



On-the-job search in urban areas [☆]

Keisuke Kawata ^{a,*}, Yasuhiro Sato ^b

^a Graduate School of Social Science, Hiroshima University, Japan

^b Graduate School of Economics, Osaka University, Japan

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ABSTRACT

This study develops an on-the-job search model involving spatial structure. In this model, workers are either employed and commute frequently to a central business district (CBD) or unemployed and commute less frequently to the CBD in search of jobs. When an unemployed worker succeeds in off-the-job search, the quality of the job match is determined stochastically: a good match yields high productivity whereas a bad match yields low productivity. While a high-productivity worker does not seek a new job, a low-productivity worker decides whether to conduct on-the-job search, which would require additional commuting to the CBD. Analysis of this model demonstrates that in equilibrium, the relocation path of workers corresponds to their career path. Furthermore, welfare analysis demonstrates that such a spatial structure distorts firms' decision regarding the posting of vacancies.

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1. Introduction

It is clear that urban areas currently play a dominant role as areas of employment and residence throughout the world.¹ In many cities, people live in suburbs and commute from there to business districts. How does the structure of a city and commuting relate to job creation and unemployment within it? Recently, several studies have addressed this question by combining urban and labor economics. These studies have succeeded in providing answers to a certain part of this question by developing search and matching models within urban structures.² This study contributes to this literature by extending the urban search

model à la Wasmer and Zenou (2002) with on-the-job search, i.e., the possibility that employed workers search for a new job, which has been recognized as a significant aspect of job search in labor economics (see Pissarides (2000) (Chapter 4), for example) but not yet fully incorporated into the urban search models.

Wasmer and Zenou (2002) introduced a monocentric city structure à la Alonso (1964) into a job search model on the basis of the key assumption that workers' search intensity is negatively affected by access to jobs concentrated within a Central Business District (CBD). Such an assumption leads to multiple urban configurations in equilibrium, including that of unemployed workers residing close to jobs or unemployed workers residing distant from jobs, with the latter configuration being consistent with the well-known spatial mismatch hypothesis.³ Smith and Zenou (2003) demonstrated that when search intensity is determined endogenously, another type of configuration is obtained in equilibrium: there are two areas where unemployed workers reside, one of which is close to the CBD and the other is distant from it. Employed workers live between these two areas.

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* Corresponding author.

E-mail addresses: keisuke@hiroshima-u.ac.jp (K. Kawata), ysato@econ.osaka-u.ac.jp (Y. Sato).

¹ United Nations (2001) reports that in 2000, 76% of the population in developed countries and 39% in developing countries resided and worked in urbanized areas.

² There are also studies that have addressed this question by using other types of models and have yielded interesting findings. See Zenou (2009a) for a comprehensive survey.

³ First stated by Kain (1968), the spatial hypothesis posits that job decentralization to the suburbs without the residential movement of African Americans has led to a high unemployment rate and low wages paid in inner-city neighborhoods, where African Americans are concentrated. Since then, a large number of empirical studies testing this hypothesis have offered much evidence for its support (see Preston and McLafferty, 1999) for a survey of recent empirical studies).

Crampton (1997) analyzed worker's simultaneous decision regarding job search and residential areas. Rouwendal (1998) demonstrated the possibility of excessive commuting because of the existence of information asymmetry in the job search process. Sato (2004) analyzed how city structure affects workers' job acceptance behavior and the labor market by introducing city structure into a search model with workers' decision to accept a job offer. He found that reductions in urban costs of living such as commuting costs, increase the likelihood that job seekers will accept job offers. Zenou (2009c) proposed a spatial search model in which both job creation and job destruction are endogenous. He demonstrated that in equilibrium, workers with high productivity and wages live close to jobs, have low per distance commuting costs, and pay high land rents. He also showed that higher per distance commuting costs and higher unemployment benefits lead to more job destruction. Zenou (2011) developed a spatial search model in which firms post wages. He found by simulation that when workers have different values imputed to leisure and different equilibrium wages, a reduction in commuting costs for all workers reduces the unemployment rate of high-wage workers and the profit of all firms while increasing the wages of all workers and the proportion of firms paying high wages.^{4,5}

It has been widely accepted in urban economics literature that income levels are related to household residential location patterns (see McCann (2001) (Chapter 3) for a brief summary of this literature). The typical location patterns are such that low-income households live close to the CBD and high-income households locate far from it. In a standard framework in this literature, households are assumed to be different in their income where such difference and income distribution are given exogenously. Land (housing service) consumption is assumed to be a normal good, which implies that high-income households place a higher value on using larger land area than low-income households. This causes high-income households to have a lower incentive to live close to the CBD. Of course, combining other factors such as opportunity costs of commuting time, we can observe much richer location patterns in relation to income distribution.

As seen in Mortensen (2003), in labor economics, it is well known that (wage) income distribution is closely-linked to job search behavior. Especially, on-the-job search has been recognized as an important factor that yields income distribution. Therefore, we introduce on-the-job search into the urban labor market model à la (Wasmer and Zenou, 2002), that is, we introduce the possibility that employed workers seek a new job. This enables us to determine both income distribution and location patterns endogenously in a unified framework. Put differently, our extension can bridge the literature of urban job search and that of the relationship between income and location patterns established in traditional urban economics.

In an on-the-job search environment, employed workers seek a new job when they are dissatisfied with their current jobs. In traditional urban economics, people change their locations when they land a new job and obtain higher wage income. This study explores the possible interactions between such a career path in the labor market and a relocation path in the urban land market. To do so, the monocentric city model of Alonso (1964) is combined with the on-the-job search model developed by Pissarides (1994), in which workers are either employed or unemployed. An employed worker

frequently commutes to the CBD to work whereas an unemployed worker commutes less frequently to the CBD in order to seek a job. When an unemployed worker succeeds in obtaining a job (i.e., succeeds in off-the-job search), the quality of the job match is determined stochastically: a good match yields high productivity whereas a bad-match results in low productivity.

While high-productivity workers do not seek a new job, low-productivity workers decide whether they should seek new jobs. On-the-job search requires additional costs of commuting to the CBD, which leads to the following urban configuration: currently employed job seekers (on-the-job searchers) live closest to the CBD, unemployed workers (off-the-job searchers) live most distant from the CBD, and employed workers not seeking a new position (non-job-searchers) live between the former two. In this model, spatial relocation corresponds to a career path, with the career path from unemployment to employment or from on-the-job search to a good-match entailing relocation from the outskirts of a city to an inner area of the city or from the innermost area of the city to the suburbs. Thus, our framework establishes both the relationship between income and location patterns that is consistent with the traditional urban economics view on one hand and the spatial mismatch phenomenon on the other. The former relationship comes from the existence of on-the-job search in our model and not from the difference in land consumption among households with different income. From this viewpoint, our result provides a new view on a well-accepted fact and complements the traditional arguments.

Spatial structure also impacts the efficiency properties of the model. This model proposes that while the decision regarding on-the-job search is efficient, firms' decision regarding job vacancies is distorted even under the Hosios (1990) condition, which contrasts with the findings of related studies of spatial off-the-job search models, such as those of Wasmer and Zenou (2002) and Zenou (2009a).

The rest of this paper is structured as follows. Section 2 introduces the model's basic structure. Section 3 demonstrates the existence and properties of a unique equilibrium. Section 4 addresses issues regarding efficiency and Section 5 concludes the study.

2. Model

Consider a closed, linear, and monocentric city whose land is owned by absentee landlords. It has one CBD, whose location is approximated by one point and within which all firms are assumed to be exogenously located.⁶ A continuum of risk-neutral workers of size N lives within the city. Although identical ex ante, the workers become heterogeneous after entering the labor market because of the occurrence of stochastic events, with u of N being unemployed and $N-u$ being employed. Although unemployed workers seek a job, employed workers earn wage income that depends on their productivity, y , which is either high or low and determined randomly upon the job match, with a good-match yielding high productivity, y_h , and a bad-match yielding low productivity, y_l . The subscript, h (l), represents that the variable is related to a good (bad) match. We assume that $y_h > y_l$ and $\Pr(y = y_{j \in \{h, l\}}) = \alpha_j \in (0, 1)$ ($\alpha_h + \alpha_l = 1$). Furthermore, it is assumed that y_l is sufficiently large such that even if a match yields low productivity, the worker prefers to be employed rather than unemployed, and her/his employer does not dismiss her/him. We assume that on-the-job search is possible, such that a low-productivity worker can seek a new job while working.

In the city, all workers occupy the same amount of the land (normalized to 1) outside the CBD. We assume that the density of land is

⁴ For a comprehensive survey of this literature, see Zenou (2009a), among others.

⁵ Sato (2001) also developed a job search model involving a monocentric city structure. However, he assumed that because all types of workers have the same commuting costs and the same level of housing consumption, the residential location of a particular type of worker cannot be determined. Therefore, he focused on the effects of the overall cost of living, which depends on the population size of the city and on the local labor market. He found a link between agglomeration economies and the worker-firm matching process by providing the conditions of the matching process necessary for the existence of agglomeration economies, as did Wheeler (2001) in a separate study using a different model.

⁶ This model of a centralized city can easily be modified to describe a decentralized city by locating all firms within a suburban business district located at one end of a linear city. Such a modification would not alter the results of this study.

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