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Theoretical Perspectives of Intra-Metropolitan Spatial Segmentation of the Labor Market[1)]

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<Abstract>

Intra-metropolitan spatial segmentation of the labor market requires barriers to mobility on both supply and demand side of the local labor market. The phenomena of spatial segmentation of the labor market are particularly applied to the secondary workers rather than to the primary workers. Supply side barriers include the costs of obtaining job information regarding jobs outside of the immediate area, commuting costs, and barriers to residential mobility. Demand side barriers include site-specific technology and product demand, and discrimination. In this paper, I discuss these barriers and examine their implications for differences in segmentation by demographic and skill groups at the intra-metropolitan scale. In particular, I apply a job search model to examine supply side barriers such as information and commuting costs, and an implicit contract model to explain demand side barriers such as dual/internal labor market and firms' (re)location strategies.

대도시 노동시장의 공간적 분화에 관한 이론적 고찰

김재홍
행정학과

<요 약>

대도시 노동시장의 공간적 분화는 국지적 노동시장의 노동공급과 수요의 양측면에서 유

1) The author thanks an anonymous referee for the constructive comments. Of course, all errors are my responsibility.

동성의 장애요인 때문에 발생하게 된다. 이러한 현상은 특히 부차적 저임금노동자들의 노동공급과 수요에서 일반적으로 나타난다. 노동공급측면에서의 장애요인으로는 직장정보획득비용, 통근비용, 주거지이동에의 장애요소 등을 들수 있다. 노동수요측면에서의 장애요인으로는 직장입지마다 특별한 기술과 생산품 때문에 이에 적합한 노동수요가 국지적으로 다를 수 있다는 점과 인종차별적 노동수요 등을 들 수 있다. 본고에서는 이러한 노동시장에서의 공급과 수요에 나타나는 장애요인들을 논의하고 인구학적인 그리고 기술수준별 노동계층간에 나타나는 대도시 노동시장에서의 공간적 분화현상을 이론적으로 고찰한다. 노동공급측면의 장애요인은 직장탐색모형을 적용하여 설명하며, 노동수요에서의 장애요인은 잠재적 계약모형을 적용하여 설명한다.

1. Introduction

There are lots of theoretical and empirical studies of labor market segmentation in terms of occupational and demographic differences in the socio-economic organization of the labor process. Some economists and/or sociologists conceptualize labor market segmentation on the basis of the dual/internal labor market hypothesis (Doeringer and Piore, 1971, Gordon, et al, 1982, Smith, 1983 among others). Some geographers tend to consider labor market segmentation in the spatio-temporal context to be a consequence of firms' labor management strategies utilizing space as an instrument to cope with internatioal and/or national economic restructuring (Clark, 1989, Massey, 1984, and Storper and Walker, 1984). Some sociologists also add a spatial emphasis to the dual economy research along with market segmentation theory based on the concept of local industrial dominance (Hodson, 1984 and South and Xu, 1990). Although the social and spatial structure of metropolitan areas may be identified on the basis of their roles within the regional, national and international economy, the vast majority of human actions in everyday life occur within the surrounding places of residence, especially for the disadvantaged workers (Warf, 1989). Nevertheless, little attention has been paid on spatial segmentation of economic activities of such workers at the intra-metropolitan scale.

There are several reasons for the present shortage of knowledge concerning intra-metropolitan spatial segmentation of the labor market despite the recent imperatives of local economic development policy. First, economists and sociologists who advocate the dual labor market hypothesis have usually overlooked the spatial aspects of labor market segmentation. If any, the spatial aspect of market segmentation is limited to the usual analytical units such as metropolitan area or region (Hanson and Pratt, 1988).[2] Second, neo-classical urban economists have usually adhered to the mono-centricity assumption, and thus a metropolitan area has been

2) Clark(1986) points out that dual labor market theory implicitly suggests spatial fragmentation, which might be structured along lines with class, race and ethinicity, and thus segments in the dual labor market can be directly related to distinct urban precincts.

traditionally assumed to be a single and homogeneous labor/housing market, where both the wage rate and the rent rate are a decreasing function of distance from the city center (Ladd and Wheaton, 1991 and White, 1988). Third, industrial/economic geographers have been more concerned about industrial (re)location strategies between metropolitan areas than spatial capital/labor relationship of divergent industries at the intra-metropolitan scale. Finally, the ambiguity and difficulty of defnition of the local labor market boundaries within a metropolitan area, and the lack of adequate data for empirical studies have been the deterrents to research in this field.

Many journey-to-work studies since Kain (1962) and Lowry (1964)[3] and an ample volume of spatial mismatch literature (for an extensive review, see Holzer, 1991) have implicitly observed intra-metropolitan labor market segmentation in terms of race, sex, and occupation on the basis of empirical eveidence. However, they have failed to provide any explicit theoretical underpinning of local labor market formulation within a single metropolitan area. And they focused on the labor market problems of inner city minorities based on dichotomy between the central city and the suburbs. Only a relatively small but increasing body of economists and geographers have tried to define a more appropriate spatial unit for local labor market analysis (Goodman, 1970, Hart, 1981, and Simpson, 1983), to provide theoretical rationales behind local labor market segmentation within a metropolitan area in terms of employment relation between firms and workers (Clark, 1983, Clark and Gertler, 1983, Clark and Whiteman, 1983, and Peck, 1989), and in terms of firms' location strategies (Nelson, 1986, Emirisch, 1987, and Scott, 1988). Likewise, there is relatively little empirical evidence of spatial segmentation of the metropolitan labor market. Only a few empirical studies find intra-metropolitan spatial variations in earnings (Ihlanfeldt, 1988, and Madden and Chiu, 1990), spatial differences in employment characteristics within a metropolitan area (Hanson and Pratt, 1988), and spatial variations in unemployment and labor force participation rates (Vipond, 1984).

However, most of them do not provide a comprehensive general framework for the intra-metropolitan spatial segmentation of the labor market in terms of the behavior of workers and employers. Emirisch (1987) and Scott (1988) demonstrate intra-metropolitan spatial transformation of industrial location through vertical disintegration and industrial linkage, but they fail to provide an explicit explanation how and why workers' residential location and industrial location are directly matched. Nelson (1986) shows theoretical and empirical evidence of intra-metropolitan spatial division of the female labor market using an example of back office location strategy and reaction of female office workers. Nevertheless, her work does not provide a general framework because of the narrow scope of industry and worker group. Clark and Whiteman's work (1983) seems to be the most comprehensive theoretical study about spatial division of the labor market in the metropolitan scale. But the analogy of 'Poortown and Richtown' in their work seems to simplify the spatial division of the

3) For the extensive reviews of intra-metropolitan gender division of the labor market based on journey-to-work studies, see Johnston-Anumonwo (1988), Hanson and Johnston (1985), Madden (1981); and for the effect of journey-to-work on simultaneous choice of workplace and residence, see Gera and Kuhn (1980), Simpson (1987), and Vickerman (1984).

metropolitan labor market into dichotomy between the central city and the suburbs, and thus tends to ignore the phenomena of the labor market segmentation within the suburbs. The present paper intends to supplement and extend Clark and Whiteman's work in order to provide a more general and comprehensive theoretical framework of intra-metropolitan spatial segmentation of the labor market.

2. Theoretical Framework

In neo-classical economic theory, the labor market is assumed to be a perfect commodity market, where labor is homogeneous; information is perfect for both buyers and sellers; and both buyers and sellers are price-takers. In this framework, workers act rationally to maximize the net benefit from the sale of their labor services, and thus they move among employment opportunities in response to market signals so that the advantages offered by divergent buyers are equalized over the market (Goodman, 1970). When neo-classical labor market theory is applied to the metropolitan labor market, workers can move among jobs in the various localities as long as firms offer wages compensating different commuting costs, residential relocation costs and/or rents between localities. It implies that all the participants in the metropolitan labor market are at the equilibrium position at their locations with respect to the metropolitan area as a whole. Thus a single metropolitan area constitutes a single homogeneous labor market under the strict neo-classical assumptions.

In reality, however, labor is heterogeneous because of qualitative differences even within the same occupational groups; and information is imperfect and costly partly because the cost of information-gathering varies among people with different productivity, spatial position, and accessibility to information, and partly because information is not a common good shared equally between workers and employers. As Warf (1989) points out, furthermore, human activity is the irreducible essence of social production and social life in the context of community. This implies that location establishes a special collective interest among individuals and thus residents have a common stake in the area's future. Logan and Molotch (1987) note that places achieve significance beyond the more casual relationships that people have to the other commodities, although individual relationships to place may vary with intensity for different class, age, gender, and ethnic group. Different collective interest and relationship to place create asymmetrical market behavior among communities in terms of capital/labor relationships. Therefore, labor is characterized by place-bounded idiosyncracy, and thus local labor markets are structured according to capital/labor relationships varying with places (Clark, 1983). In contrast to the neo-classical concept of the labor market as discrete exchange, the concept of the labor market imbedded in this paper emphasizes the roles of individual spatial positions and place-specific capital/labor relationships in the labor market function.

Given intrinsic heterogeneity of labor and the high degree of place-boundedness of the less-skilled, low-wage workers due mainly to narrow information networks,

information asymmetry among workers as well as between workers and employers leads firms not to act as price-takers, but to act price setters. This implies the market clearing price may not exist even in a metropolitan area (Clark and Whiteman, 1983).[4] Consequently, on the the one hand, firms may take advantage of segmentation among heterogeneous workers through the structured dual/internal systems of labor management (Gordon, et al, 1982 and Weitzman 1989). On the other hand, utilizing and manipulating information asymmety between workers and employers as well as among workers, firms may project the persistent fragmentation of the working class into space, that is, spatial division of labor through firms' (re)location strategies (Storper and Walker, 1984). In this context, firms tend to exploit the typically more place-bounded, low-skilled, low-wage workers characterized in the secondary labor market so as to increase firms' unilateral power in capital/labor relationship through spatial division of labor. Sometimes the semi-skilled, routinized workers in the subordinate primary labor market may be objects of such a firms' labor market segmentation strategy.[5] Thus, intra-metropolitan spatial division of the labor market must be understood in the context of relationships between labor supply behavior of the disadvantaged workers and firms' labor management strategies in the local labor markets.

As Goodman (1970) notes, "The labor market is a unity absent in practice. In the real world, it is composed of a variety of sub-markets demarcated by various criteria, but linked by mobility." If mobility among sub-markets, as a kind of arbitrage, is to a high extent restricted by whatever reasons, each sub-market is considered an island to have a distinct supply and demand function (Phelps, 1970 and Simpson, 1987). Thus the degree of mobility based on individual job search is the most important criterion to define a unit of the specific labor market. This implies that the less mobility, that is, the less efficient job searches between sub-markets, may characterize price dispersion and market segmentation in the spatial economic system (Clark. 1986).

In geographical terms, the labor market may be variously delineated with respect to the spatial scale of the specific location, in which labor trade takes place between buyers and sellers. For residents of a metropolitan area, the job market for primary sector workers may be the entire metropolitan area, even a regional/national one, partly due to the primary workers' unique skills and general backgrounds not industry/job-specific, and partly due to their wide information networks. However, the less-skilled, low-wage secondary labor market is likely to be more localized, and not

4) As Stiglitz (1977) suggests, "with imperfect information, market equilibrium may be characterized by a price dispersion rather than a single price, and thus the price system will fail to equate the marginal rates of substitution of different individuals." In this context, Grossman and Stiglitz (1980) also claim that it is impossible that all markets are always in equilibrium, when arbitrage is costly.

5) Gordon, Edwards, and Reich (1982) classify jobs into hierarchical segments such as independent primary, subordinate primary, and secondary jobs. The independent primary segment includes professional, managerial, and technical jobs with high degree of autonomy; the subordinate primary segment includes many semi-skilled, primary sector blue-collar jobs and many semi-skilled white-collar jobs, which usually involve routinized, relatively task-oriented and governed by specific supervision and formalized work rules within the enterprize; and the secondary segment is usually characterized by the unskilled, low-wage, immobile workers, whose jobs are considerably vulnerable and instable with respect to the economic fluctuation.

to extend beyond the immediate locales and the spatial range within which friends and acquaintances as information sources work and live. The implication is that at least for the less-informed, less-skilled, low-wage workers, their labor markets are spatially segmented even within a metropolitan area, and thus separate sets of labor market conditions can coexist so that they affect the lives and job prospects of people located in contiguous places even within a metropolitan area. If it is the case, it raises such questions as why the secondary job markets should be penned up within the limited boundaries and how firms exploit and project spatial division of labor for their (re)location strategies. The answers for the questions will provide an explicit theoretical basis for intra-metropolitan labor market segmentation in terms of labor supply side and labor demand side, respectively.

3. Labor Supply and Spatial Job Search

The supply of labor can be thought to be the process of individual job search. On the basis of the individual rational job search behavior, we demonstrate why the less-informed, unskilled, low-wage workers in a specific local labor market within a metropolitan area have difficulty in changing their job locations to other local labor markets. Although the job search theory used in the present study is derived from the usual neo-classical theoretic concept of job search with imperfect information, our model focuses on the role of individual spatial positions in terms of search costs and commuting costs (or migration costs). Such costs reinforce the local character of the less-skilled, low-wage labor market in that searching and commuting costs are clearly less for jobs closer to home. Given those workers' experience in the labor market concerning the distribution of job/wage offers, there will be a point where a wide spatial search will incur greater costs than the likely return in wage offers, thus resulting in the spatial segmentation of the less-skilled, low-wage labor market (Clark and Whiteman, 1983, 86-87).

The implications imbedded in the job search theory described below may provide the explicitly theoretical basis for not only the intra-metropolitan spatial segmentation of the labor market, but also for the spatial mismatch hypothesis.

Based on Maier (1985), we begin with an adaptive job search theory with imperfect information. Now consider a searcher for jobs provided from the local labor market A. Let's assume there are m discrete wage offers (job vacancies) in the local labor market A:

$$X_1,\ X_2,\ \cdots,\ X_m \qquad [1]$$

It is assumed that the probability of observing a specific X_k is constant, and that the searcher does not know this wage offer distribution exactly (imperfect information), but has the prior information about the distribution, which is characterized by the vector N:

$$N_1,\ N_2,\ \cdots,\ N_m \qquad [2]$$

The vector N is a measure of the searcher's prior information about wage offer distribution in the local labor market A. From the prior information, the probability of observing a specific wage offer X_k, p_k, is constant, and the precision of the prior information, v, is assumed to be the inverse of the sample size:

$$p_k = \frac{N_k}{\sum_{i=1}^{m} N_i} \quad \text{and} \quad v = \frac{1}{\sum_{i=1}^{m} N_i} \qquad [3]$$

Based on the prior information, s/he can update her/his belief simply by adding 1 to the

corresponding element N_k of the vector N, when s/he observes a wage offer X_k. Then the distribution of (p,v) is as follows:

$$D_k(p, v) = \frac{p_k + v}{v+1}\ ;\ \frac{v}{v+1}\ ,\ k = 1,\ 2,\ \cdots,\ m \qquad [4]$$

In this context, the wage offer is not only an employment opportunity, but also a piece of information used to revise the prior distribution. From updating one's prior and the individual decision whether to accept or reject a wage offer drawn during the sequential searching procedure, the expected return of searching at state of information (p;v) and limited to n draws, $U^n(p;v)$, can be formulated as follows (finite searching horizon):

$$U^n(p, v) = -C + \sum_k p_k \max[\ X_k,\ U^{n-1}(D_k(p, v))] \qquad [5]$$

where C represent the search costs for each searching draw.

An individual optimal strategy is to accept a job offer if wage offer X_k is greater than or equal to $U^{n-1}\{D_k(p;v)\}$, the reservation wage (R_n) for the searcher.[6] The reservationwage R_n is expected to vary with searchers' individual characteristics.[7] A higher reservation wage implies a lower probability of accepting a job, and *vice versa*. Thus we can infer there exists a reservation wage that maximizes an individual's utility during search in terms of levels of reservation wage and acceptance probability.

Suppose that X_1, X_2, ... ,X_n form a random sample of wage offers in the market A.

6) Strictly speaking, the function U(*) is the utility function. If we assume risk neutrality, however, we can ignore the individual's utility function so that the expected utility is equivalent to the expected income (see Maier, 1985).

7) As Pissarides (1985) notes, "we may distinguish two sets of parameters that influence the reservation wage; those related to the market environment and those related to the individual's environment. In the usual utility-maximizing model subject to a sequence of wage offer distributions, the market parameters define mainly the sequence of distributions, whereas the individual parameters define the utility function and the horizon. Thus market parameters are likely to affect all individuals in a similar way, whereas individual parameters are likely to vary between individuals."

Let Y_n denote the largest value in the sample and Y_{n-1} denote the next largest value. Then the random variables $Y_1, Y_2, \ldots, Y_n$ form *ordered statistics*, which are minimal jointly sufficient statistics, of the given sample (DeGroot, 1987, 366-368). Consider that the values of the ordered statistics $(y_1, y_2, \ldots, y_n)$ have a specific probability distribution. When n goes to infinity, we can find out a minimum R_i, satisfying the condition described below:

$$\int_{R_i}^{\infty} f(y)(y-R_i)dy \geq C \qquad [6]$$

where
R_i: the reservation wage at the i^{th} draw;
f(): the probability density function; and
C: the search cost of each draw; assumed to be constant.

Here the optimal reservation wage R_n^* is defined by:

$$R_n^* = \min(R_i \mid y \geq R_i), \quad i=1, 2, \cdots, n \qquad [7]$$

However, when the number of sample is finite and C is very large, there may not exist a specific R_i satisfying equation [6]. When this possibility is applied to the job search framework, a searcher can receive only the negative return from his/her job search. Such a searcher can be better off from not searching than from searching. Nevertheless, if s/he wants to search, the optimal reservation wage will be zero (really no search is optimal in this case). This means that the high cost of search leads to the low optimal reservation wage, and in a extreme case the very high cost of search may prevent people from searching jobs. Thus the cost of search, *ceteris paribus*, will play a substantial role in one's job search behavior. In our framework, there exists an optimal reservation wage (even zero) during search for a specific individual. [8] From equations [5] and [7], the reservation wage (R_n) and the optimal reservation wage (R_n^*) during search, respectively, are defined by:

$$R_n = [\ U^{n-1}(D_k(p, v)) \mid X_k \geq U^{n-1}(D_k(p, v))] \qquad [8]$$

$$R_n^* = \min[\ U^{n-1}(D_k(p, v)) \mid X_k \geq U^{n-1}(D_k(p, v))] \qquad [9]$$

From equations [8] and [9], it is evident that the reservation wage depends on both the wage offer, the cost of search, and the individual information at a specific stage of the continued searches. Thus, the lower the wage offer and the less accurate information, the lower the reservation wage, and also the higher the cost of search,

8) McKenna (1985) argues that a unique optimal reservation wage is not guaranteed under adaptive search. However, Maier (1985) notes that if the wage offer distribution is Dirichlet (see DeGroot, 1970), the unique optimal reservation wage exists.

the lower the reservation wage. As search continues, the prior information is updated. The degree of the prior information and the number of wage offers to be searched (or total searching time) seem to depend on one's costs of information-gathering and one's search costs for each draw. Thus they also depend on one's initial wealth and one's ability to handle a piece of information in that the higher initial wealth tends to make the longer search duration possible, and in that the higher ability to handle and access information makes one's search costs lower. The reservation wage may vary with one's experienced wage rate; the higher the experienced wage rate, the higher the reservation wage. If the searcher's working life comes to the end, his/her reservation is expected to decline (Lippman and McCall, 1976). The reservation wage would be less in recession than in boom (Wright, 1985). If we consider the uneven development within a metropolitan area, therefore, the reservation wage in the declining area would be less than that in the growing area. The reservation wage also depends on one's taste in that the reservation wage of a risk taker seems to be higher than that of a risk averter. While one's reservation wage at a specific draw may vary, one's optimal reservation wage for a specific searcher is conceptually given during one's search if the market conditions do not change. However, the optimal reservation wages also vary with the market environments and the individual environments.[9] Thus the optimal reservation wage can be written as a function:[10]

$$R_n^* = R(X, C, M, W, L, E) \qquad [10]$$

where
X: the specific wage distribution;
C: the costs of searching and information gathering;
M: the initial wealth;
W: the experienced wage rate before searching;
L: the remaining working life; and
E: the economic condition of the local labor market.

Now consider a case where two searchers look for jobs in the local labor market within a metropolitan area; one (searcher 1) lives and works in the area A (the boundary of the local labor market A); another (searcher 2) in the area B. For the time being, we assume that both searchers have the identical initial wealth,

9) While the standard job search model assumes the constant reservation wage, some job search theorists show that the reservation wage is decreasing or increasing according to the specific situations (for the extensive review, see Lippman and McCall, 1976, McKenna, 1985 and Pissarides, 1985). More recently, Maier (1985) notes that the reservation wage cannot increase during the job search procedure, and Burdett and Vishwanath (1988) show that the individual reservation wage declines as a consequence of the selection process in a situation, where learning takes place during job search.

10) Given the market environments and the individual environments, regardless of one's level of risk, there exist an optimal reservation wage for an individual searcher. However, since a reservation wage may depend on one's level of risk, one's reservation wage function may include one's taste including the level of risk (I):
$R_n^* = R(X, C, M, W, L, E; I)$

experienced wage rate, remaining working life, and taste. It is also assumed that both searchers are prepared for only the secondary jobs. Here we assume that searcher 1 has a wage offer information described above, but searcher 2 has no or less information than searcher 1 does. This assumption is realistic in that searcher 1 has the higher accessibility to the job information and the longer job experience in the market A than searcher 2 does. As noted in the previous works (O'Regan and Quigley, 1991 among others), most secondary workers are likely to access to job information through family members, friends, and acquaintances as informal information network within a narrow spatial range like a neighborhood. For searcher 2 to obtain the same degree of information that searcher 1 has, the former should buy information or do other costly information gathering acts (migration or information gathering at the expense of foregone earnings and/or travel costs). Therfore, searcher 2 should pay the higher search costs for the job offers in the market A than searcher 1 should:

$$C_{A2} > C_{A1} \qquad [11]$$

where C_{A1} and C_{A2} represent the search cost for each job offer in the market A, faced by searcher 1 and 2, respectively.

On the basis of the reservation wage property imbedded in equations [10] and [11], it is evident that the optimal reservation wage of searcher 1 is higher than that of searcher 2:

$$R^*_{A1} > R^*_{A2} \qquad [12]$$

where

R^*_{A1} : the optimal reservation wage of searcher 1 in the market A; and

R^*_{A2} : the optimal reservation wage of searcher 2 in the market A.

From equation [12], it is derived that, in the market A, the minimum acceptable wage of searcher 2 is always lower than that of searcher 1, since one's minimum acceptable wage is equal to one's optimal reservation wage by the definition. This does not mean that wage offers for searcher 2 are always lower than those for searcher 1, but means that whereas searcher 2 has to stop his/her searching only if s/he finds a wage offer greater than or equal to R^*_{A2}, searcher 1 can search more until s/he finds a wage offer greater than or equal to R^*_{A1}. This implies that the probability of searcher 1 to accept a good wage offer is higher than that of searcher 2. Of course, we can imagine that the initial reservation wage of searcher 2 may be higher than that of searcher 1, since searcher 2 may anticipate a job offer that compensates his/her higher searching costs. However, since a high reservation wage implies a lower acceptance probability, and since high-wage firms are less likely to make offers, s/he will learn to reduce his/her initial reservation wage to his/her

optimal reservation wage in order to receive a job offer, as search goes. Furthermore, the higher search costs paid by searcher 2 mean in fact the short time horizon of search and/or the lower searching intensity. If it is the case of the real world, the optimal reservation wage difference between searcher 1 and searcher 2 will be much larger than in the case we assume. In another words, due to the higher search cost of searcher 2, it is difficult for him/her to compete with searcher 1 for the jobs providing the same level of the expected return in the market A. This may result in that the different information due to the different spatial postions may be the significant barriers against the spatial job mobility even within a metropolitan area.

Up to now, we have considered the case, where searcher 2 buy information or migrates to the area A in order to obtain the same prior information as searcher 1 does. Let's consider another case where searcher 2 starts job searching with information less than searcher 1 does. This case seems to be closer to the real world situation. We assume that search costs for each draw and probability distribution p are same for both searchers,[11] but only the precision v is different; searcher 2 has the higher level of v than searcher 1 does. Maier (1985) notes that "in a situation with less precise information about the wage offer distribution, the individual's expected income must be lower." Thus the expected return of searcher 2 should be lower than that of searcher 1. Further, since the expected return depends on the reservation wage, the optimal reservation wage of searcher 2 cannot be higher than that of searcher 1 at least for the positive expected returns. Therefore, it is evident that this case also derives the same result as the above.

Now we consider the different welfare effect of two searchers with different spatial positions. If searcher 2 finds a job in the market A, he has to commute or migrate from the area B to the area A. In neo-classical mono-centric urban economic theory, it is assumed that commuting cost is compensated by low rent rate. However, the assumption is no longer valid in the multi-centric cities with decentralized employment, where the rent rate is not a monotonic decreasing function of distance from the city center (Dubin and Sung, 1987 and White, 1988 among others). For the sake of simplicity, it is assumed that the present value of the discounted remaining life time commuting costs are equal to the migration costs. Because we have to consider the effect of the different commuting costs between searcher 1 and searcher 2 on their net earnings, the actual net wage offer distribution, which searcher 2 will face in the market A, will be as follows [compare equations [1] and [13]:

$$X_1-T,\ X_2-T,\ \cdots,\ X_m-T \qquad [13]$$

where T indicates the difference of journey-to-work costs between searcher 1 and searcher 2.[12]

11) In practice, the search costs of searcher 2 are expected to be higher than those of searcher 1 even in this case. But this assumption is considered only to give the best condition to searcher 2.

12) For the sake of analytical simplicity, we assume the commuting cost of searcher 1 is zero, but that of searcher 2 is T.

Equation [13] implies that if searcher 2 accepts a specific wage offer X_k in the market A, his/her actual net wage will be X_k-T. Whether or not searcher 2 accepts the job offered at the actual net wage level X_k-T in the market A may depend on the job opportunities in the market B and his/her initial job status (or experienced wage rate). If two market conditions are similar, and thus if the wage offer distribution of the market B is similar to that of the market A, searcher 2 will not accept the job offered in the market A. Instead s/he may find a job with the similar wage offer X_k in the market B. Logically, if two market conditions are expected to be similar, searcher 2 with the rational behavior probably does not try to search a job in the market A because of his perception of the higher search costs and potential commuting costs (or migration costs). This implies that if the economic conditions between local labor markets within a metropolitan area are similar, people will have little motivation to change job locations and/or residential locations without critical change of amenities at one's given residential location and/or without change of taste. Even though market conditions between two areas are different, workers will have little motivation to change their workplaces if wage chages are not expected to be large enough to compensate for search costs and transportation costs.

As an example, the wage rates of the part-time workers of fast food restaurants or grocery store are spatially a little different, but they are usually around the minimum wage rate. Those kind of jobs tend to be filled with local residents who can see advertisements on the store windows like "HELP WANTED," or who are friends, acquaintances, or relatives of the current employees of the restaurant or the store. This implies that such kind of job information is difficult for residents of other areas to reach, and thus that search costs of residents of other areas for job vacancies are very high, relatively to the local residents. Although such job information is available without high search costs, residents of other areas tend not to apply for such jobs if commuting costs are not expected to be compensated.

Recently, large metropolitan areas, especially, in the old manufacturing region are characterized by uneven development; while some suburban areas have been growing in terms of both population and job opportunities, central cities and some old manufacturing communities have been suffering from ever-lasting job losses and high unemployment. In labor market theory with perfect information, such inequilibrium should be adjusted through the inter-market capital/labor mobility mechanism. However, the reality shows that the neo-classical inter-market adjustment has only failed. Thus it will be an important theoretical concern to demonstrate why the unemployed have difficulty in changing job locations and/or residential locations from the economically distressed areas to the relatively growing areas even within a metropolitan area.

Now consider the job searching process of searcher 2, who is assumed to be unemployed in the market B. The economic conditions of the market B is also assumed to be worse than those of the market A. If he has experienced the long duration of unemployment and his/her expected probability of recall or reentry in the market B is very low, s/he probably will accept the actual net wage offer (X_k-T) in

the market A, only if the actual net wage offer is greater than the amount of unemployment insurance, other welfare benefits, and/or the expected value of leisure. However, the job searching condition of searcher 2 in the market A seem to be worse than what we assume, partly because his/her initial wealth (M) for search intensity are less than those of his/her competitors with similar quality in the market A like searcher 1, and partly because searcher 2's work history of more frequent lay-offs (relatively to the competitors of the market A) signals incompetence to the prospective employers in the market A.[13] In practice, thus, his/her reservation wage may be much lower than the reservation wage considered under the condition assumed above.[14] Furthermore, if the reservation wage of the unemployed declines with the length of one's respective unemployment spell as a consequence of the selection process, especially when learning takes place during job search (Burdett and Vishwanath, 1988), and if the unemployed become demoralized and their skills and work habits decay as the unemployed spell increases (Lockwood, 1991), his/her reservation wage may decline more sharply, and thus his/her expected return of continued search may also decline precipitously. This may lead to the lower probability of the unemployed people's spatial job mobility than what it would otherwise be.

Many who are laid off tend to perceive their layoffs to be just temporary, and thus they anticipate to be rehired sooner or later (Feldstein, 1976, Burdett and Mortensen, 1980, and Clark, et al, 1986). This suggests that searcher 2, even if s/he is temporarily laid off, has little intention to search for an alternative employment prospect, in the short run at least, due to expectation of recall and to search costs.[15] In addition to expectation of recall, unemployment insurance benefit, which is excluded from taxable income, is an essential deterrent to extensive search for an alternative job. "Given that the long run is derived from just a series of short runs," as Clark and Whiteman (1983) note, such behavior of temporarily laid-off workers is a source of the persistently different unemployment rates between local labor markets within a metropolitan area in the long run.

Consider steelworkers in Pittsburgh or autoworkers in Detroit, who have usually lived in the communities surrounding the working plants. Before the periods of massive plant closures or relocation, they have experienced repeatedly lay-offs/recalls along with economic fluctuations. Because their wages were relatively high and their skills were to a high extent job-specific and plant-specific, they had little motivation to search the alternative jobs in other areas or other industries even in the periods of

13) As Bartel and Borjas (1981) shows, spells of unemployment or involuntary separations tend to result in the substantial loss in future wages. It may be result from adverse selection, with which employers think that "those who are either involuntarily separated or who are prepared to change jobs without alternative employment immediately available should be the least able group of job-changing workers" (Greenwald, 1986).

14) We assumed that other conditions except the search costs and the net wage offer distribution are same for both searcher 1 and 2.

15) Searcher 2 may expect on the basis of the cumulative experience that his/her search costs will be foregone if s/he is rehired during job search. Or s/he may think that the economic opportunities of the other markets would not be much better than those of his/her own especially during the economic recession.

lay-offs. Even when massive lay-offs started, laid-off workers tended not to search for alternative jobs because of expectation of economic recovery and recall. Only after the plants were finally closed or relocated, they figured it out that they were laid off permanently rather than temporarily. However, since their skills are limited to only their duties of the past jobs, and since jobs relevant to their skills are no longer available around their communities, they have to search for jobs relevant to their skills outside of their communities or metropolitan areas with high search costs and/or to search for jobs relevant to less or unskilled workers within or outside of their communities. Since job information relevant to their skills is difficult and costly to gather and to gain access, and since less or unskilled jobs do not provide wage levels satisfying their expectations or higher than their unemployment insurance and other social welfare benefits, they tend to remain unemployed in their current communities. This is a source of spatial mismatch as a reason why there exist some communities with the high unemployment rate despite recent metropolitan-wide proliferation of service jobs

4. Labor Demand and Implicit Contract Theory

Now we investigate firms' behavior as another source of spatial labor market segmentation. While the supply of labor is modeled as a job search process, the demand for labor is represented by job offeres from firms. The supply of labor (employees) and the demand for labor (employers) are interdependent in that employers depend on labor for production, whereas employees need jobs for their subsistence. However, the relationships between employers and employees are also characterized by mutual antagonism in that employers pursue profit maximization through low wages, whereas employees seek to enhance their well-beings through high wages. The perfectly competitive solution to the problem is to set wage rate equal to worker's marginal productivity. It is the neo-classical wage setting mechanism in which labor exchange is considered to be discrete exchange like a commodity. In this framework, the wage rate decreases as output (profit) declines, that is, the rule of demand and supply in the labor market determines the market clearing wage rate like in the commodity market.

In reality, however, over a typical business cycle, wages fluctuate less than employment (Hall, 1980). Although Keynes (1936, 13-15) explains that wage rigidity results from workers' behavior such as money illusion and reluctance to accept relative wage reduction, as Azariadis and Stiglitz (1983) argue, Keynes' own explanation is at least atheoretical. A challenging explanation is provided by implicit contract theory, in which employers and employees tend to make mutual agreements for continuity in labor exchange over time (ususally in the short run) and space in order to protect both parties from future uncertainty.[16] The implicit contract model is

16) For another explanations of wage rigidity, see Oi (1962) based on human capital theory, McDonald and Solow (1985) based on efficiency wage for primary segment of labor in terms of dual/internal

based on the idea that (risk-neutral or less risk-averse) firms give (more) risk-averse workers insurance against income fluctuations in the context of variable labor demand in future.[17] However, if firms are risk-averse with respect to their future profit streams, it is never optimal for firms to bear all the risk of the variations in profit. With regard to risk allocation, various forms of contracts may be possible. We consider two typical forms of contracts: *flexible wage-fixed employment* and *fixed wage-flexible employment* (Grossman and Hart, 1983). In the former form, employment is guaranteed for workers during a specified time horizon, but wage rates will be cut in the bad economic situations. In the latter form, workers are guaranteed a particular wage rate but may be laid off in a bad economy. If firms and workers share a set of symmetric information, they would be indifferent regardless of the forms of contracts.

However, it is often assumed that firms have better information than workers since firms can directly observe their own payrolls in the local labor markets, and/or the payrolls of their branches in other areas, and since they have more experience in the hiring process than workers (Clark, 1986). If it is the case, the flexible wage-fixed employment contract tends to favor firms since firms may cut down wages without reducing employment even in a good economy, by misreporting the economic state. With the fixed wage-flexible employment contract, in contrast, it may not be profitable for firms to misreport the economic state. Doing so would mean the loss of relatively productive labor (Grossman and Hart, 1983). In this respect, the fixed wage-flexible employment contract seems to be a more likely outcome under asymmetric information. However, the forms of contracts may vary with industry and location with regard to bilateral (or unilateral) power distribution between employers and workers, which is associated with site-specific history of labor relationship. As Clark et al (1986, 86-87) note, "the pattern of rigidities and fluctuations can be deduced from the particular characteristics of each local labor market and the distribution of power in society ... Contracts are structured by the local context in which workers and employers operate."[18]

As long as the different local contexts coexist, various forms of contracts may coexist along with capital/labor relationship in the communities even within a single metropolitan area. This implies that wage offers are spatially dispersed, and that firms' retention, lay-off, and recruitment policies may be different from location to location even in the same industry within a metropolitan area. Various contractual forms may be attributed to technological differences among firms. For firms requiring

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labor theory, and Greenwald and Stiglitz (1989) based on price inertia.

17) Hart (1983) notes two reasons why people have appealed to the idea of implicit (rather than explicit) contracts: First, individuals simply cannot conceive of all the possible eventualities that may occur because of their bounded rationality. Thus even the explicitly written contracts cannot rule out some implicit contents. Second, the nature of the limited time horizon and the renegotiation imbedded in contracts implies implicit, rather than explicit, contracts.

18) Weitzman (1989, 134) also asserts the geographical different forms of contracts in the regional level, noting that "Hewlett-Packard basically hires flexible high-cost labor that can be relied upon to move up the product lifecycle rapidly. Texas Instruments, by comparison, tends to hire dedicated lower cost labor that fluctuates more. Both personnel strategies are viable, and indeed they can coexist in the same industry."

similar level of technology, however, the local characteristics seem to be an imperative to affect firms' behavior. In this respect, firms have a variety of contractual bargaining and locational strategies related to the employment relation in the local labor markets. Firms' labor control strategies are based on their superior information to workers. The possibility of risk (information) sharing between firms and workers is very low in reality since utility functions between firms and workers are exactly opposite. The resulting consequences appear some forms of firms' discretionary labor control strategies such as dual/internal labor management system and spatial division of labor. With the dual/internal labor management system, firms have an inherent tendency to magnify differences of workers out of proportion to their actual relevance (Weitzman, 1989). In this system, the primary segment of labor is paid high enough to be retained in the expense of the lower-wage, cyclically more fluctuating secondary segment of workers than they could otherwise be. Spatial division of labor is considered to be firms' (re)location strategy, with which firms wish to externalize their labor requirements from their original location to other locations with more docile employment relation and/or cheaper labor for example.

If a firm has the specific standards of labor requirements especially in skill and experience, it may internalize its labor market through internal promotion, training and a particular recruitment standards (Clark, 1981). In the firm, the stable work group as a primary segment tends to be formulated through job-specific skills and efficiency wage strategy. The group establishes territoriality over the labor supply, and intends to emphasize collective behavior as a noncompeting group, thus resulting in segmentation of the labor market (Doeringer, 1985). In this system, entry of outside searchers into the primary segment is to a high extent resisted by the kinship and family-based inside work group and by the selection process due to firm-specific local evaluation criteria. The use of local evaluation criteria for recruitment will inevitably lead to spatial labor market segmentation (Clark, 1986). A job searcher from a distressed community is usually considered inferior to a competitor from a boom town, not because of differences of productivity or skill *per se*, but because of the former's relatively bad lay-off records, even when quality of both searchers is in fact similar. This simply implies that "living on bad estates jeopardizes job prospects" (Haughton, 1990, 197). In the dual/internal system of the labor market, secondary workers are regarded as only a buffer against economic fluctuations in that they are the last hired and the first fired in contrast to the job stability of the primary segment of labor over time. As McDonald and Solow (1985) note, even in a firm, contractual forms may differ between primary segment and secondary segment of its labor, resulting in pervasive differences of bargaining power, and thus income and job tenure between two segments. In turn, low income and bad work history inherent to the secondary workers seem to have geographical configurations which reflect the limitation of commuting boundaries and spatial job prospectives.

On the other hand, if a firm needs only general labor requirements, it will attempt to externalize its labor requirements, spatially separating workers whom it wishes to retain from those for whom it has only irregular and temporary demand (Clark and

Whiteman, 1983). For the purpose, the firm tend to spatially and fuctionally separate production facilities as a way of segmenting different labor groups for favorable contractual bargaining. This kind of (re)location strategy is taken on the various geographical scales, which could be international, national, regional, and metropolitan. For the purpose of the present study, firms' strategies for intra-metropolitan spatial division of labor may well be explained by some typical examples such as the recent emergence of suburban back offices and metropolitan-wide production subcontracting in labor-intensive industries, which are worth describing in more detail.

Significant technological advance in tele-communications has separated the traditional office function into the front office function with face-to-face meetings from the back office function with basically automated, routinized data processing and other clerical work. While front offices such as headquarter offices have been rather tightly concentrated in the CBD due to the multifarious daily interfirm contacts, back offices have significantly relocated from the central city to the suburbs (Hoover and Giarratani, 1984, 188). Although not every back office labor force is clerk-intensive, clerical jobs account for the primary demand for labor of back office. Most clerical jobs are filled with female labor force. In contrast to the clerical job qualification of the other industries such as retail, however, back office function requires female workers with high quality but no higher job rewards than those of secondary labor market positions. Far from being ubiquitous in a metropolitan area, the supply of labor satisfying this job qualification is quite localized in the suburban residential areas of the single-family middle income group with abundant potential labor force of married women who are relatively well educated, stable and non-militant (Nelson, 1986). The nature of these married women, who are eager for alternative employment fitting around household responsibilities, may be particularly matched with the demand for labor of back offices. Since the journey-to-work of these women workers is limited by low clerical wages and by household responsibilities, back offices must be located nearby these women's residential areas in order to recruit these women, who are otherwise not willing to supply their labor at the given level of clerical wage. Suburbanization of back offices is understood as one of firms' labor management strategies seeking for location providing favorable employment relation, if considered that spatial division of office labor is imperative to the widespread productive reorganization in response to economic restructuring (Bluestone and Harrison, 1982).

Production subcontracting results from firms' management strategies to maintain managerial control over the labor process, to ensure an adequate supply of labor and to reduce labor costs. Since geographical scales of subcontracting vary from international scale to localities even in the same industry, it is difficult to generalize the spatial configuration of subcontracting relationships (Holmes, 1986). As shown in Scott (1988) and Johnson and Johnson (1983), however, spatial subcontracting patterns at the metropolitan scale may be identified in some labor intensive industries such as the apparel industry. The geography of subcontracting in a metropolitan area is that subcontractors are particularly concentrated in areas with readly available cheap and non-miliant labor such as females, immigrants and illegal workers. In this respect,

subcontracting process especially in the labor intensive industries tends to bring about metropolitan-wide spatial segmentation of the labor market.

5. Conclusion

Individual job search behavior shows that different accessbility and different search costs due to one' spatial position and spatially different industrial experiences seriously constrict the degree of labor mobility among local labor markets within a metropolitan area. The limited labor mobility among local labor markets leads to the spatial variations in earnings, and provides evidence of spatial segmentation of the labor market within a metropolitan area. Intra-metropolitan spatial segmentation of the labor market is highly associated with barriers to residential locations for the disadvantaged workers. Housing market discrimination is an important barrier for the central city minorities to change their residence into the suburbs. Married women and youth are usually dependent on householders' residential location choice (Madden and Chiu, 1990). Thus, predetermined residential location of the disadvantaged workers tend to constrict their spatial positions to the limited job catchment fields.

In terms of labor demand, spatial division of labor is understood in the context of firms' labor management strategies pursuing favorable employment relation, cheaper labor, and externalization of uncertainty. In this respect, firms may be interested in keeping community stability for sustenance of good employment relation, or they may prefer community instability in order to reduce or weaken the possibility of tight labor organization. Spatial division of labor may be interpreted as a spatial form of the dual/internal system of labor management. Segmented labor market has a geographical configurations which reflect the ability of people in different segments of labor to gain access to space-wide information of prospective jobs and to commute from home to work (Haughton, 1990). Because people in the secondary segment of labor lack in both of such abilities, their economic activities have to be limited to the narrow spatial boundaries surrounding home, resulting in intra-metropolitan spatial segmentation of the labor market, especially for the disadvantaged workers.

Intra-metropolitan spatial segmentation of the labor market has an important policy implication. Among many forms of urban employment policies, especially targeting the urban poors and the disadvantaged, direct job creating activities in the local area have been regarded as especially most effective. However, controversy remains about the effectiveness of the policies; whether or not the created jobs by the policies have been taken up by locally targeted people. The measurement of policy outcomes is to a high extent dependent on the definition of the local area. In general, the larger and more open a labor market unit, the more difficult to establish meaningful criteria for targeted people and local jobs, whereas the smaller the targeted area, the higher leakage of the created jobs (Haughton, 1990). As Clark and Gertler (1983) suggest, employment targeting of policies should be placed on both the appropriately designated area and population most in need. The designated area should be a frictionless area, in

which the targeted people can receive benefits from the employment policies without excessive costs, such as those due to migration. In this respect, a local labor market should be delineated to reflect the most appropriate spatial unit for the future urban employment policy development, so that the targeted jobs and people might be easily defined.

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