



# Land development, search frictions and city structure <sup>☆</sup>



Yasuhiro Sato <sup>a</sup>, Wei Xiao <sup>b,\*</sup>

<sup>a</sup> Graduate School of Economics, Osaka University, Japan

<sup>b</sup> Research Institute of Economics and Management, Southwestern University of Finance and Economics, China

## ARTICLE INFO

### Article history:

Received 8 April 2014

Received in revised form 19 October 2014

Accepted 23 October 2014

Available online 1 November 2014

### JEL classification:

R14

R21

R28

### Keywords:

Land development

City structure

Search frictions

Spatial mismatch

## ABSTRACT

This paper analyzes the interactions between labor and housing (and land) markets in a city. We develop a monocentric city model involving land development and frictional unemployment and characterize the city's spatial configurations in equilibrium. To better understand the properties of equilibria, we implement a comparative steady state analysis. Further, we explore the effects of policies such as (a) a tax on land development to subsidize residents' consumption, (b) a subsidy to improve the transportation infrastructure financed by a lump-sum tax, and (c) income transfers from employed to unemployed workers. Finally, we provide an extension wherein the job arrival rate is endogenous and depends on distance to jobs.

© 2014 Elsevier B.V. All rights reserved.

## 1. Introduction

The incidence of unemployment is unevenly distributed across different areas within cities. In several large U.S. cities, unemployment rates are higher in city centers than in the suburbs.<sup>1</sup> In other countries, the variation of unemployment rates in different areas within a city can also be observed, although the pattern becomes more complex.<sup>2</sup> For instance, in Japan, the three largest metropolitan areas (MAs) exhibit different patterns<sup>3</sup>: in the second largest city, Osaka MA, the unemployment rate is higher in the city center than in the suburbs (in 2005, it was 0.108 in the central city and 0.068 in the suburban areas). In the third largest city, Nagoya MA, the opposite holds true (the unemployment rate in 2005 was 0.055 in the

central city and 0.044 in suburban areas). In the largest city, Tokyo MA, we observe no systematic spatial difference in the unemployment rate (in 2005, it was 0.056 in the central city and 0.056 in the suburban areas). As first shown by Wasmer and Zenou (2002) and further investigated by subsequent studies (see Zenou, 2009), interactions between the land and labor markets can explain these spatial differences in the unemployment rate.

Meanwhile, the intensity of land development greatly varies between different areas within modern cities: buildings close to a city center are usually taller than those in a city's fringe. How is such a land development pattern related to the unemployment distribution? Which types of spatial unemployment configurations result in higher incentives for land development? The answers to these questions will help us to evaluate the efficacy of various land policies, including urban renewal plans such as “City Planning of Downtown Development” in Japan and “A Five-Borough, Ten Year Plan” in New York.

In this paper, we construct a monocentric city model involving frictional unemployment and land development, and provide a complete analysis of the spatial configuration of a city with unemployment. More specifically, we consider a city where all jobs are located in the unique central business district (CBD). Workers in the city are either employed or unemployed due to search frictions in the labor market. Developers rent land from absentee landlords and supply housing services. Each worker obtains utility from the numéraire and housing consumption whereas she/he needs to commute to the CBD in order to work if employed or to search for a job if unemployed. As a benchmark,

<sup>☆</sup> We thank Marcus Berliant, Ping Wang, and Yves Zenou for their comments and suggestions. We also thank two anonymous referees for very helpful comments. Of course, we are responsible for any remaining errors. We acknowledge the financial support from the Research Institute of Economy, Trade and Industry (RIETI) and the Japan Society for the Promotion of Science, through a Grant-in-Aid for Young Scientists (B).

\* Corresponding author.

E-mail addresses: [ysato@econ.osaka-u.ac.jp](mailto:ysato@econ.osaka-u.ac.jp) (Y. Sato), [xiaow@swufe.edu.cn](mailto:xiaow@swufe.edu.cn) (W. Xiao).

<sup>1</sup> A discussion about this phenomenon can be found in the literature on spatial mismatch initiated by the seminal work of Kain (1968).

<sup>2</sup> Zenou (2000) presented a careful comparative review of the spatial distribution of unemployment in U.S. and European cities.

<sup>3</sup> Here, we define Japanese MAs according to the Urban Employment Areas proposed by Kanemoto and Tokuoka (2002).

we first consider the case with an exogenous job arrival rate. By comparing the maximum housing price that each type of worker is willing to pay at each location, we obtain two types of equilibrium: segregated (spatial mismatch) equilibrium in which unemployed workers locate far from the CBD and integrated equilibrium where unemployed workers remain close to the CBD.

As shown by Wasmer and Zenou (2002), such equilibrium configurations may accompany market inefficiency, indicating possible positive roles for policies in improving residents' welfare. Therefore, we use this framework to analyze the policy effects on land use/development and residents' welfare in the two types of equilibria. Here, we focus on the following three policies: (a) a land development policy that taxes housing development in the city to subsidize residents' consumption, (b) a transportation policy that implements a lump-sum tax to improve the city's transportation infrastructure, and (c) an income transfer from employed to unemployed workers. We emphasize the policy effects on land development, which become available by endogenizing land development.

We then extend the model by assuming that the job arrival rate depends on the location of unemployed workers within the city. Following Wasmer and Zenou (2002), we assume that unemployed workers living closer to the CBD have more job information than those residing further away.<sup>4</sup> In contrast to the case with a fixed job arrival rate, three spatial configurations emerge in equilibrium. Apart from the segregated and integrated equilibria, we obtain another equilibrium in which the unemployed workers reside in both the area close to the CBD and the outskirts whereas the employed workers live in the middle area of the linear city. Because the model becomes analytically intractable with an endogenous job arrival rate, we conduct a numerical analysis to discuss the robustness of the results in the benchmark case.

### 1.1. Related literature

Our paper contributes to the literature on city structure and spatial mismatch. Only a few papers have explicitly modeled land development and housing consumption when discussing both aspects in cities with frictional labor markets.

There is an important body of literature in urban economics that discusses the spatial structure of cities. This literature dates back at least to the classic monocentric city model of Alonso (1964), Mills (1967) and Muth (1969) (see Fujita, 1989 for a comprehensive description), which has become the standard framework to explain the observed regularities in real-world cities, such as variations in land development intensity and housing (land) prices. Brueckner (1987) provides a unified treatment of these models, which is built around the key observation that differing commuting costs within an urban area are balanced by differing housing prices. The model in Brueckner (1987) does an excellent job of predicting the internal structure of cities and explaining intercity differences in spatial structure. To account for the observed pattern of higher-income groups locating more peripherally, Hartwick et al. (1976) and Wheaton (1976) extend the monocentric city model with homogeneous workers to incorporate multiple income groups. Although these studies provided complete analyses of the city structure under a perfectly competitive labor market, they did not include unemployment, implying that no scope exists for welfare improving policies.

A growing body of literature considers spatial mismatch in cities with frictional labor markets. Given the prevailing spatial variations in labor market conditions, recent studies have examined interactions between labor and housing (land) markets. Wasmer and Zenou (2002) develop an urban search model by introducing a land market into the search-matching model.<sup>5</sup> In their model, workers' search efficiency is

negatively affected by their distance to jobs. The endogenous location of workers within the city reflects the trade-off between commuting costs, land rents, and the surplus associated with searching. They indicate two possible city spatial configurations that unemployed workers may either be located close to the CBD or in the city fringe, far away from jobs. Sato (2001, 2004) considered the heterogeneity of workers in the background of urban labor markets. In all these models, land and housing markets are not fully modeled: they simply assume that no land development occurs in the city and each worker consumes fixed units of land. Coulson et al. (2001) explained the spatial mismatch by developing a search matching model for a city with central and suburban labor markets. However, the simple city structure is still exogenously given in their model. Our model is the most closely related to those of Smith and Zenou (2003) and Xiao (2014). Smith and Zenou (2003) extend the model described in Wasmer and Zenou (2002) by endogenizing job search intensity and housing consumption whereas they treat land development exogenously, and Xiao (2014) endogenizes land development in the context of a monocentric city with search frictions in the labor market, whereas he assumes fixed housing consumption.<sup>6</sup> In contrast, we endogenize both the demand and supply sides of the housing market in order to examine the full relationship between housing and labor markets, which is indispensable to policy analysis.

To the best of our knowledge, this paper is the first to provide a model with endogenous land development and housing consumption to explore the interactions between land, housing and labor markets in a monocentric city with frictional unemployment. We show that labor market conditions affect the land price, land development, housing price, housing consumption, and city configuration.

The paper proceeds as follows. Section 2 proposes the model. Section 3 characterizes two spatial configurations: the segregated equilibrium and integrated equilibrium. Section 4 explains the results of the comparative steady state analysis, which are useful in understanding the policy effects. Section 5 explores policy performance. Section 6 extends the model by assuming that the job arrival rate depends on the location of unemployed workers. Section 7 concludes.

## 2. Model

### 2.1. Spatial structure

We extend the basic framework of an urban search model developed by Smith and Zenou (2003). Consider a closed city where there is a continuum of workers of size one. Workers are either employed or unemployed. An employed worker works and obtains wage income whereas an unemployed worker searches for a job and obtains unemployment benefits. We follow Smith and Zenou (2003) in assuming the city structure and commuting behaviors of each type of workers: we consider a linear monocentric city, normalize the land endowment at each location to one, and assume that land is owned by absentee landlords. An employed worker commutes to the CBD to work and her/his commuting cost is  $tx$ , where  $t$  is a positive constant and  $x$  is the distance from the CBD. An unemployed worker commutes to the CBD to search for a position and get interviewed by firms posting vacancies. She/he bears the commuting cost  $stx$ , where  $s \in (0, 1)$  represents the search intensity (such as frequency of job interviews). Because our primary purpose is to analyze the housing development in the monocentric city with job search, we simplify the framework of Smith and Zenou (2003) by assuming that  $s$  is exogenous whereas we endogenize the supply of housing service.

<sup>4</sup> For empirical evidence of the links between distance to jobs and the job arrival rate, see Holzer and Reaser (2000) and Ihlanfeldt (1997).

<sup>5</sup> A complete introduction of the search-matching framework can be found in Pissarides (2000).

<sup>6</sup> For the earlier studies relating the labor market to the housing (land) market, see Zenou (2009).

Download English Version:

<https://daneshyari.com/en/article/983698>

Download Persian Version:

<https://daneshyari.com/article/983698>

[Daneshyari.com](https://daneshyari.com)