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Inequality and Unemployment Management

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Abstract

Many studies have claimed that inequality and unemployment should be reduced. They also assert that the middle class should be increased for economic development. These strategies sound like similar outcome strategies. However, what would happen if they were not? In other words, if reducing inequality and unemployment risks aggravating the middle class, how should we manage inequality and unemployment? In this paper, we will examine this.

Keywords: Inequality, Unemployment, Middle class, Malmquist index. Productivity index, Data envelopment analysis

Contents

1. Introduction

Inequality and unemployment are key topics for the social stability and economic growth of a country. But what do inequality and unemployment management mean? Which countries manage them well? Most people may answer based on value of the Gini coefficient and the unemployment rate. For example, if a country's Gini coefficient and unemployment rate are low, people may say that inequality and unemployment are managed well.

However, this is only partly correct. The Gini coefficient and the unemployment rate do not consider societal structure. In other words, various social structures can exist under the same inequality and unemployment levels. Therefore, inequality, unemployment, and social structure should be considered comprehensively.

For this study, we think of inequality and unemployment as resources. Through this approach, their relationship with social structure is explained, and the definition of ideal inequality and unemployment management is redefined.

The paper is organized as follows. In the following section, the concept of this paper is explained, and ideal inequality and unemployment management are theoretically reviewed. In the second half of the paper, the management of inequality and unemployment of 49 countries during, before, and after the financial crisis is analyzed.

2. Inequality and Unemployment

In this paper, we handle the inequality and unemployment as the resource, and use the terms "inequality resource" and "unemployment resource". According to the OECD, "income inequality has a negative impact on subsequent growth". Federico (2014) From the Okun's law, we know that there is a negative relationship between GDP growth and unemployment. Therefore, these resources have a negative impact on society. While it is better not to use them, this is impossible. Each country uses these resources to a certain degree. To estimate the consumption of inequality resources and unemployment resources, the Gini coefficient and unemployment rate are used here.

Ideal stratification: When inequality and unemployment resources are allocated to society, people's income level is seen to be diversified, and unemployment occurs. This means that the society is divided into three groups (upper, middle, and lower class). In other words, each country produces stratification by spending inequality and unemployment resources.

The outcome of consuming inequality and unemployment resources is stratification. Therefore, we need to consider the structure of stratification because consuming the same amount of resources does not guarantee the same structure of stratification. From the same Gini coefficient and unemployment rates, various Lorenz curves can be generated. Therefore, we pursue ideal stratification.

What is ideal stratification? It differs depending on the goal of each country. If each country's goal is economic development and social stability, then ideal stratification means that there is a relatively large middle class because the middle class is strongly related to economic development and social stability. Kristin Forbes (2000); William (2001) claimed that a "higher share of income for the middle class is associated with higher income and higher growth." Landes and David (1998) also noted that the "ideal growth and development of society" is related to "a relatively large middle class." In Africa, strong economic growth has been accompanied by the emergence of a sizeable middle class over the past two decades. Mthuli *et al.* (2011) Castellani Francesca and Gwenn (2011) and Parent also argue a robust middle class is related to economic and social stability and to better development prospects.

In conclusion, the size of the middle class is important. From now on, we will focus on the middle class and use the term "middle class production."

Efficiency: To explore the consumption of inequality and unemployment resources, and middle class production, the concept of efficiency is used.

The term efficiency is often used in the input-to-output ratio. Abraham *et al.* (1978) there are two types of efficiency (absolute or relative efficiency). However, in the case of absolute efficiency, it is almost impossible to know the theoretical levels of efficiency. Therefore, relative efficiency is often used and is used in this paper.

Inequality and unemployment resources correspond to the input variable, and the output variable is middle class production. Therefore, the management ability of the inequality and unemployment resources is represented as

$$\text{Efficiency} = \frac{u_1 \cdot \text{Middle class}}{v_1 \cdot \text{Inequality} + v_2 \cdot \text{Unemployment}} \quad (v_1, v_2, u_1 : \text{weight}) \qquad (1)$$

There are two types of efficiency (input-oriented and output-oriented efficiency). William Cooper *et al.* (2007) Among them, input-oriented efficiency is defined as that the ability to use a minimal amount of input to generate a given level of output. In this paper, the input-oriented efficiency is used to estimate the ability to manage inequality and unemployment resources. Therefore, the goal of ideal inequality and unemployment management is to achieve the lowest inequality and unemployment with a given middle class size.

Theoretical review: For simple explanation, we will use only the inequality resource in this section. Let us consider two Lorenz curves described in Figure 1. Middle class refers to households whose income falls between a% and b% of income distribution. At this time, the middle class on Lorenz curve (1) is bigger than that on Lorenz curve (2)[1]. However, the Gini coefficient of Lorenz curve (1) is bigger. Therefore, a little inequality does not necessarily guarantee a larger middle class. In other words, the risk of weakening the middle class exist in polices intended to reduce inequality.

[1] D%-A% > C%-B%

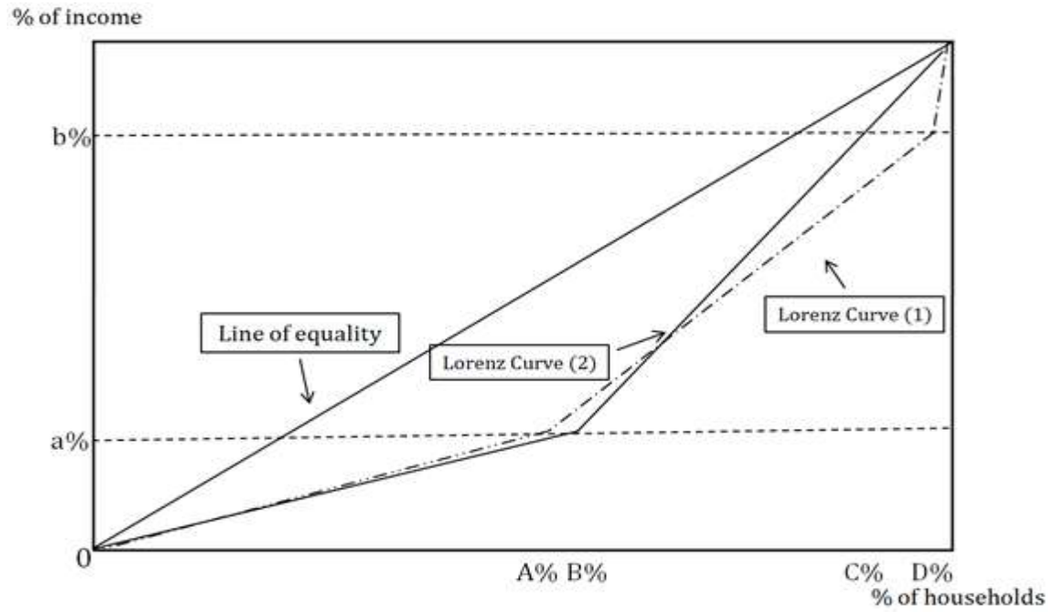

Figure-1. Paradox example in inequality and middle class

Which Lorenz curve is better? We can answer is found in the terms "consumption of inequality resource" and "middle class production." They can be illustrated as efficiency; the greater the value the better.

$$\text{Efficiency} = \frac{u_1 \cdot \text{Middle class}}{v_1 \cdot \text{Inequality}} \quad (v_1, u_1 : \text{weight}) \qquad (2)$$

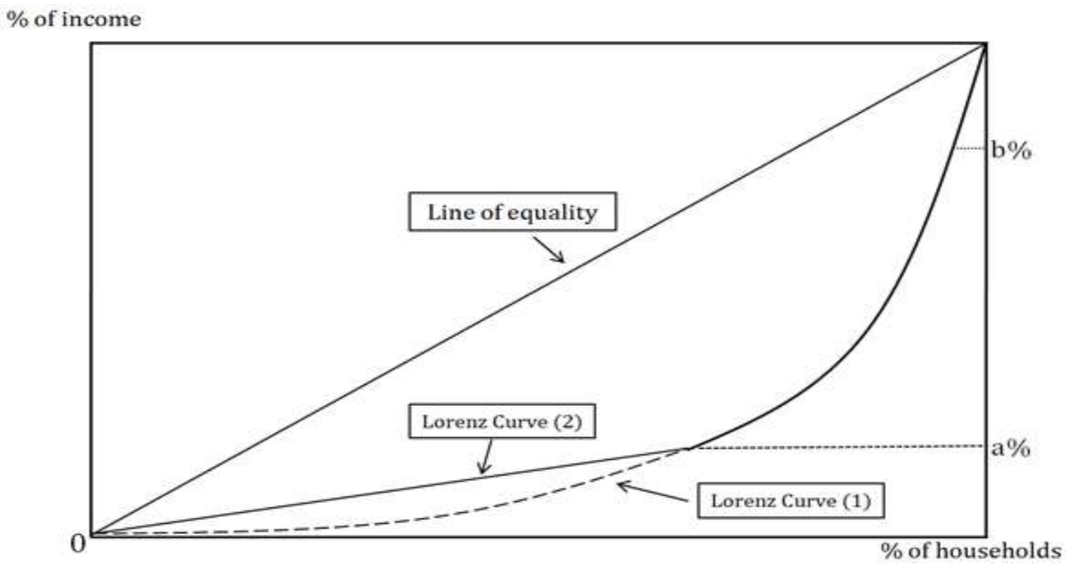

Figure-2. Concept of ideal inequality management

In this paper, ideal inequality management means achieving a minimum consumption of inequality resources with a given middle class size. In Figure2 the middle class of the two Lorenz curve are same in a% - b% in terms of income distribution. However, the Gini coefficient of Lorenz curve (2) is smaller than Lorenz curve (1). When Lorenz curve (1) is closer to Lorenz curve (2), the efficiency of Lorenz curve (1) increases. By definition of relative efficiency, the maximum attainable efficiency of Lorenz curve (1) is achieved when it matches Lorenz curve (2). In conclusion, inequality should be managed to achieve Lorenz curve (2).

3. Definition of the Middle Class

There is no consensus on a definition of the middle class. Craig Elwell (2014) There are two main approaches (income or consumption based), and each includes a number of sub-definitions. In this paper, we adopt the income-based approach has been used to cope with the Gini coefficient representing income distribution.

The income-based definition is also divided into four sub-approaches (PPP-based, distribution-based, median income-based, and poverty-line based). In this study, we will use the distribution-based and median income-based definitions have been used. The former is a relative approach and assumes the relative position with regard to national income distribution. The latter is an absolute approach and considers fixed income ranges.

In this study, the two definitions are presented as follows. The distribution-based middle class refers to households whose income falls between the 20th and 80th percentile of income distribution. In addition, a median income-based middle class refers to households whose income ranged within 50 - 200% of the median income. Although a distribution-based middle class can be estimated by a simple calculation, and estimating the median income-based middle class needs additional calculations, as described in the following section.

3.1. Estimating the Median Income-Based Middle Class

General quadratic Lorenz curve: To estimate the median income-based middle class, we should estimate the Lorenz curve by year for each country. There are two types of Lorenz curves: the general quadratic Lorenz curve (GQ Lorenz curve) and the beta Lorenz curve (Jose and Barry Arnold, 1984; Gaurav, 1998); both are accurate. As the GQ Lorenz curve is more convenient to calculate, we will use it in this study. The equation of the GQ Lorenz curve is below.

$$\mathrm{L(p)} = -\frac{1}{2}\left[\mathrm{bp} + e + (\mathrm{mp}^2 + \mathrm{np}^2 + e^2)^{1/2}\right]$$

where,

$$e = -(\mathrm{a} + \mathrm{b} + \mathrm{c} + 1), \mathrm{m} = \mathrm{b}^2 - 4\mathrm{a}, \mathrm{n} = 2\mathrm{b}e - 4\mathrm{c},$$

$$\mathrm{r} = (\mathrm{n}^2 - 4\mathrm{m}e^2)^{1/2}, \mathrm{s}_1 = (\mathrm{r} - \mathrm{n})/(2\mathrm{m}), \mathrm{s}_2 = -(\mathrm{r} + \mathrm{n})/(2\mathrm{m})$$

All parameters are estimated from the percentile income distribution data. In the actual calculations, the World Bank's POVCAL software is used.

Head-count index (H): After estimating the GQ Lorenz curve, the headcount index

$$\mathrm{H} = -\frac{1}{2\mathrm{m}}\left[\mathrm{n} + \mathrm{r}(\mathrm{b} + 2\mathrm{z}/\mu)\{(\mathrm{b} + 2\mathrm{z}/\mu)^2 - \mathrm{m}\}^{-1/2}\right]$$

Is used and the middle class size is estimated. It is a method to calculate the ratio of people under a certain income level.

Table 1 shows the median income in each year of the three groups according to income level. In addition, Figure 3 shows the median income difference between each group.

During 2005-2012, the average median income of high-income countries is about five times larger than that of the middle-income countries. In addition, the average median income of middle-income countries is about two times greater than that the low-income countries.

Table-1. Median Incomes (US$ per household, at current prices)

	High income country	Middle income country	Low income country
2005	81718.3	10859.9	6600.2
2006	86520.1	12086	6789.7
2007	74736.7	14517.7	7651.5
2008	80019.4	17651.4	8960.1
2009	79804	16504.2	8629
2010	96811	19254.7	9128.2
2011	11562.1	22646.8	10011.3
2012	119550.1	24137.8	10247.5
Average	91847.5875	17207.3125	8502.1875

The middle class estimated range is 50-200% of each median income. In the case of high- and middle-income countries, they are rounded to the nearest hundredth, and in the case of low-income countries, they are rounded to the nearest tenth.

The difference between high-income countries and the other two groups is greater than the difference between middle- and low-income countries. The median income difference between high-income countries and the other two groups decreased before and after the financial crisis. However, since 2009, it has sharply increased. On the other hand, between the middle- and low-income countries, it gradually increased, but the difference is not large. In conclusion, the financial crisis created a significant income gap between high-income countries and other countries.

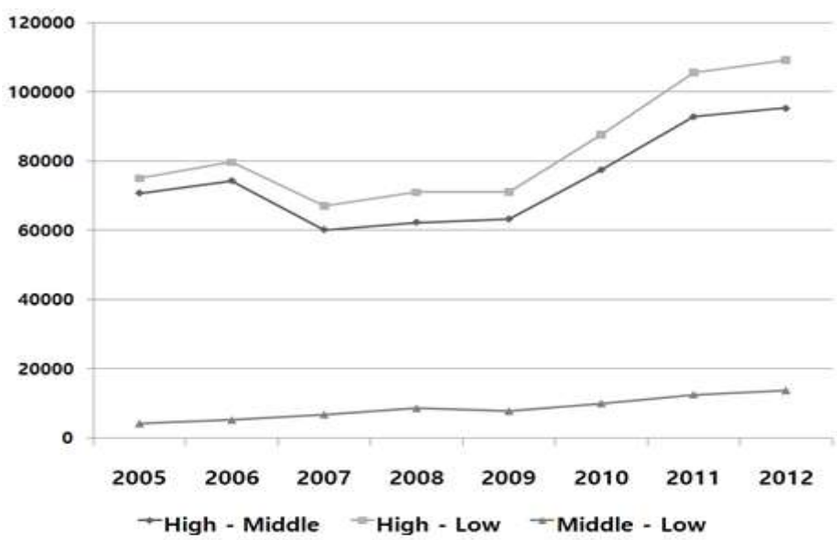

Figure-3. Median income difference (US$ per household, at current prices)

4. Malmquist Index

The Malmquist index shows the change in efficiency over the two periods. The Malmquist index can be decomposed into two components: the catch-up effect and the frontier-shift effect.(Michael James, 1957)

Catch-up effect (CU) shows the change in distance from the efficient frontier, namely the technical efficiency change (Rolf *et al.*, 1985); (Rolf *et al.*, 1990); (Rolf *et al.*, 1992); (Rolf *et al.*, 1994).

In this paper, efficiency is defined as a country's ability to manage inequality and unemployment resources under a certain sized middle class. CU refers to changes in this management ability. Therefore, an increase in CU means an improvement in management ability. The country can produce the same middle class size from lower resource consumption.

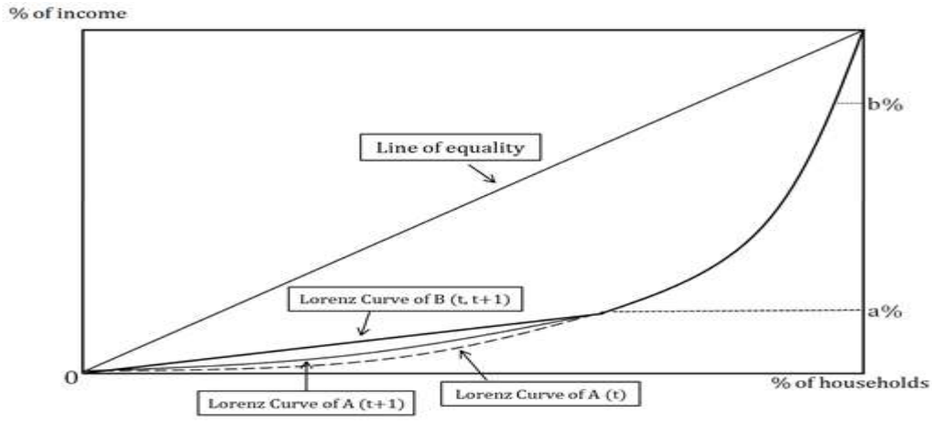

Figure-4. Concept of CU in this paper

In Figure 4 the middle class of A and B are same. Over the two periods (t, t+1), B is constant. Although the middle class of A has not changed, inequality is reduced. In all periods, B is more efficient than A. When it is compared to B, although A is inefficient, the efficiency of A improves between period t and t+1. At this time, CU of A is bigger than 1, and we say it is relatively efficient.

The frontier-shift effect (FS) shows the shift of the efficient frontier, namely the technical change. This refers to a change in the attainable minimum level of input with a given level of output. FS can be interpreted as the external influence. In this paper, FS mainly refers to the impact of the financial crisis.

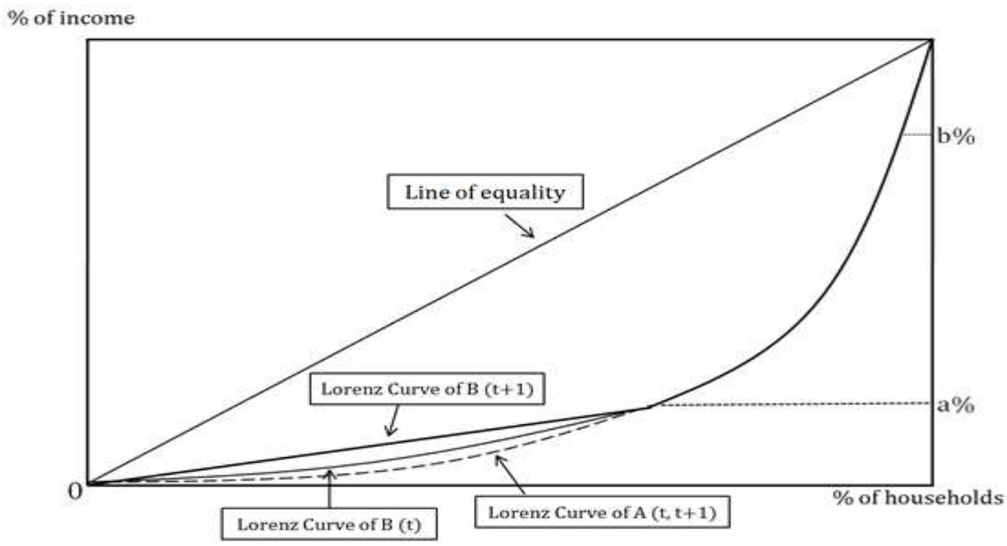

Figure-5. Concept of FS in this paper

In Figure 5 over the two periods, although A is constant, the inequality of B decreased. B is always more efficient than A. A should reduce inequality to improve efficiency. By definition of relative efficiency, A can improve efficiency to the point where it matches B. In period t, the maximum efficiency of A can be attained when it matches the Lorenz curve of B (t). Using the same logic, the attainable maximum efficiency of A is the efficiency of the Lorenz curve of B (t+1) in period t+1. This means A has a greater possibility to reduce inequality and improve efficiency in period t+1 than t. Therefore, period t+1 is more favorable to A than period t. At this time, we say the efficient frontier is shifted upward, and the value of FS is bigger than 1.

Productivity considers the CU and FS. The whole period is divided into several sub-periods. In this paper, the whole period (2005-2012) is divided by three-year sub-period, and there are five sub-periods. CU, FS and productivity are calculated for each period. The average productivity of all sub-periods is MI.

We explained the concept of CU, FS, and productivity in this paper by using the Lorenz curve. It is necessary to review the Malmquist index more deeply because the concept of unemployment is added and all variables are changed.

Figure 6 below illustrates the construction of the Malmquist index, which uses the inputs, x and x+1 in periods, t and t+1 to produce the output y and y+1, respectively. The efficient frontier of the first and second periods is, the CF and BE. O_1 is the position of the first period, and O_2 is the position of the second period.

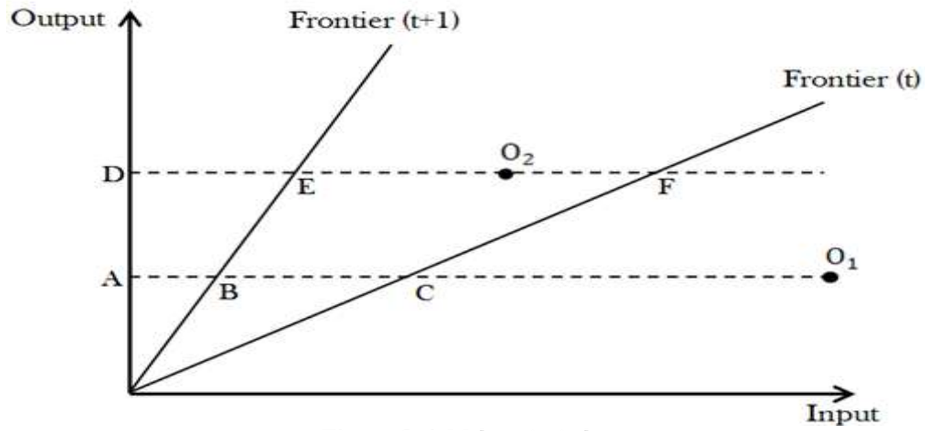

Figure-6. A Malmquist index

The catch-up effect from the first period to the second period is represented below:

$$\text{Catch up} = \frac{\text{DE}}{\text{DO}_2} \Big/ \frac{\text{AC}}{\text{AO}_1} \qquad (3)$$

If CU > 1, it means it is relatively efficient. Oppositely, CU < 1 means it is relatively inefficient.

In Figure 6 the reference point of O_1 moves from C to B from the first period to the second. Therefore, the frontier-shift effect φ_1 of O_1 is expressed as following.

$$\varphi_1 = \frac{\text{AC}}{\text{AB}} \qquad (4)$$

This can be rewritten as the following equation.

$$\varphi_1 = \frac{\text{AC}}{\text{AO}_1} \Big/ \frac{\text{AB}}{\text{AO}_1} \qquad (5)$$

Similarly, the frontier-shift effect φ_2 of O_2 is represented as following.

$$\varphi_2 = \frac{\text{DF}}{\text{DE}} = \frac{\text{DF}}{\text{DO}_2} \Big/ \frac{\text{DE}}{\text{DO}_2} \qquad (6)$$

According to Rolf *et al.* (1994) the frontier-shift effect φ is defined as the geometric mean of φ_1 and φ_2, namely

$$\varphi = \sqrt{\varphi_1 \varphi_2} \qquad (7)$$

If FS > 1, it means the efficient frontier is shifted upward.

As a result, MI is the product of the CU and FS. If MI > 1, it means productivity growth, and MI < 1 means a productivity decline.

$$\text{MI} = \frac{\text{AO}_1}{\text{DO}_2} \sqrt{\frac{\text{DF}}{\text{AC}} \frac{\text{DE}}{\text{AB}}} \qquad (8)$$

5. Data

For a time series analysis, data sets from 2005 to 2012 are used. All data are taken from Euromonitor[2]. However, the middle class size of each country is calculated by the present author, using the household income distribution data.

In total, 49 countries are analyzed in this study.[3] To increase the accuracy of the analysis, they are divided into three groups depending on the income level. Although we followed the classification of Euromonitor, Taiwan has been regarded as exceptional. According to Euromonitor, Taiwan belongs to the high-income countries. However, when emerging and developed countries are analyzed together, the emerging countries tend to be overestimated. Therefore, Taiwan is analyzed in the group of middle-income countries in this study.

5.1. Input and Output

For the analysis, two input variables (inequality and unemployment resources) are used. Table 4 in Appendix shows the statistics of the input variables. On the other hand, the middle class size is the output variable. Statistics of output variable are illustrated in Table 5.

[2] World Consumer Income and Expenditure patterns 2014

[3] It is ideal to handle all of the world's major countries. However, in the case of oil-producing countries, due to the peculiarities of their economic structures, the result has been distorted. For this reason, they are excluded from this study. It is desirable to study separately the case of the Middle East.

Two types of middle classes (distribution-based and median income-based) are used for the analysis. A distribution-based middle class (DB middle class) is defined as households not including the poorest 20% and the richest 20%. In addition, a median income-based middle class (MB middle class) means households whose income is within 50-200% of the median income.

Table 2 shows the correlations of two types of middle classes. There is a high positive correlation between the DB middle class and MB middle class in high-income countries. However, the lower the income levels, the smaller the correlation coefficient. In the case of low-income countries, the correlation coefficient is less than two. This means the results are greatly varied depending on the middle class definition when studying the middle classes of low-income countries.

Table-2. Correlation of the middle class sizes

	High income country	Middle income country	Low income country
2005	0.891349315	0.558145854	0.081098545
2006	0.852985495	0.570599265	0.125025219
2007	0.81352883	0.607218803	0.225812519
2008	0.864168942	0.687132048	0.162813883
2009	0.845014362	0.68883036	0.061711886
2010	0.845800916	0.583921509	0.251772797
2011	0.757251884	0.578693627	0.300136708
2012	0.715479671	0.531436074	0.293427904
Average	0.823197421	0.600747193	0.187724933

6. Results

Three groups are analyzed two times in accordance with the output items. For each analysis, a 2-input (Unemployment rate and Gini coefficient) 1-output (DB middle class or MB middle class) model are used. In the actual calculations, the DEA-Solver-PRO(Professional Version 10.0) software is used.

6.1. The Correlation Coefficient between the Results

The correlation coefficient between the productivity results is also large in the case of high- and middle-income countries, as it is greater than 0.9, see Table 3. On the other hand, in the case of low-income countries, it is only 0.49. This can be thought of in connection with Table 2. In the case of low-income countries, the middle class size is different according to the definition. As well, it affects the productivity results, the details of which will be mentioned in section 6.6.

Table-3. The correlation coefficient between the results

High income country	Middle income country	Low income country
0.937341	0.921121	0.498141

6.2. Standard Deviation

The standard deviation of the analysis results shows a remarkable fact (see Table 6 in Appendix). First of all, the FS in most countries is less than 1. This means the attainable minimum level of resource consumption has decreased. In other words, there is an unfavorable change in the situation.

In all analyses, a standard deviation of the FS is very small compared to that of the CU. It means, the MI of each country is determined greatly by the CU. In conclusion, although negative influences existed during the financial crisis period, they had little effect on productivity. Therefore, if a country's productivity decreased, the main reason was poor management of inequality and unemployment.

6.3. U-Curve

Most countries show a U-curve over five sub-periods of analyzing MI. Figures 7 and 8 show the average productivity change of each group.

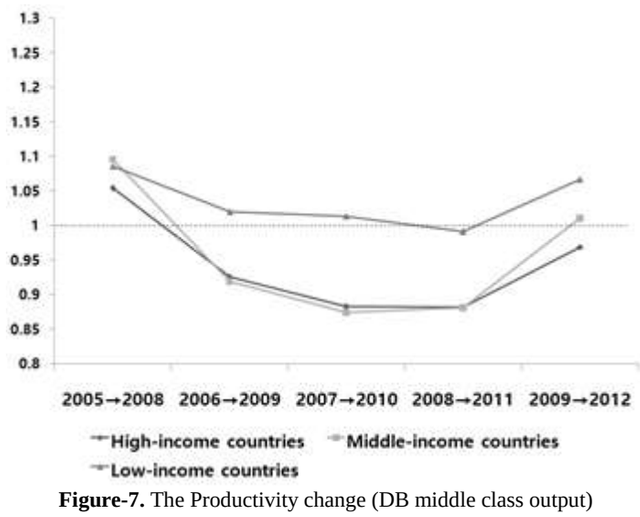

Figure-7. The Productivity change (DB middle class output)

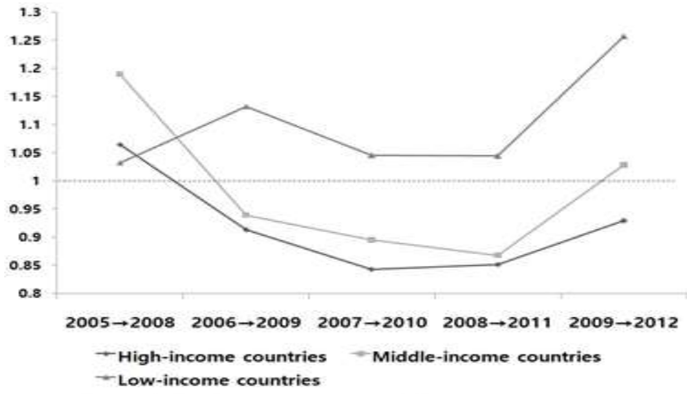

Figure-8. The Productivity change (MB middle class output)

Overall, except for the low-income countries in the case of the MB middle class output, all are shown in the form of a U-curve. This means productivity was reduced until the financial crisis, but it recovered after the financial crisis. High and middle-income countries have shown the typical U-curve form in the two analysis results. In both results although middle-income countries have recovered productivity at greater than 1, high-income countries have not reached 1.

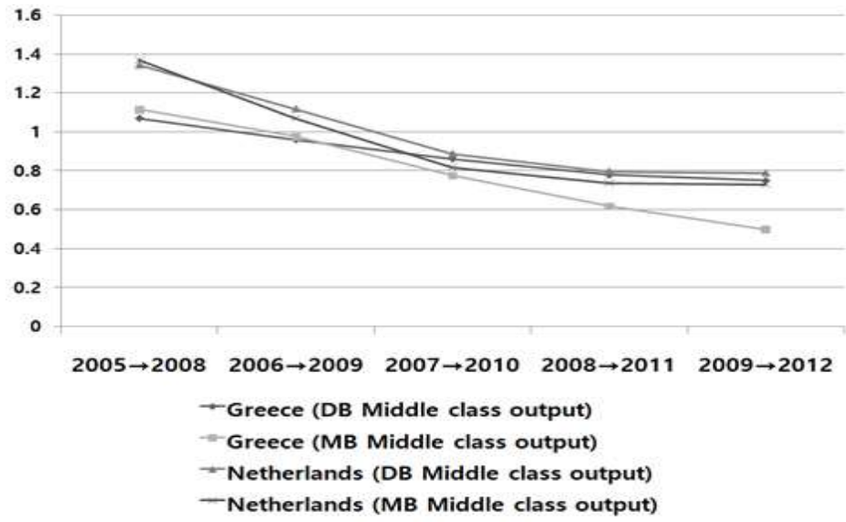

Figure-9. Productivity Change of Greece and Netherlands

In particular, although most high- and middle-income countries appear in U-curve form, Greece and the Netherlands have declined their productivity continuously. Figure 9 shows the productivity changes between the two countries.

In both analyses, low-income countries are quite remarkable. In most of the sub-periods, the average values of low-income countries are greater than 1. In particular, when the output is the MB middle class, they are greater than 1 in all sub-periods. Furthermore, they sharply increased after the financial crisis. This was possible thanks to remarkable economic growth in China, about which we will mention later.

6.4. High-Income Countries

Figure 10 shows that High-income countries show generally low MI. The MI of only three countries among high-income countries is greater than 1 in two analyses at the same time. However, in the case of Austria and Finland, it is hard to say "growth," because their values are almost 1. Therefore, Germany is the only country we can say exhibited "growth" among high-income countries.

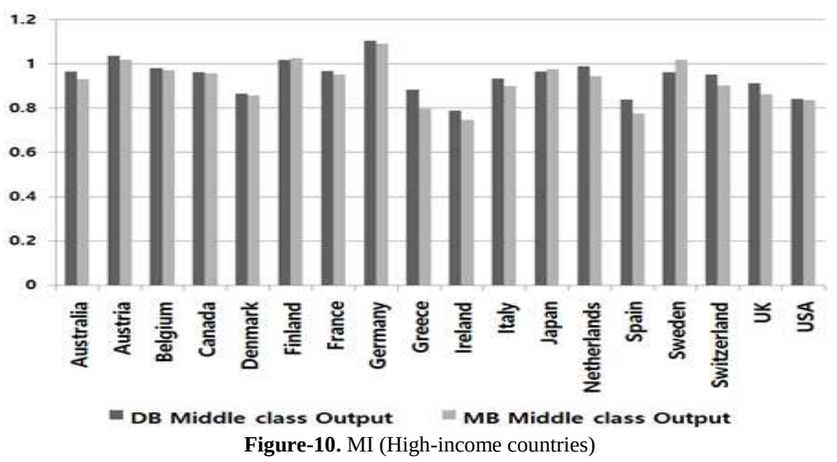

Figure-10. MI (High-income countries)

On the other hand, five low MI countries demonstrated the relationship between input and MI. Four countries except the USA among the five countries consumed unemployment resource excessively. Figure 11 shows the trend of unemployment rates in four countries.

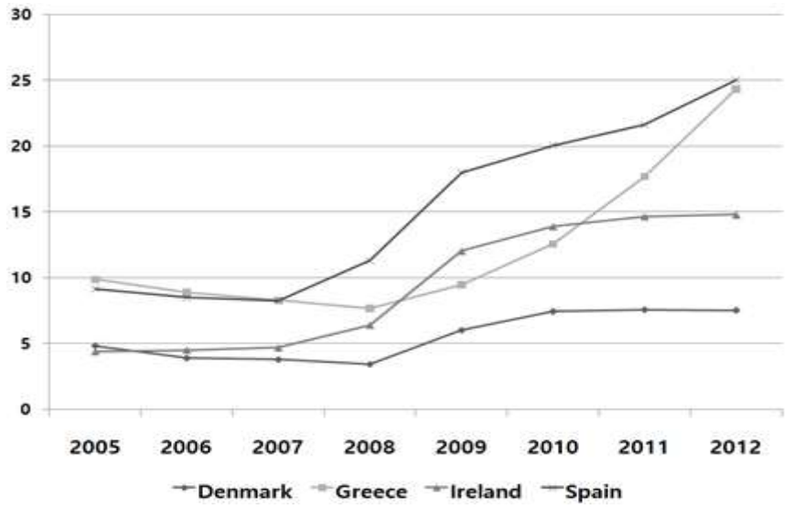

Figure-11. Unemployment rate (Denmark, Greece, Ireland, Spain)

On the other hand, the USA consumed inequality resource excessively, rather than unemployment resource. The Gini coefficient of the USA is higher than 0.46. Although the USA is the richest country in the world, it is also the most unequal country among high-income countries. It is the reason of low MI of USA.

6.5. Middle-Income Countries

In middle-income countries, it is necessary to look at Argentina and Lithuania. In the case of Argentina, the results are different depending on the middle class definition. When an MB middle class is the output, its MI is high (1.3), see Figure 12.

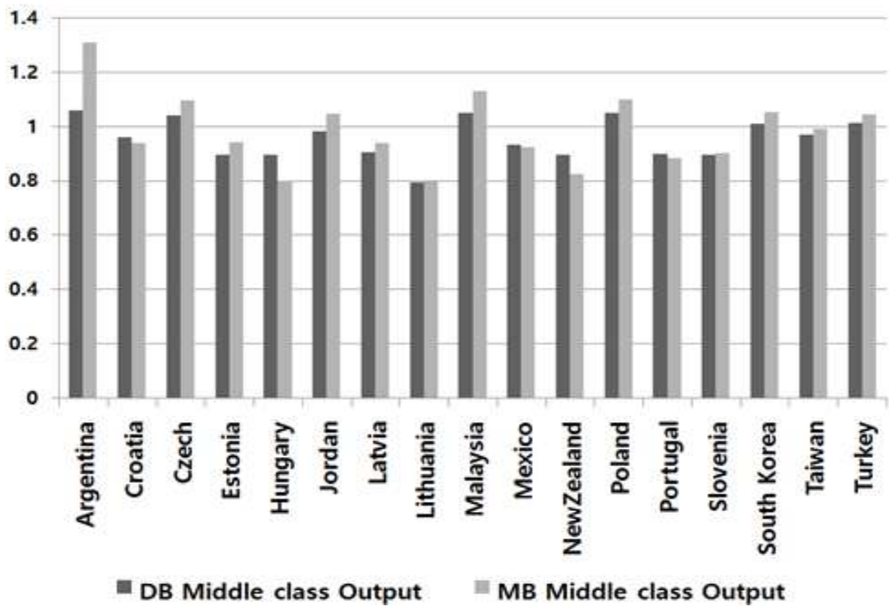

Figure-12. MI (Middle-income countries)

However, when the DB middle class is the output, the MI dropped significantly. This means Argentina was not significantly effective in its distribution of wealth. Furthermore, Argentina defaulted on its debt again in 2014, as well as faced a national crisis. On the other hand, even though, Lithuania's results are the worst in both analyses, since Lithuania joined the euro in 2015, it is worth watching for changes in the future.

6.6. Low-Income Countries

The performance of China is prominent among low-income countries. When the MB middle class is the output, the MI is 1.52, see Figure 13. In addition, it has the highest MI among 14 low-income countries. However, when the DB middle class is the output, the MI declines to 1.05, and its ranking dropped to 4th. This difference means economic fluctuations and distributions are moving apart. In other words, even though the economy is growing, distribution is not done well. Countries, such as Ukraine and Indonesia, have the same problem.

In the case of low-income countries, the MI of more than half the country is greater than 1 in both analyses. Alternatively, in the case of high-income countries, the MIs of just three countries are greater than 1. However, the important thing is we should not conclude that low-income countries are better than high-income countries from the results. This is because all results are based on the relative value comparison of their group. Thus, even if one country's MI is very high in its group, it does not mean one country is better than another country of other group.

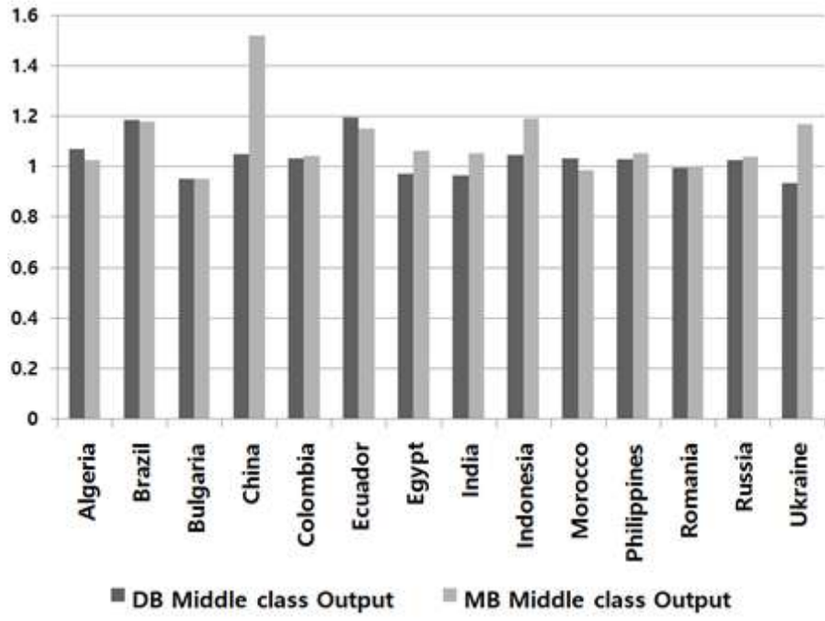

Figure-13. MI (Low-income countries)

7. Conclusion

We redefined the definition of ideal inequality and unemployment management, and evaluated the management ability of 49 countries during, before, and after of the financial crisis.

This paper has shown that reducing inequality and unemployment is not always same as improving the middle class. Therefore, social structure should be taken into account. Second, during the financial crisis period, in the case of the high-income countries that account for a large share of the world economy, although most countries had the option to manage inequality and unemployment more efficiently, they failed (except for Austria, Finland and Germany). Third, in the case of low income-countries, the reliability of the results is low. The main reason is they are very sensitive to the definition of middle class.

Additional problems should be resolved. First, it is necessary to properly define inequality and unemployment management because these concepts are too general. Second, we need to review their relationship with economic fluctuations. Although we saw a productivity decrease during the financial crisis, the specific functional relationship between them should be reviewed. Third, examining the ambiguous definition of the middle class is required. Finally, an analysis method, which can compare different income-level countries, should be developed to make more efficient inequality and unemployment management possible. This will help to achieve sustainable economic development and social stability.

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Table-4. Statistics of input variables

		High Income country							
		2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Unemployment rate	Average	6.7777777778	6.310555556	5.803888889	5.919444444	7.983333333	8.533333333	8.608888889	9.318888889
	Max	11.28	10.28	8.66	11.33	18.03	20.08	21.64	25.05
	Min	4.38	3.91	3.56	3.08	3.73	4.4	4.04	4.19
	SD	2.221924326	2.081270744	1.806374786	2.058550239	3.287210511	3.894533122	4.791525471	6.179384977
Gini coefficient	Average	0.345777778	0.350277778	0.352611111	0.349833333	0.352055556	0.352555556	0.345611111	0.355555556
	Max	0.469	0.47	0.463	0.466	0.468	0.47	0.477	0.478
	Min	0.267	0.273	0.28	0.268	0.259	0.266	0.269	0.271
	SD	0.046430917	0.44471809	0.4160195	0.44333296	0.448480 73	0.04457937	0.45113111	0.045023116
		Middle Income country							
		2005	2006	2007	2008	2009	2010	2011	2012
Unemployment rate	Average	8.106470588	7.191764706	6.424705882	6.401176471	9.122352941	9.936470588	9.314117647	9.285882353
	Max	17.93	13.97	13.1	12.65	18.23	19.83	16.2	15.85
	Min	3.53	3.3	3.23	3.18	3.62	3.22	3.09	3.04
	SD &	3.931057334	3.287841684	2.980012831	2.718675878	4.139005813	4.903756138	4.132252804	4.174432684
Gini coefficient	Average	0.375882353	0.373705882	0.370352941	0.372529412	0.372176471	0.372235294	0.373352941	0.374470588
	Max	0.506	0.5	0.492	0.485	0.48	0.475	0.472	0.471
	Min	0.26	0.264	0.261	0.254	0.251	0.252	0.256	0.257
	SD	0.066662285	0.063870733	0.062213284	0.062161199	0.061076013	0.059788721	0.059145944	0.058906831
		Low Income country							
		2005	2006	2007	2008	2009	2010	2011	2012
Unemployment rate	Average	9.476428571	9.052142857	8.372857143	7.754285714	8.347142857	8.239285714	8.107857143	7.865714286
	Max	15.26	12.27	13.79	11.33	12.03	11.79	12	12.68
	Min	4.19	4.1	4.02	4.19	4.29	4.1	3.83	3.74
	SD	2.687044722	2.209062379	2.436770967	2.083693888	1.783511785	1.869827077	2.342175775	2.713861043
Gini coefficient	Average	0.423642857	0.423785714	0.429285714	0.428	0.429	0.429071429	0.428428571	0.429142857
	Max	0.595	0.594	0.593	0.593	0.592	0.592	2.592	0.591
	Min	0.31	0.33	0.343	0.343	0.342	0.333	0.326	0.328
	SD	0.089279688	0.088914115	0.083282123	0.084742143	0.083054199	0.084137675	0.083081715	0.082099243

Table-5. Statistics of output variables

		High Income country							
		2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
DB middle class	Average	52.37166667	52.08722222	51.85444444	52.17833333	52.15666667	52.05333333	51.90722222	51.86722222
	Max	54.94	54.76	54.58	54.95	55.51	55.37	55.23	55.15
	Min	46.41	46.34	46.68	46.73	46.38	46.39	45.79	45.72
	SD	2.138356296	2.144022623	2.258112277	2.081691196	2.13239716	2.145479516	2.244446232	2.250949618
MB middle class	Average	67.92222222	67.70555556	68.02777778	67.63333333	67.36111111	65.62777778	65.71111111	64.23888889
	Max	75.5	74.9	75.5	78	80.4	77.3	78	76.7
	Min	52.5	52.5	54.5	53.4	53.7	52.3	52.9	48.3
	SD	5.569724416	5.361131599	5.085597374	5.264755176	5.555086582	5.668779883	6.443500043	7.495656694
		Middle Income country							
		2005	2006	2007	2008	2009	2010	2011	2012
DB middle class	Average	50.54176471	50.82588235	50.80647059	50.73	50.67764706	50.78117647	50.76823529	50.70882353
	Max	55.42	55.21	55.22	54.84	54.69	54.82	54.94	54.8
	Min	42.04	42.82	43.16	43.47	43.83	44.01	44.19	44.26
	SD &	3.566604189	3.278555434	3.23780857	3.217067764	3.132677627	3.147447145	3.127555426	3.102738473
MB middle class	Average	58.55294118	58.55294118	59.45294118	62.51176471	59.69411765	61.04705882	61.68235294	60.63529412
	Max	77	77.1	77.7	85.4	84.8	85.2	84.2	78.8
	Min	34.9	36.7	36.7	41.3	41.2	46.7	45.1	45.3

Continue

	SD	12.48114166	10.80272637	11.87145303	11.79776898	11.21413564	10.81827838	10.52765615	9.930316031
		Low Income country							
		2005	2006	2007	2008	2009	2010	2011	2012
DB middle class	Average	45.66428571	45.33571429	44.94285714	45.4	45.27857143	45.17857143	45.10714286	45.09285714
	Max	52.1	53	51.9	51.9	51.9	51.8	51.8	51.7
	Min								
	SD	6.032681142	6.297692757	6.196737887	5.973273809	5.799360518	2.774769868	5.561054726	5.539989487
MB middle class	Average	58.08571429	48.82142857	56.95714286	54.22857143	52.72142857	58.02857143	55.04285714	56.86428571
	Max	89.5	81.2	82.6	79.8	82	85.5	83.8	82.7
	Min	34.6	23	31.3	34.2	27.3	41.8	39.8	37.9
	SD	16.23750915	15.80521718	13.49716291	12.78739936	14.98666699	12.37804686	11.95804938	10.81911465

Table-6. Standard deviation of CU and FS

		High Income countries		
	DB middle class output		MB middle class output	
	CU	FS	CU	FS
2005→2008	0.095436267	0.037089688	0.108190434	0.035407862
2006→2009	0.12069557	0.020808809	0.129922961	0.08518847
2007→2010	0.116588756	0.026162906	0.133956861	0.033139944
2008→2011	0.102556379	0.015777084	0.140820412	0.010348775
2009 →2012	0.100155306	0.008259692	0.15963529	0.010348775
Average	0.107086456	0.021619636	0.134505192	0.024676021
		Middle Income countries		
	DB middle class output		MB middle class output	
	CU	FS	CU	FS
2005→2008	0.105347548	0.063119159	0.181023277	0.075170224
2006→2009	0.141520478	0.04469597	0.171126902	0.06139061
2007→2010	0.184350774	0.25327634	0.255543253	0.21240582
2008→2011	0.128440321	0.043864624	0.223649275	0.032986299
2009 →2012	0.117962361	0.051703667	0.180505365	0.067636202
Average	0.135524296	0.04574221	0.202369614	0.051684783
		Low Income countries		
	DB middle class output		MB middle class output	
	CU	FS	CU	FS
2005→2008	0.119996807	0.024365075	0.197829426	0.057696919
2006→2009	0.09426296	0.022783937	0.219483715	0.025571054
2007→2010	0.126240602	0.031737642	0.1817485	0.036689347
2008→2011	0.150401295	0.029173167	0.319145649	0.067701349
2009 →2012	0.1678201	0.018151432	0.365622042	0.017532905
Average	0.13174436	0.025242251	0.256765866	0.041038315