

# 行政院國家科學委員會補助專題研究計畫成果報告

## 以城市作為勞動力的篩選裝置 City as a Screening Device of Labor

計畫類別： 個別型計畫          整合型計畫

計畫編號：NSC 90 - 2415 - H - 004 - 024

執行期間：2001年8月1日至2002年7月31日

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#### 中文摘要

本文建立一個搜尋均衡模型，其中不同工作能力的勞動者將依其能力高低選擇居住在不同規模的城市或是郊區中。我們發現勞動者將會選擇居住在與其能力相當的城市中（也就是該勞動者之工作能力接近該城市所有勞動者的平均工作能力）。具高工作能力的勞動者，雖然會冒著較高的失業風險，但卻受到高工資率的吸引而前往能提供高工資率的高生產力之城市。在一個穩定狀態的均衡下，高生產力的城市之城市規模將大於低生產力的城市；此外，城郊工資率的差異也會隨著城市的規模變大而變大。在本文的模型中，城市之數目是內生決定的，且其均衡解不但唯一，也是社會最適解。如果考慮到公司對工作難度的要求所產生的勞動市場摩擦，對城市規模、城郊工資率差異及城市數目的影響將變為不明確，但若是勞動市場摩擦性問題不嚴重，本文之結論則不會改變。在缺乏個別勞動者工作能力的資訊之情況下，對工作難度有不同要求（生產力高之公司之工作難度要求也高）的公司而言，則可透過區位之選擇，以城市規模大小作為篩選機制，找到適任之勞動者。

關鍵詞：搜尋均衡模型、城市規模、勞動市場、工資率差異、失業率

#### 1. Abstract

In this paper, we construct a search equilibrium model in which heterogeneous workers sort themselves into rural and urban

areas according to their abilities. We find that a worker tends to search for employment in a city where his ability is close to the average ability of workers in the city. Thus a worker with high ability goes a city that is more productive because of a high wage rate, taking the risk of being unemployed at the same time because of a tight local labor market there. In a steady-state equilibrium, we found that productive cities are larger than those less productive and that the wage gap between urban and rural areas increases with the city size. We also show that the number of cities is endogenous and that the steady state equilibrium is unique, as well as a social optimum. With friction in the part of firms with different job requirements, the impacts of mismatch on city size, wage, and the number of cities become ambiguous in the resulting equilibrium, but remain the same if the market friction is not so severe. Without the information about individual worker's ability, firms with different job requirements (more productive firms require higher job requirements) can find workers with corresponding abilities through locational choices by using city size as a screen device.

Keywords: Search Equilibrium Model, City Size, Labor Markets, Wage Gap, Unemployment Rate

#### 2. Motivation

In a recent empirical paper, Glaeser and Maré (2001) found three central facts that are of interest to us: (1) Wage are 32 %

higher in large MSAs (metropolitan statistical areas) than in non-MSAs, but only 21 % higher in smaller MSAs than in non-MSAs; (2) The wage gaps don't fall very much when observable worker characteristics are controlled for but fall a lot when unobservable characteristics are controlled for using fixed effects; and (3) The wage gap increases with age or experience. The authors centered their interpretation of the data on (3), and stated that cities are generators of human capital growth. To us, however, the most important question is how to model these phenomena in terms of economic forces. To our knowledge, there is no theoretical model that can reconcile all facts mentioned above.<sup>1</sup> In this paper, we focus on the mechanism that may explain the emergence of wage gap as a result of the interactions of workers' and firms' decisions. As pointed by the title, we also show that how cities can be used as a screening device that help firms with imperfect information about worker's ability to find their partners. The main idea of this paper is that the differences of friction between rural and urban labor markets may sort out workers and locate them in different localities according to their abilities. A worker may tend to search for employment in city where the average ability of workers in the city is close to his own ability. Thus, a worker with higher ability may choose city that is more productive because of a higher wage rate provided there. Meanwhile, he might also take the risk of being unemployed because a tightness labor market maybe present in the city. For this reason, we construct a search equilibrium model of Diamond (1982). Not only does the model explain well the wage gap between rural and urban areas, but it also provides analytical results in congruence with some urban phenomena. For instance, unemployment rates are higher in large cities. Moreover, with some plausible assumptions, we can

show that the number and the size of cities in this economy can be endogenous.

### 3. Results and Discussion

We found that the steady state equilibrium of rural and urban labor markets processes the following properties, as predicted by Glaeser and Maré (2001):

- (1) The city size increases with the average ability of workers in a city.
- (2) The wage level of a city and wage gap between rural area and the city become bigger as the city size being enlarged.
- (3) The labor markets of bigger cities are tighter than those of smaller ones. That is, it is more difficult to have a match between workers and firms in large cities. Hence, the unemployment rate tend to be higher in large cities.

Moreover, we also find that there exists a unique steady state equilibrium in our search equilibrium model, which is also a social optimum. Finally, with market frictions, the number of cities may shrink in this economy.

In this paper we have shown that many urban phenomena can be explained in our model and that cities themselves can be treated as a screening device to affect firms' locational choices. Through periodically announced public information about cities, the government may enhance the efficiency regarding to the number and size of cities.

Some extensions still can be made. For example, information spillovers in cities may result in a higher wage gap, a small number of cities and bigger size of cities. By the contrast, congestion costs have the opposite effects. The comparison of efficient and social optimal outcome may deserve more attentions to introduce some useful urban policies. Finally, this model is non-spatial in that we didn't include the land and housing markets. We leave this extension for the future study.

### 4. Self-Evaluation

This paper provides fundamental

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<sup>1</sup> Kim (1990, 1991), Hesley and Strang (1990), and most recent paper by Sato (2001) also consider labor heterogeneity in their models, but they didn't address these issues in depth.

theoretical supports for the empirical findings of Glaeser and Maré (2001), which are important urban phenomena demanding for explanations. We have completely accomplished the goal of this project, and we think this paper is suitable to be submitted to the *Journal of Urban Economics* or the *Regional Science and Urban Economics*.

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