

Exploring the Scale Effect in Social Mix Policy

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Abstract

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Social mix policy aims to creating mixed communities for enhancing social interaction among various socio-economic groups. However, some research expressed doubts about the effectiveness of these policies, and claimed the need for more knowledge about the differentiated scale effect in social mix policy. This research tries to build one empirical bases for this scale effect of social mix. By analyzing the effect of income and racial mix on individual opportunity (measured by unemployment rate) in two different spatial scales - census block-group and census tract - in Los Angeles County in 2010, this research confirmed the existence of social mix effect, and showed that neighborhood effect is differentiated by spatial scale and the age of target population. This results contributes to building empirical evidences which could help create social mix policy which is based on more appropriate and effective spatial scale.

주 제 어: 소셜믹스(사회적혼합), 규모효과, 실업률

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I. Introduction

Social and residential segregation means distance or isolation among different socio-economic population groups (Feitosa and Wissmann, 2006). It is widely recognized since the end of the nineteenth century (Feitosa and Wissmann, 2006) that this segregation, especially geographical concentration of very poor households, causes many problems. These problems include discouragement of social interaction and cohesion, neighborhood stigmatization, deterioration of social service and infrastructure, and increase of violence and anti-social behavior associated with a lack of role models in poor and segregated communities. Thus in research and practice of housing and community

policy field, ‘social mix’ has been an important purpose which should be pursued for alleviating the negative impact of spatial concentration of poverty and to provide “broader social networks that may lead to employment-related opportunities” (Arthurson, 2010; 49), as a “remedy for a dual society” (Blanc, 2010; 268).

For this purpose, United States has paid attention to kinds of social mix policies since the 1960s influenced by Civil Right movement (Feitosa and Wissmann, 2006). First, the Section 8 program, which is approved in 1974, is the first step of American housing policy which is associated with spatial dispersion of poverty, by providing housing vouchers to poor families. Second, the HOPE (Housing Opportunities for People Everywhere) VI program, which started in 1992, pays more attention to place-based strategy and replaced deteriorated public housing with low-density, mixed income neighborhood. Third, Moving to Opportunity (MTO) in 1994 was a demonstration program to evaluate the effect of mobility counselling and housing vouchers with geographical restriction on social mix, by providing housing vouchers available only for those moving to the areas with less than 10 percent of poverty.

However, research on the effects of social mix policy is not much compromised. While much research confirmed the effectiveness of these social and housing mix policies, others criticized that their influences are very limited, or they even create more conflicts. And one of the critical factors of social mix policy is the spatial scale. Many researchers noted the possibility that the spatial scale of neighborhood has critical influence on the “relationship between neighborhood composition and social outcome” (Andersson and Musterd, 2010). Although some tried to show effects of neighborhood which are differentiated by spatial scale through empirical studies, the empirical evidence of scale effect in social mix policy is very limited.

Thus this study aims to construct empirical ground of social mix policy. And not only confirming the existence of the effects of social mix on individual opportunities, this study investigates whether these influences are differentiated by spatial scales of neighborhood. These founding will help policy makers establish the social mix strategy in the proper spatial scale where this policy work more efficiently.

II. Problem Definition

Manski (2003) emphasized that the identification and selection of samples in empirical studies affect or limit the conclusion, which he called “selection problem” (Manski, 2003: 15). This supposition is closely associated with the fundamental concern of this research, which aims to explore the differentiation caused by the selection of spatial units in social mix. This research aims to build more empirical basis for replying to the unanswered question, ‘at which scale among “street, block or neighbourhood” (Arthurson, 2010), should the social mix policy be implemented?’. Arthurson (2010) emphasized that “we need a better understanding of the consequences of operationalizing social mix at a different spatial scales” (Arthurson, 2010) for social mix policies to promote wider social network and interaction between different socioeconomic classes. Other researchers also noticed that income mix policy implemented at the building level showed little evidence of social interaction between different socioeconomic groups. Some argued that social mix in too small scale, for example in current social housing policy, may cause conflict, rather than social cohesion (Brophy and Smith, 1997; Arthurson, 2010; Blanc. 2010).

As shown here, much research emphasized the importance of spatial scale in social mix because “social mix is likely to have different consequences at different scales of operationalization” (Arthurson 2010). However, there is little empirical evidence to shed meaningful light on the policy practice. Thus investigating the differentiated effect of each spatial scale in social mix could help policy makers establish social mix housing and community policy based on proper spatial scale.

III. Literature Review

As mentioned above, many researchers who investigated social mix policies emphasized the different influence of different spatial scales. For example, Arthurson (2010) emphasized consideration of spatial scale in social mix. Through exploring social mix policies in three suburbs in South Australia and interviewing with 40 residents in-depth, across these neighborhoods, she found that scale of implementation is the one of the “critical factors in determining whether or not social interaction occurs” (Arthurson, 2010: 49) along with other factors including schools and location of social networks.

Beyond emphasizing the role of spatial scale on various individual and social outcomes, more prominent research tried to find the critical spatial scale. This research can be categorized into two types of research methodology. The first group of research investigated the influences of spatial scale of social mix policy on individual income, employment, health or interaction, through empirical analysis. The second group looked into what the most appropriate spatial scale is for social mix, using qualitative research methods.

The first group of research tried to find the most influential spatial scale in social mix policy using empirical research methods. Root (2012) focused on the fact that the spatial scale of socio-economic mix influences the specific health outcome. Using data on birth defects in North Carolina, she examined the relationship between SES and orofacial clefts at different spatial scales, by creating different size of “buffers” (surrounding areas) from the incidence point using GIS. She found that neighborhood size of approximately 4,000 m is optimal for modeling the influence of SES on health. She contributed to the debate of ‘appropriate’ neighborhood scale (Root, 2012 ;993), by showing that “aggregating data to different scales of geography might yield different results” (Root, 2012;993). And Andersson and Mustad (2010) explored the relation between neighborhood composition and social outcomes, considering the different effect of each scale of neighborhood, from very local level like a few neighboring street to higher scale, using data of the three largest metropolitan areas in Sweden. Adopting multi-level models, they found that “there are generally significant effects of the area compositions on individual income, at all scales” (Andersson and Mustad, 2010) and neighborhood effects on income are strongest at the very local level, while less important at macro level. They also showed that the most critical factors in neighborhood on individual income are the percentage of low incomes and the percentage of non-western migrants.

Blanc (2010) and Lawton (2013) can be categorized into the second group who tried to find the appropriate spatial scale for social mix with qualitative approach. Blanc (2010) also raised the issue that the “communal scale of the measure of segregation and social mix” (Blanc, 2010), in evaluating the impact of social mix policy in France. His main concern and argument were to criticize the housing policy in France which aimed to challenge segregation in housing, in that “social mix policy strengthens ghettos and hinders the right to decent housing for the very poor” (Blanc, 2010). He said that the commune, “the neighborhood level, more or less a catchment area for schools and daily

trade, appears more appropriate as social interactions may take place at” (Blacn, 2010; 267). Lawton (2013) also highlighted that the *degree* to which the mix of different groups of ethnicity, race and social class, and the *scale* at which social mix takes place, from the urban blocks, streets to larger scales, are important for promotion of livability as a key element of social mix. With Amsterdam as an empirical case, he interviewed with key stakeholders of recent urban development and concluded that these factors should receive more attention in “understanding the dynamics of social interaction” (Lawton, 2013) in communal space of socially-mixed neighborhood. The interviewees generally thought that “social mixing was most ideal at the level of the street or open public space” (Lawton, 2013; 114) and he concluded that “the level of social interaction will take place at a scale above that of the internal spaces of the staircases or corridors” (Lawton, 2013; 114).

All the take together, previous researches thought the critical spatial scale influencing on individual outcome as area of 4000 m radius, commune in France, neighborhood at the level of the street or open public space, or SAMS in Sweden. However it should be noted that the appropriate scales may be different for each purpose or outcome. This research investigates the most appropriate geographical scale in social or racial mix policy, for individual opportunity.

IV. Research Design and Methods

1. Research Questions

This research explored the following three research questions. First, this research tried to find the answer of the question whether the neighborhood effect of social mix really exists, by asking if the unemployment rate is influenced by income mix or racial mix. Second, this research focused on whether the spatial scale of social mix influences on the neighborhood effect, through investigating if the unemployment rate is influenced by social mix, by different degree according to the various spatial scale of social mix. Lastly, this paper investigated whether the influence of social mix is also differentiated by characteristic of target population, by testing whether the influence is more critical on young age.

2. Models

As shown in the literature review, previous research investigated the influence of social mix on individual income, employment, health or interaction itself. Among them, this paper adopted unemployment rate as a proxy of individual opportunity, based on the Musterd and Andersson's (2005) research. And to explore the first question, this paper investigated whether the change of this unemployment rate is caused by social mix - income and racial mix (Mustard and Anderson, 2005).

First model tests the influence of income and racial mix at census block-group level, and the second model tests them at census tract level¹⁾. And other factors besides social mix which would heavily influence on the unemployment rate, median income, median age, education and share of non-white are used as control variables. And to answer the second research question, same mix variables in two different spatial scale are included at the same time in each model. Third model is to test the influence of spatial scale of income mix on individual opportunity, and the forth would show that of racial mix. Also, the third research question, whether influence of social mix is more critical on young age, would be investigated through the four interact terms in each model. These terms are created by each mix variable, multiplied by median age and would show whether the influence of mix on unemployment rate is enforced by the different median age of target population groups.

$$Unemp_i = \beta_0 + \beta_1 Racialmix_BG_i + \beta_2 Income_BG_i + \beta_3 Interact1_i + \beta_4 Interact3_i \\ + \beta_5 Medincome_i + \beta_6 Medage_i + \beta_7 Edu_i + \beta_8 Shareofnonwhite_i + v_i$$

$$Unemp_i = \beta_0 + \beta_1 Racialmix_CT_i + \beta_2 Incomemix_CT_i + \beta_3 Interact2_i + \beta_4 Interact4_i \\ + \beta_5 Medincome_i + \beta_6 Medage_i + \beta_7 Edu_i + \beta_8 Shareofnonwhite_i + \varepsilon_i$$

$$Unemp_i = \beta_0 + \beta_1 Incomemix_BG_i + \beta_2 Incomemix_CT_i + \beta_3 Interact1_i + \beta_4 Interact2_i \\ + \beta_5 Medincome_i + \beta_6 Medage_i + \beta_7 Edu_i + \beta_8 Shareofnonwhite_i + e_i$$

$$Unemp_i = \beta_0 + \beta_1 Racialmix_BG_i + \beta_2 Racialmix_CT_i + \beta_3 Interact3_i + \beta_4 Interact4_i \\ + \beta_5 Medincome_i + \beta_6 Medage_i + \beta_7 Edu_i + \beta_8 Shareofnonwhite_i + u_i$$

¹⁾ Census block-group is statistical division of census tract, is generally defined to contain between 600 and 3,000 people, and census tract generally has a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people (United States Census Bureau).

3. Data

This paper investigates these research questions using Los Angeles County using 2010 census data and 2013 American Community Survey. The unit of analysis is census block-group. Table 1 shows the variables adopted by above four models.

Table 1 Variables Description

	Variables	
Dependent Variable	Employment rate, age 16 and over	Represent the individual opportunity
Independent Variable	Income mix_BG	Income mix of census block-group
	Income mix_CT	Income mix of census tract
	Racial mix_BG	Racial mix of census block-group
	Racial mix_CT	Racial mix of census tract
	Interact 1	Income mix_BG * median age
	Interact 2	Income mix_CT * median age
	Interact 3	Racial mix_BG * median age
	Interact 4	Racial mix_CT * median age
Control Variable	Median income	
	Median age	
	Education	Share of high school graduate or higher
	Share of non-white	Including Hispanic

Table 2 Summary Statistics of Variables

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Unemployment rate	6,380	0.115	0.0699	0	0.667
Incomemix_BG	6,377	0.811	0.0894	0	0.980
Incomemix_CT	6,379	0.890	0.0552	0	0.989
Racialmix_BG	6,390	0.441	0.157	0.0205	0.770
Racialmix_CT	6,373	0.450	0.153	0.0324	0.750
Median income	6,372	64,300	34,673	4,743	250,000
Median age	6,390	35.99	6.866	13.50	69.10
Education (more than high school)	6,384	0.761	0.193	0.0625	1
Share of non-white	6,390	0.704	0.273	0.0604	1
Interact1 (Income mix_BG * median age)	6,377	29.11	6.016	0	59.49
Interact2 (Income mix_CT * median age)	6,379	32.06	6.630	0	63.21
interact3 (Racial mix_BG * median age)	6,390	16.22	6.824	0.582	41.83
interact4 (Racial mix_CT * median age)	6,373	16.54	6.783	0.880	43.15

The social mix including income or racial mix index can be constructed in various way.

Andersson and Musterd (2010) measured neighborhood characteristics using the ratio of immigrants from non-Western countries, the ratio of low-income households, and the ratio of high-income households. Root (2012) adopted the percentage of the population living below 100 percent of federal poverty level, the percentage of the population with less than a high school education, and the percentage of the population unemployed, as socioeconomic variables which work as factors of neighborhood effect. This paper adopts the entropy index to measure the income and racial mix, which was used in Musterd and Andersson (2005). This index is first developed from information theory (Musterd and Andersson, 2005), but now widely used in various fields in measuring diversity. Entropy index properly reflects the concept of diversity about how various components are composing the neighborhood. This paper adopts the standardized forms of this index to compare them with mix index in other spatial scales. Standardized entropy index is calculated using the following equation, and all income and racial mix²⁾ indices are produced by this formula in this study.

$$H(x) = -\sum P_i \ln P_i / \ln N$$

P_i: the probability of an observation belonging to category I of X

P_i ln P_i = 0 for P_i = 0

N: the number of categories

The variables adopted in four models are as shown in table 2. All the mix indices are from 0 to 1, 0 means no diversity and 1 means good mix and diversity.

V. Results

This paper focuses on the three research questions, whether the social mix effects on unemployment exist, whether this effect is differentiated by spatial scale of social mix, and finally, this influence is also different by the median age of target population group. For answering these questions, this paper did three parts of analysis. First part investigated income and racial mix effects in each scale to answer the first question. I modeled to see

²⁾ Racial mix is calculated from the categories: White (non-Hispanic), Hispanic, black, Indian, Asian, native Hawaiian, other, and two or more.

the differentiated influence of income mix in different spatial scale in the second part, and tested the differentiated influence of racial mix also in different spatial scale in the third part, to answer the second research question. In second and third part, I analyzed whether the employment rate in census block-group is influenced differently by social mix in census block-group and social mix in census tract. And from the interaction terms included in each model, the third question whether the effect of social mix is differentiated by the age of target group would be explored.

1. The differentiated influence of social mix in each spatial scale

Table 3 shows the results of analysis of the influence of both income and racial mix in each spatial scale (census block-group and census tract) on unemployment in census block-group. Again, the value of these entropy index is 1 when the income level of residents is various (well-mixed), 0 when the incomes of all residents are the same. And in both scale, the coefficients of income and racial mix variables show negative signs in general. This implies that the more mixed the community is, the less unemployed people are, which is consistent with theory of positive neighborhood effect of mixed community on individual opportunity.

Model 1-3 are constructed from the data of census block-group level. In model 1, without interact terms, the racial mix effect on unemployment rate is shown significant while income mix effect is not proven. Model 3 includes the interact terms of each income and racial mix variable with median age (interact 1 and interact 3). These coefficients for interact terms show how the effect of social mix changes with a one-unit increase of median age. Model 3 shows that the coefficients of these interact terms of both income and race are negative in census block-group level. This result means that the influence of social mix is larger in the community with lower median age, which strongly implies that the neighborhood effect works more on the young than on the older.

Model 4-6 show the results of analysis on the effect of social mix in census tract level, and their results are similar with the case of census block-group. In model 4, without interact terms, the racial mix effect on unemployment rate also seems significant and income mix effect is not shown either. Also, Model 6, which includes interaction terms of each income and racial mix variable with median age (interact 2 and interact 4), does give evidence of the differentiated effect of social mix in census tract level on different median age groups. As the model 3, the influences of social and racial mix get larger as

Table 3 Results of Analysis of Racial and Income Mix Influence in Each Spatial Scale

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6
incomemix_BG	-0.000149 (0.0156)	-0.0611 (0.0932)	0.185** (0.0768)			
racialmix_BG	-0.0148** (0.00605)	0.000934 (0.0362)	0.114*** (0.0357)			
interact1		0.00164 (0.00253)	-0.00782*** (0.00223)			
interact3		-0.000497 (0.00109)	-0.00345*** (0.00102)			
medincome			-8.11e-07*** (5.84e-08)			-7.00e-07*** (4.98e-08)
medage	-0.00270*** (0.000153)	-0.00378* (0.00195)	0.00767*** (0.00187)	-0.00269*** (0.000155)	-0.00346 (0.00493)	0.0129*** (0.00419)
eduhighover			-0.0155 (0.0103)			-0.0203** (0.00961)
shareofnonwhite			0.0111** (0.00519)			0.0110** (0.00512)
incomemix_CT				-0.0281 (0.0370)	-0.0527 (0.210)	0.395** (0.169)
racialmix_CT				-0.0125* (0.00670)	-0.0297 (0.0398)	0.0846** (0.0369)
interact2					0.000623 (0.00580)	-0.0132*** (0.00478)
interact4					0.000525 (0.00119)	-0.00262** (0.00107)
Constant	0.219*** (0.0140)	0.261*** (0.0733)	-0.0214 (0.0620)	0.243*** (0.0304)	0.272 (0.178)	-0.216 (0.145)
Observations	6,380	6,380	6,375	6,363	6,363	6,358
R-squared	0.076	0.077	0.171	0.077	0.077	0.163
Adjusted R-squared	0.076	0.076	0.170	0.076	0.076	0.162
RMSE	0.068	0.068	0.064	0.068	0.068	0.064
AIC Prob>F	-16261.61 0.0000	-16259.67 0.0000	-16992.22 0.0000	-16211.79 0.0000	-16208.3 0.0000	-16885.33 0.0000

Interact1: income mix_BG * median age; interact2: income mix_CT * median age; interact3: racial mix_BG * median age; interact4: racial mix_CT * median age

Robust standard errors in parentheses

AIC: Akaike's Information Criterion

*** p<0.01, ** p<0.05, * p<0.1

the median age of the community increases, thus the young seem to be more sensitive to the influence of social mix. And commonly in model 3 and 6, this effect variation by age is larger from income mix, than from social mix.

2. The influence of income mix

As for income mix effect on unemployment rate, both income mix in census block-group and census tract level showed its significant influence, as shown model 1 in table 4. The negative signs of coefficients of the mix variables mean that the more varies the income, the lower is the unemployment rate, as shown above.

Table 4 Results of Analysis of Income Mix Influence

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
incomemix_BG	-0.0946*** (0.0151)	-0.0897*** (0.0156)	0.109* (0.0627)	0.0941 (0.0633)
incomemix_CT	-0.0935*** (0.0301)	-0.0678* (0.0348)	0.342** (0.162)	0.369** (0.166)
medincome	-8.72e-07*** (3.17e-08)	-7.59e-07*** (5.52e-08)	-8.94e-07*** (5.30e-08)	-8.39e-07*** (5.89e-08)
medage		-0.000137 (0.000231)	0.0136*** (0.00399)	0.0139*** (0.00403)
eduhighover		-0.0121 (0.00834)		-0.00886 (0.00848)
shareofnonwhite		0.00946* (0.00511)		0.00984** (0.00495)
interact1			-0.00564*** (0.00170)	-0.00515*** (0.00172)
interact2			-0.0107** (0.00455)	-0.0112** (0.00462)
Constant	0.331*** (0.0292)	0.305*** (0.0331)	-0.202 (0.138)	-0.227 (0.139)
Observations	6,375	6,375	6,375	6,375
R-squared	0.161	0.164	0.172	0.173
Adjusted R-squared	0.161	0.163	0.171	0.172
RMSE	0.064	0.064	0.064	0.064
AIC Prob>F	-16931.72 0.0000	-16946.15 0.0000	-17006.5 0.0000	-17012.71 0.0000

Interact1: income mix_BG * median age; interact2: income mix_CT * median age

Robust standard errors in parentheses

AIC: Akaike's Information Criterion

*** p<0.01, ** p<0.05, * p<0.1

And considering each mix index is standardized, the effect of income mix in census block-group seems to be slightly larger than that in census tract, as shown in Andersson

and Musterd (2010) which suggested the smallest geographical scale has the largest impact on individuals (in model 1 and 2 in table 4). However, when including interact terms of mix variables and median age (model 3 and 4), the results are different. The influences of interact variables are larger in census tract scale than block-group level. This raises the possibility that different age groups are engaged in and influenced by social interaction in different spatial scales.

The coefficients for interact terms, again, show how the effect of social mix changes with a one-unit increase of median age. These coefficients are all negative and significant ($p < 0.05$) and confirms that the influence of social mix gets larger as the median age in that community (here, census block-group) gets younger. This result confirms that the neighborhood effect is more serious especially for the young.

3. The influence of racial mix

Regarding racial mix effect, the model construction is different from that of income mix, because of the racial mix index of block-group scale and census tract scale is highly correlated ($\text{corr} = .95$). Thus I constructed separated model sets for each special scale (model 1~3 for census block-group, and model 4~6 for census tract in table 5). For this reason, the differentiated effect of the scale could not be tested regarding racial mix.

However, both coefficients of racial mix index in census block-group and census tract (model 1 and model 4) show the negative signs, as the case of income mix. This implies the existence of racial mix effect, the more various and mixed is the racial composition in the neighborhood, the less unemployment rate in each spatial scale. These results is the strong empirical evidence which supports the theory that social mix has positive influence on individual opportunity.

When the interact terms of racial mix and median age are included into the model of each spatial scale (model 2, 3 and 5, 6 in table 5), the coefficients of interaction terms are negative as the case of income mix. This result also aligns with the argument that the neighborhood effect of racial mix is more serious especially for the young.

Table 5 Results of Analysis of Racial Mix Influence

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6
racialmix_BG	-0.0133** (0.00566)	0.110*** (0.0154)	0.162*** (0.0358)			
interact3		-0.00341*** (0.000400)	-0.00498*** (0.00101)			
medincome			-5.93e-07*** (3.51e-08)			-5.93e-07*** (3.51e-08)
medage			0.00208*** (0.000538)			0.00188*** (0.000587)
eduhighover			-0.0346*** (0.0117)			-0.0348*** (0.0114)
shareofnonwhite	0.0719*** (0.00326)	0.0525*** (0.00386)	0.0121** (0.00533)	0.0721*** (0.00328)	0.0529*** (0.00395)	0.0110** (0.00535)
racialmix_CT				-0.0128** (0.00584)	0.101*** (0.0154)	0.142*** (0.0376)
interact4					-0.00315*** (0.000398)	-0.00434*** (0.00107)
Constant	0.0705*** (0.00398)	0.0853*** (0.00418)	0.106*** (0.0170)	0.0704*** (0.00411)	0.0849*** (0.00433)	0.113*** (0.0181)
Observations	6,383	6,383	6,375	6,366	6,366	6,358
R-squared	0.084	0.099	0.154	0.084	0.097	0.153
Adjusted R-squared	0.084	0.098	0.153	0.084	0.097	0.152
RMSE	0.067	0.067	0.064	0.067	0.067	0.064
AIC Prob>F	-16323.08 0.0000	-16423.45 0.0000	-16868.68 0.0000	-16273.77 0.0000	-16363.69 0.0000	-16808.04 0.0000

Interact3: racial mix_BG * median age; interact4: racial mix_CT * median age

Standard errors in parentheses

AIC: Akaike's Information Criterion

*** p<0.01, ** p<0.05, * p<0.1

VI. Conclusion

This paper offers a strong empirical ground for the social mix policy, by suggesting four main findings regarding the influence of social mix on unemployment rate. First, there is positive influence of income and racial mix on individual opportunity (employment). Second, the influence of income mix in small area (census block-group) is slightly larger than the influence of income mix in wider spatial scale (census tract). Third, these

influences of mix are differentiated by median age in each community. And it is plausible that different age groups are engaged in and influenced by different spatial scales. Lastly, although influence of racial mix is larger than that of income mix in general, effect of income mix associated with the age variation on unemployment is larger than that of racial mix.

The first finding that confirms the positive influence of social mix is consistent with preceding research and theories. Although these are some doubts about the social mix in too small grain, like a building, could not contribute to social integration as noted in literature review, this research empirically confirms the old belief about the positive influence of social mix, at last in some blocks (census block-group scale), again. Social mix is still presumed to be a proper policy purpose, although it requires more refined knowledge about how it really works. The second finding means that the unemployment rate in the small community is more influenced by the income mix of that community itself, than the income mix of wider geographical area the community belongs to. This implies it is very important for policy makers to consider the proper spatial scale when they think about the 'social mix'. This paper empirically proved that social mix in a building, in a block, in some block-groups, or in a city could have differentiated influence.

The third finding sheds light on the base for more refined social mix policy. It showed the younger seem to be more influenced by social mix in each community as previously believed. However, the influence of social mix changes more dramatically in larger spatial scale. This suggests that the critical spatial scale of social mix could be different for the younger and for the older could be different. It could possibly be caused by the fact that the sphere of activity of the younger could be wider than that of the older. This should be more investigated in following research. Final finding also shows the different influence of social mix on the age of target population group. This implies that the effect of income mix is more differentiated by the age of target population group than that of racial mix. All the take together, the social mix influences on individual opportunity, especially on the younger, and the younger is more influenced by the social mix in relatively larger spatial scale, and relatively by the mix of income than mix of race, than the older.

This research still holds some limitations. First limitation is about the dependent variable. This paper measured individual opportunity with unemployment rate, but if future research adopt the unemployment rate of resident below poverty line or of non-White as dependent variable, the influence of social mix could be more robustly

explored for the policy purpose of enhancing the individual opportunity of the disadvantaged. Additionally, if the spatial scales could be more various, not only the census block-group and census tract, the scale effect could be more fully explored. Lastly, although this research showed the influence of social mix is differentiated by spatial scale, the age or the kinds of mix (race or income), the influence might be also differentiated by the policy purpose. For example, social mix policies aiming to construct high quality of public facilities could be more effective when the policy is based on municipal levels sharing common finance, and policies aiming to maintain and manage the quality of existing facilities could be better to be based on smaller scale. Thus future research could explore these differentiated proper scale for different policy purpose.

This research contributes to building one empirical evidence regarding the spatial scale and age of target group which can be referenced for social mix policy aiming enhancing individual opportunity. In social mix policy like housing mix, the policy maker could try to see the income mix of which scale is most appropriate for the policy purpose. Important implication is that this proper spatial scale of policy is varied by the characteristics and the scope of daily life of target group. Also, theoretically, this research is meaningful in that it tried to respond Manski's (2003) posing of selection problem by adding one evidence regarding the differentiated effects of different scale and on different age group. This notion is fundamental concern of this research.

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