Social Effects of Regional Income Disparities

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Abstract

Since late 2000s, economic growth has gained increasing attention, while economic development became the ultimate objective of the national policies. Recently regional income disparities rose as a critical factor of regional development policies, as people started to recognize relative poverty from the drastic national economic growth with huge income gap between social classes. Wilkinson and Pickett (2011) illustrated the very strong positive relationship between income disparities and social problems in 29 OECD countries and explained the expanded income gap could cause social conflicts and/or problems.

The purposes of this paper are to identify the level of inter-city wage differentials across Korean Metropolitan Statistical Areas (MSAs) and figure out the relationship between regional wage differentials and social problems such as divorce rate, health insurance holding rate, and suicide rate. To do so, it is first necessary to delineate the Korean Metropolitan Statistical Areas. As there have not been many studies on both wage differentials across cities and economically-defined geographic areas, the regional differences in the standard of living have barely been analyzed. Therefore, wage analysis could be a substitute for Gross Regional Domestic Products (GRDP). There are several meaningful findings from the wage differential analysis. First of all, there is significant difference between GRDP and wage, which means that residents may not recognize the regional economic growth. Second, according to the Roback model, individuals in an open economy maximize their utility by choosing their location of residence with consideration of the regional average wage, cost of living, and amenities. Roback's theory is also valid in Korea, but it seems that the regional characteristics are not reflected on the wage adequately. Finally, regional wage differentials are big in the relatively lagged areas, which is quite different from the Wilkinson and Pickett's results. It may be interpreted that enhancing regional economies is still of effective policies for not only economic development but also social stability in Korea.

Key Words : Regional Income Disparities, Social Problem Index

I. Introduction

The purposes of this paper are to analyze the regional economic development from the perspective of residents by using wage data, to figure out regional income disparities across Korean Metropolitan Statistical Areas, to identify the relationship between income disparities and residents' satisfaction level. In many cases, there is illusion of the economic growth associated with the high product level. However, residents in a region characterized by low value added manufacturing industry may struggle with low wage. This relative poverty could bring social conflicts, which is the main reason for conducting this research.

Unfortunately, there was no appropriate measurement to compare regional economies except Gross Regional Domestic Product (GRDP), which is about production side. However, wage level and social problem index could be good proxies to reflect real economic level across region. In order to do this research, the spatial scope of region is supposed to be delineated in terms of economic geography, which is different from administrative districts in general. Since metropolitan areas are usually defined by commuting flow, Korean Metropolitan Statistical Areas (MSAs) delineated by Kim et. Al (2008) has been used here to grasp economic spatial range of cities. For the wage analysis, Korean Occupational Employment Statistics (OES) has been used, which is unique wage data set across Counties in Korea. The income gap or intra-MSA wage differential has been defined in two ways: One is the wage ratio of top 10 percentile wage to bottom 10 percentile wage and the other is the wage ratio of high income occupation to low income occupation. The social problem indicators such as health insurance unholder rate, divorce rate, and suicide rate just like in Wilkinson and Pickett's research are used as proxy variables for qualitative economic level of residents.

This research contributes to regional economic analysis comparing wage differentials,

social problems, and the relationship between them among MSAs in Korea in that this is almost first attempt to compare regional economy with wage, wage differentials, and qualitative measurement such as social problem.

II. Literature Review

The most well known literature on wage differentials is Roback model. According to her model, people move to maximize their utility which consists of average wage level, costs of living, and amenities in a specific location. Therefore, in general wage is supposed to be compensated for higher living costs as long as amenities are not much different across region. In other words, higher nominal wages in larger cities could be interpreted as a compensation for the higher living costs, such as relatively high rent. At an equilibrium where people moved voluntarily to maximize their utility, the indirect utilities(V) across regions are all same as shown in the following equation.

$$V_i\ (w_i, p_i\ ;\ a_i) = V^* = V_j\ (w_j, p_j\ ;\ a_j) \qquad (1)$$

, where w_i, is average wage in the region i, p_i is cost of living in the region i and a_i, is amenity level in the region i.

O'Sullivan (2008), on the other hand, paid attention to the agglomeration effect of urbanization. According to him, not only nominal wage but also real wage increase with city size, due to the spillover effect of agglomeration economy. On the other hand, Kim et al (2009) pointed out that the real wage may not increase significantly with city size, because nannies in larger cities may not have any specialties compared to nannies in small towns. Therefore, it could be instead a simple compensation for higher living costs. Addario and Patacchini (2008) also showed that the agglomeration effect seemed not significant based on Italian micro data, even though wage level increased by 0.1% for every 100 thousand

increase in city population. Krashinsky (2011) also showed that increase in wage to city size is not significant as long as family characteristics are considered. Comes, Duranton, and Gobillon (2008) defined determinant of spatial wage differentials as "skill composition of workforce" based on the studies using French data. In other words, skilled workers could be sorted by city size.

There are a couple of Korean literatures regarding wage differentials. Lee (2002) found that spatial wage differentials especially among 7 Metropolitan Cities are determined by the individual characteristics such as education and experience. Jang and Lee (2001) figured out that on average, the wage increases by 3% as the number of education increases by 1 year. However, Lee (2002) pointed out that it is only skilled workers with advanced degree who benefit from positive effects of migration. Therefore, in this paper, more appropriate wage differentials are measured across and within the Korean cities defined by economic geography. The following sections consist of regional wage analysis using the abovementioned city concept.

As reviewed so far, wage could be an important and meaningful substitute for GRDP, because GRDP is not appropriate in many places to reflect reality. For example, As Kim (2011) stated, the wage level is relatively low in low value added manufacturing oriented small city with higher GRDP. Then, the fundamental question arises. What is the economic development? What is the objective of regional policies? If the fruit of regional economic growth is not returned to residents, it is necessary to reconsider to adjust policies. Wilkinson and Pickett (2011) pointed out that sometimes higher economic growth with huge disparities may generate social conflicts showing the level of residents' satisfaction level. As shown in Figure 1, there is a strong positive relationship between income inequalities and health and social problems in 29 rich countries, while no significant relationship is found between Gross

National Income (GNI) and health and social problems (See their paper). This pattern is also shown in a country. In the U.S.A., the health and social problem is relatively but significantly higher in the States with a higher income inequality (See Figure 2).

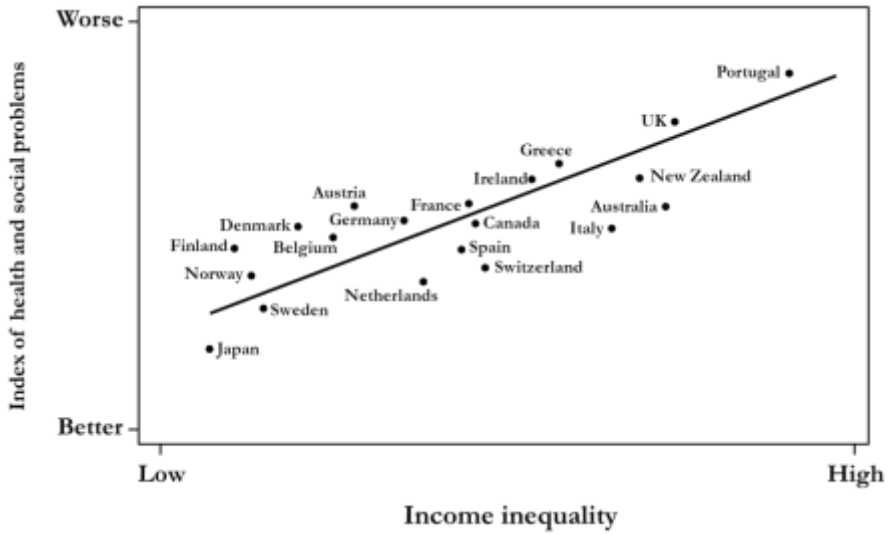

Figure 1. Health and social problems are closely related to inequality among rich countries.

Source : Wilkinson and Pickett (2011)

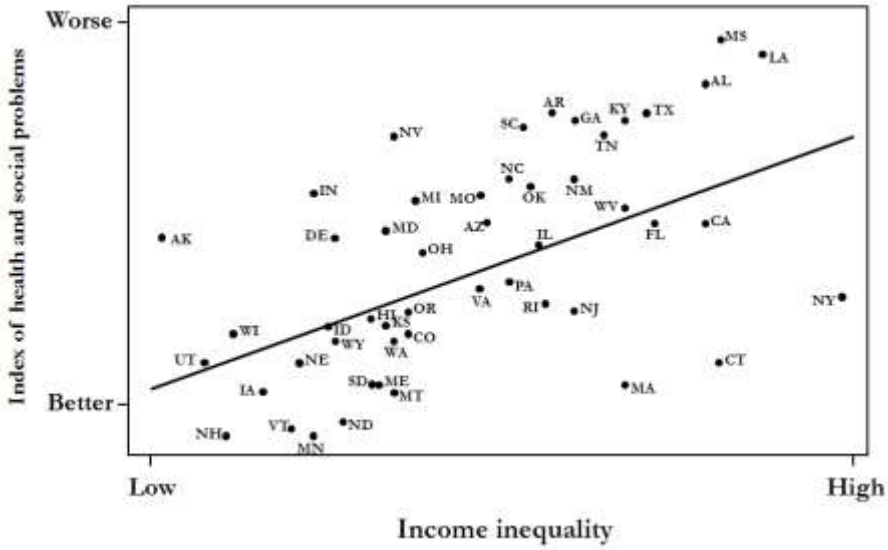

Figure 2. Health and social problems are only weakly related to average income in US states.

Source: Wilkinson and Pickett (2011)

Atkinson and Piketty (2006) and Piketty and Saez (2006) also measured income inequalities with the ratio of top 10 percent or 1 percent income to total income and stated unbalanced income structure may trigger social problems. Therefore, this paper tries to figure out the levels of regional income disparities and social problem and to identify the relationship between them for some meaningful policy implication.

III. Delineation of Korean Metropolitan Statistical Areas

As the first step in analysis of wage differentials in inter-city wide and/or intra-city wide, the definition of city is defined. In this paper, Korean Metropolitan Statistical Areas (MSAs) as newly defined by Kim et al (2009) are used as economic context of cities. The definition of a city is crucial in comparing any statistical indicators across cities. Nevertheless, although a few researchers have attempted to define a city, not many of them analyzed the statistical data across economic geographic cities in Korea. Unfortunately, administrative districts such as the 16 Provinces or 232 Counties are used thus far. There are some research conducted defining Metropolitan Areas in a simple form such as the MSA in the United States. Therefore, Korean MSAs is delineated first in this section in the following ways (Kim et. al. 2008). Counties are the basic geographic classification in defining MSAs in Korea. For cross-commuting rates, commuting flow data from the National Census for workers and students over 12 years old was used. The criteria for delineating MSAs are as follows:

① Central city:

any metropolitan cities or general cities with over 50 thousand people

② Peripheral city:

i) any adjacent *Si-Gun-Gu*s over 100people/km^2 of population density to a central city AND

ii) commuting rates of any *Si-Gun-Gu*s to or from a central city are over 10%

Based on the criteria, a total of 50 MSAs are shown in Table 2, which cover 44% of the land area and about 95% (44 million) of the total residential population in 2005. Among those 50 MSAs, there are 14 MSAs that consist of more than two Counties. The Seoul MSA, for example, includes 18 Counties in Gyeonggi-do. The population of the Seoul MSA was about 16.7 million in 2005, which is much smaller than that of Capital Area, Seoul-Incheon-Gyeonggi, but much larger than that of Seoul Metropolitan City[1]. The Busan MSA, including Gimhae and Yangsan is the second largest MSA, but its population is only about 4.2 million which is about one-fourth of Seoul MSA. The third largest MSA, the Daegu MSA with Gyeongsan has a population of 2.7 million, which is about one-seventh that of Seoul MSA.

The population growth in the Seoul MSA from 2000 to 2005 is higher than the average population growth in the MSAs. In the meantime, there were population decreases in the Busan MSA and Daegu MSA. In the mid size MSAs, namely Suwon-Hwaseong-Osan MSA, Ulsan MSA, and Cheonan-Asan MSAs have experienced population increases, while the population in the Changwon-Masan-Jinhae MSA has barely changed. In general, the MSAs with higher concentrations of manufacturing industries have experienced population increases. In particular, the employment rate in manufacturing industry in the Gwangju MSA and the Daejeon MSA are 15.7% and 12.2% in 2005, which are much less than the national average rate of 19.7%. It is an evidence that over-concentration in the Seoul MSA is an issue from the perspectives of not only the primary city but also large cities.

[1] 23 million in Seoul-Incheon-Gyeonggi and 10 million in Seoul Metropolitan City in 2005

Figure 3. Korean Metropolitan Statistical Areas

Source: Kim et al (2008)

IV. Analysis of Intra-City Wage Differentials across MSA

For the analysis of wage differentials across MSAs, Korean Occupational Employment Statistics (OES) has been used, which is unique wage data set across Counties in Korea. The data set has been built since 2001. As shown in Table 1, the total number of employees (respondents) in 2009 survey is 101,674.

Table 1. Korean Occupational Employment Statistics

year	Number of households	Number of employees
2001	49,559	65,193
2002	51,519	71,360
2003	51,008	71,790
2004	51,182	70,016
2005	51,121	70,254
2006	75,999	100,129
2007	76,377	103,813
2008	76,594	101,617
2009	75,735	101,674

In 2005, the national monthly wage was 174 ten thousand Korean Won, KRW (about 1,740 USD). The wage (202 ten thousand KRW) of Seoul MSA was the second highest following except Samchek MSA, while that of Milyang MSA was the lowest as shown in Table 3. In general, the MSAs with large population or traditional manufacturing industry concentration have higher wage. Exceptionally, Busan and Daegu MSAs have relatively lower wage due to the industrial structure.

To analyze intra-city wage differentials, it is necessary to define the wage differentials (gap) first. The most common way of defining wage differential is to use the percentile ratio, the ratio of top 10 percentile wage to the bottom 10 percentile wage. The other way of measuring wage differentials within a city is to calculate the wage ratio of skilled labor to unskilled labor within a city. Then, the definition of skilled labor and unskilled labor are supposed to be defined. In this paper, workers are categorized with high income occupations and low income occupations shown in Table 2. In general, managers and doctors are in high wage occupations, while nurses and child care teachers are in low wage occupations.

Table 2. High Income (Wage) and Low Income (Wage) Occupations

High Income (Wage) Occupation	Low Income (Wage) Occupation
Administrative Managers	Secretaries
Manager in Constructions	Child Care Teachers
Managers in IT industry	Nurses
Sales Managers	Physical Therapist Helper
Managers in Environments	Barbers
Accountants and Appraisals	Ticket Seller
Financials in Banking and Insurance	Sales Person
Doctors and Pharmacists	Security Guards
Computer Programmers	

The intra-city wage differentials in Seoul MSA are relatively lower than the national average as shown in Table 3. Top and bottom 10 percentile wage differential in Seoul MSA in 2005 was 5.0, while the national differential was 6.7. The wage differential measured by occupation in Seoul MSA was 2.9. On the other hand, the wage differentials in Yeosu MSA with a highly concentrated petroleum chemical industry are 10.0 and 4.3 respectively. Even though it is not significant, MSAs with large population have relatively lower wage differentials, which is a result quite contrary to the findings of Wilkinson and Pickett (2011).

Table 3. Intra-City Wage Differentials and Social Problem Indicators in Korean MSAs (2005)

MSAs	Monthly wage (10 K KRW)	Top10% / Bottom10%	HighIncome / LowIncome	Healthinsurance unholer rate	Divorce rate	Suicide rate
Seoul	202	5.0	2.9	0.406	0.031	0.054
Busan	156	6.0	2.8	0.401	0.037	0.052
Daegu	152	6.0	3.2	0.412	0.030	0.049
Incheon	175	5.6	2.7	0.409	0.039	0.058
Gwangju	179	4.3	3.6	0.377	0.027	0.044
Daejeon	173	6.7	2.8	0.384	0.030	0.060
Ulsan	193	6.7	3.3	0.306	0.029	0.053
Suwon	192	3.8	2.3	0.349	0.029	0.060
Pyeongtaek	186	5.7	2.3	0.369	0.030	0.062
Dongducheon	156	4.6	1.8	0.475	0.049	0.070
Ansan	194	3.9	3.1	0.409	0.037	0.073

Icheon	132	6.0	2.1	0.394	0.024	0.060
Chuncheon	149	7.5	2.7	0.381	0.029	0.040
Wonju	161	6.0	2.0	0.405	0.031	0.058
Gangneung	170	6.7	2.9	0.425	0.030	0.047
Donghae	172	7.4	1.8	0.382	0.032	0.046
Taebaek	162	10.0	2.7	0.353	0.035	0.045
Sokcho	134	5.0	4.0	0.489	0.045	0.058
Samchek	211	5.5	2.1	0.369	0.023	0.050
Cheongju	179	5.0	3.0	0.351	0.028	0.062
Chungju	140	8.3	2.6	0.424	0.027	0.055
Jecheon	156	5.1	2.2	0.422	0.028	0.061
Cheonan	186	7.8	3.1	0.359	0.027	0.058
Gongju	130	10.7	3.5	0.443	0.022	0.056
Boryeong	157	7.2		0.462	0.025	0.055
Seosan	171	11.1		0.397	0.022	0.062
Jeonju	190	7.0	3.1	0.378	0.026	0.041
Gunsan	148	7.5	2.5	0.385	0.032	0.039
Iksan	139	7.3	3.7	0.405	0.028	0.050
Jeongeup	126	14.6	2.3	0.455	0.023	0.027
Namwon	111	15.0	2.3	0.446	0.021	0.020
Mokpo	157	10.0	3.1	0.435	0.031	0.038
Yeosu	186	10.0	4.3	0.402	0.028	0.040
Suncheon	192	10.0	2.1	0.370	0.024	0.035
Pohang	198	8.0	2.7	0.351	0.029	0.038
Gyeongju	161	6.9	3.6	0.379	0.024	0.033
Gimcheon	126	10.4	1.3	0.391	0.022	0.040
Andong	127	8.3	2.0	0.382	0.021	0.040
Gumi	150	5.8	2.7	0.327	0.020	0.056
Yeongju	140	12.0		0.411	0.019	0.047
Yeongcheon	129	10.0		0.416	0.029	0.041
Sangju	143	12.0		0.451	0.018	0.036
Mungyeong	120	8.3		0.419	0.021	0.022
Changwon	180	4.3	3.2	0.330	0.030	0.050
Jinju	153	13.3	2.6	0.399	0.029	0.046
Tongyeong	157	6.0	2.3	0.510	0.037	0.046
Milyang	93	10.0	2.9	0.442	0.024	0.042
Geoje	155	22.5	3.1	0.288	0.027	0.053
Jeju	164	4.5	3.0	0.444	0.040	0.051
Seogwuipo	147	6.0		0.496	0.036	0.052
Nation	174	6.7		0.400	0.030	0.049

V. Social Effects of Regional Income Disparities

In general, larger MSAs have a higher GRDP per capita. However, it does not necessarily mean that larger MSAs have a higher standard of living. Shown in Figure 4, the correlation between average wage and GRDP per capita is not significantly high. For example, Anyang-Siheung MSA, adjacent to Seoul MSA has superiority in wage level but not in GRDP per capita. On the other hand, GRDP per capita is the highest in Gumi MSA but the wage level is relatively low. Therefore, the level of regional economy measured by quantitative GRDP per capita may be quite different from how residents feel about their economic and living standards.

As ultimate objective of regional policies, residents' satisfaction could be measured by social problem indicators, which are available in Korean National Statistical Office. Health insurance unholder rate, divorce rate and suicide rate have been used as social problem index by equal weight after standardization. According to Wilkinson and Pickett (2011)'s finding, the correlation between GRDP per capita and health and social problem is very low. However, there is a strong negative correlation between them in Korea (See Figure 5). It could be interpreted that more growth oriented policy lowers the social problem.

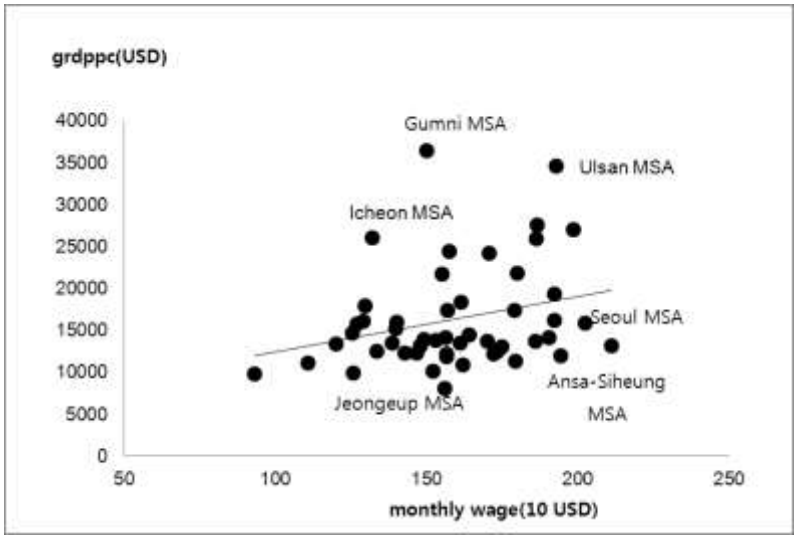

Figure 4. Wage and GRDP (2005)

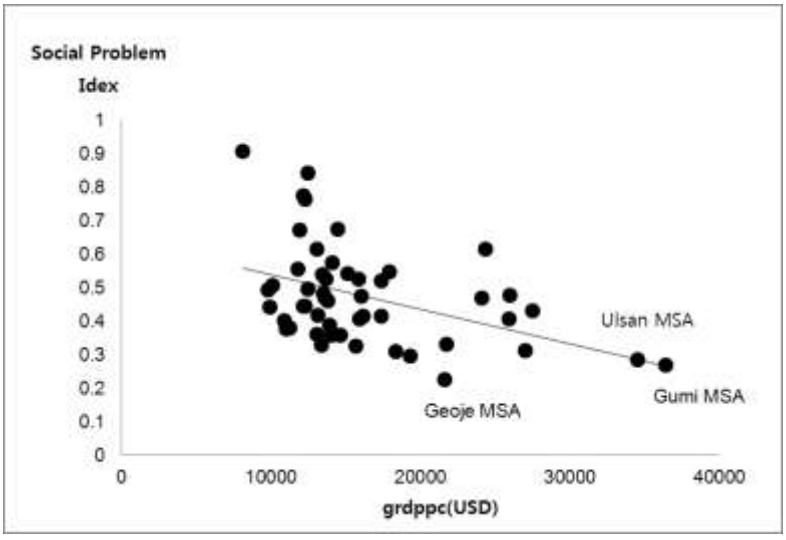

Figure 5. GRDP and Social Problem (2005)

In addition, Wilkinson and Pickett (2011) showed that health and social problem is significantly high in the region with higher income inequality. However, just like GRDP per capita, the wage differential (or income disparity) has negative relationship with social problem in Korea (See Figure 6). Wage differentials measured by top and bottom 10 percentile and occupational ratio showed consistent results. It is because larger MSAs such as Seoul MSA have relatively lower social problem but higher wage differential. On the other hand, smaller MSAs have a higher social problem.

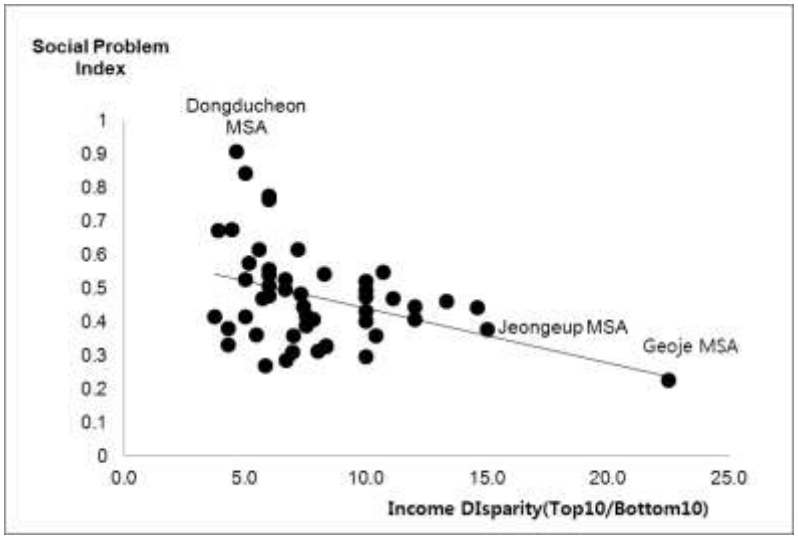

Figure 6. Income Disparity and Social Problem (2005)

Now, regression with other important specification has been analyzed to figure out the causality between social problem and wage differential, which is quite different from Wilkinson and Pickett's. Again, as the ultimate policy objective, Social Problem Index (SI) could be expressed as a function of wage gap and GRDP per capita (grdppc) and some other economic variables such as population growth (popgrowth) and employment growth rate (ergrowth). In Table 4, the model (1), (4), and (6) used wage gap measured by the top and bottom 10 percentile. As stated before, the social problem index has negative relationship with wage gap significantly. On the other hand, the model (2), (5), and (7) used wage gap (jobwagegap) measured by the occupational wage ratio. Even though it is not significant, the results show positive relationship between them, which is consistent with Wilkinson and Pickett's finding. GRDP per capita is negatively related with social problem index in all models. Since there might be causality problem between social problem index and wage differential, the two stage least square regression (instrument variable regression, IV regression) has been conducted. It is not clear whether social problem changes GRDP per capita or GRDP per capita changes social problem: Still, however, IV regressed model (6) and (7) showed same results. In addition, population growth raised social problem but employment rate growth lowered social problem.

SI = *f*(wage gap, grdppc)

grdppc = *f*(popgrowth, ergrowth)

Table 4. Regression for Social Problem (2005)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
grdppc[1)]			-0.000010	-0.000010	-0.000012	-0.000011	-0.000013
			[3.34]***	[3.04]***	[3.83]***	[3.43]***	[3.96]***
wagegap	-0.016249			-0.015400		-0.014009	
	[2.90]**			[3.46]***		[2.76]***	
jobwagegap		0.003456			0.032699		0.002834
		[0.09]			[0.99]		[0.10]
popgrowth						0.226384	1.817624
						[0.22]	[1.78]*
ergrowth						-2.797230	-6.198720
						[2.13]***	[3.68]***
Adj R-square	0.1489	0.0002	0.1886	0.322	0.2681	0.3907	0.4898
Obs	50	43	50	50	43	50	50
Instruments						vapcmfg	vapcmfg
						finindep	finindep

1) instrumented variable

VI. Conclusion and Policy Implications

There are several very important findings in this research regarding regional income disparity and social problem. First, the wage is a good substitute for GRDP per capita for regional comparison analysis in that wage is more sensitive to residents. Furthermore, since wage comparison is a bit different from the GRDP per capita comparison, it also means that regional economy that residents recognize may be different from the GRDP per capita. In other words, GRDP per capita may not fully reflect the standard of living. In general, the average wage is higher in MSAs with large population and MSAs with specialized traditional

manufacturing industries. Moreover, wage differentials across MSAs have been compared. There was a tendency of MSAs with a larger population having a smaller wage differential (income disparity or income inequality), because low percentile wage is relatively high. Finally, as an ultimate objective of regional policy, satisfaction has been measured by the social problem indicators. Unlike Wilkinson and Pickett (2011), the empirical studies of this paper showed that MSAs with higher income disparity have lower social problem. Dominant number of previous studies showed a relationship where the income disparity increases as local economy grows. However, our study shows that in Korea, income disparity increased by economic growth may lower social problems, which is very important policy implication to local government as well as central government.

Reference

Addario, Sabrina Di, and Patacchini, Eleonora(2008), "Wage and the City. Evidence from Italy", *Labour Economics*, 15: 1040-1061

Atkinson, A. and Piketty, T. (2006), Top Incomes over the Twentieth Century. Oxford University Press

Cobes, Pierre-Philippe, Duranton, Gilles, and Gobillon, Laurent(2008), "Spatial Wage Disparities: Sorting Matters!", *Journal of Urban Economics*, 63: 723-742

Docquier, Frederic and Rapoport, Hillel(2004), "Skilled Migration: the Perspective of Developing Countries", Worldbank Policy Research Working Paper 3382

Jang, Soomyung and Bunsong Lee(2001), "Distribution of Human Capital Across Korean Cities and Industries, and External Economies of Human Capital", *Korean Labour Economics*, 24(1):1-33

Kim, Dongsoo, Liu, Feng, and Yezer, Anthony(2009), "Do Inter-city Differences in Intra-city Wage Differentials Have Any Interesting Implications?", *Journal of Urban Economics*, 66: 203-209

Kim, Dongsoo, Jang, Jaehong, and Lee, Doohee(2009), "Migration Analysis based on Korean MSAs", *Journal of the Korean Economic Development*, 15(1):133-152

Kim, Dongsoo, Huh, Mungu, and Lee, Doohee(2009), "Analysis of the Regional Economy Competitiveness and Characteristics based on newly Constructed Korean MSAs", *Journal of the Economic Korea Planners Association*, 44(1):181-196

Krashinsky, Harry(2011), "Urban Agglomeration, Wages and Selection: Evidence from Samples of Siblings", *Labour Economics*, 18: 79-92

Lee, Wonho (2002), "Wage Determination Process and Income Disparity in Korean Metropolitan Cities", *Journal of Economic Geographical Society of Korea*, 5(2):187-207

O'Sullivan, A. (2009), Urban Economics, seventh ed. McGraw-Hill, Boston

Piketty, T. and Saez, E. (2006), "The Evolution of Top Incomes: A Historical and International Perspective". AEA Papers and Proceedings. pp.200-205

Roback, J. (1988), "Wages, Rents, and Amenities: Differences among Workers and Regions". *Economic Inquiry*, vol.26. pp.23-41

Roback, J. (1982), "Wages, Rents, and the Quality of Life", *the Journal of Political Economics*, 90(6), pp1257-1278

Wheeler, W. H. (2006), "Cities and the Growth of Wages Among Young Workers: Evidence from the NLSY", *Journal of Urban Economics*, 60, pp162-184

Wilkinson, R. and Pickett, K. (2011), The Spirit Level, Bloomsbury Press