future research.

2. Background on Shanghai

Shanghai is regarded as one of the world's most populous metropolises, with around 24 million inhabitants in a total area of 6340 km². This great metropolis has developed by absorbing nearly 10 million people over the last 2 decades and is predicted to accommodate about 7 million more residents by 2030, mainly for its economic competitiveness and employment opportunities (UNDP, 2009; United Nations, 2014). According to the Brookings Institution (2016), Shanghai's gross metropolitan product (GMP) increased at an annual rate of 10.1% and reached US\$809 billion in 2015, recording US\$3187 of inward FDI per capita for 2009–2015, both of which are the largest amounts among all China's major and emerging metropolises. It is noticeable that Shanghai's metropolitan-scale economic progress during the last 15 years has relied not on massive employment growth in the manufacturing sector (an increase of 0.93 million people or but a decline in share of 10.5%) but rather a structural shift toward the knowledge- and service-based sectors (increases of 4.83 million people and 17.9% in share), as shown in Table 1. Not surprisingly, Shanghai's drastic industrial restructuring (or “deindustrialization”) in recent years has been state-led to a large extent. Since 2005, the municipal government has intensively introduced a range of new economic programs for the acceleration of Shanghai's modern service economies, aiming to raise the contribution of the tertiary sector above 80% of GMP in urbanized areas.

Economic growth and industrial restructuring have called for the state-led reconfiguration of the traditional city center, former and existing district centers, and new employment subcenters across local jurisdictions within the Shanghai metropolitan area. Learning from the economic and environmental problems of monocentric urban growth from other megacities in developed countries (e.g., Greater Tokyo), Shanghai's municipal government sequentially decided to establish multiple new employment subcenters (named “mini-CBDs”) surrounding the traditional city center in 2006, 2007, and 2012, mostly by converting former industrial parks or upgrading old commercial districts along with floor area ratio increases, transportation infrastructure investments, and

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