# SERVICE SECTOR GROWTH AND INCOME INEQUALITY: EVIDENCE FROM OECD COUNTRIES

**By**

**Jeehui HWANG**

**THESIS**

Submitted to

KDI School of Public Policy and Management

in partial fulfillment of the requirements

for the degree of

MASTER OF PUBLIC POLICY IN ECONOMIC DEVELOPMENT

2013

# SERVICE SECTOR GROWTH AND INCOME INEQUALITY: EVIDENCE FROM OECD COUNTRIES

**By**

**Jeehui HWANG**

**THESIS**

Submitted to

KDI School of Public Policy and Management

in partial fulfillment of the requirements

for the degree of

MASTER OF PUBLIC POLICY IN ECONOMIC DEVELOPMENT

2013

Professor Jinsoo Lee

# SERVICE SECTOR GROWTH AND INCOME INEQUALITY: EVIDENCE FROM OECD COUNTRIES

By

**Jeehui, HWANG**

**THESIS**

Submitted to

KDI School of Public Policy and Management

in partial fulfillment of the requirements

for the degree of

MASTER OF PUBLIC POLICY IN ECONOMIC DEVELOPMENT

Committee in charge:

Professor Lee, Jinsoo, Supervisor

Professor Jeong, Insoo

Professor Park, Hunjoo

Approval as of December, 2013

**Abstract**

# SERVICE SECTOR GROWTH AND INCOME INEQUALITY: EVIDENCE FROM OECD COUNTRIES

**By**

**Jeehui Hwang**

This paper intends to study the relationship between service sector's growth and income inequality for 34 OECD countries during the period from 1974 to 2011. From our analysis, we find evidence that the growth in service sector in terms of employment is negatively related to income equality. However, we also find that the growth in service sector in terms of value added is positively related to income equality. Also, we find that both the labor productivity of service sector compared to manufacturing sector and labor compensation of service sector compared to manufacturing sector are positively related to income equality. Overall, our analysis suggests that the advance in service sector is not necessarily related to deterioration in income inequality. If the labor productivity and compensation in service sector are high enough, the growth in service sector may lead to more equal distribution of income. We can confirm the above findings for both more market-oriented economies (liberal market economies) and less market-oriented economies (coordinated market economies).

## DEDICATION

This thesis is dedicated to my wonderful family.

# ACKNOWLEDGEMENTS

First of all, I praise the almighty God for His kind grace in helping me complete this study. I would like to express my deepest gratitude to my supervisor, Prof. Jinsoo Lee who encouraged and supported me to grow as an independent researcher. His guidance and valuable comments were the milestone in every step of developing my thesis. It was also a great honor to have Prof. Insoo Jeong as an adviser who inspired me to begin my research on service sector and income inequality. I owe my sincere appreciation to Prof. Yu-Sang Chang, Joon-Kyung Kim, Jungho Yoo, Sang-Dal Shim and Jung Kwon for encouraging my new journey during my student life in the KDI school. In addition, I wish to express special thanks to the KDI school staff for their kind assistance and support during the whole study period of this undertaking.

Above all, I wish to express sincere thankfulness to my parents-in-law, my parents and my dearest husband to whom all I am enormously indebted for their endless love and support during my study.

# TABLE of CONTENTS

# LIST of TABLES

**Table** **Page**

# LIST of FIGURES

**Figures** **Page**

# LIST of APPENDICES

**Appendices** **Page**

## I. Introduction

As evident from the 'Occupy Wall Street' protest in 2011, one of the biggest problems the world facing today is income inequality. Many people believe that the fruits of economic development are not fairly divided. For example, according to a research by BBC in 2008, a majority of people in 34 countries believed that income inequality had been deteriorated.

There have been many researches on income inequality (OECD(2008)). The existing literature suggests a set of explanations for income inequality. Those explanations can be largely grouped into two categories: (i) market related factors and (ii) political and institutional factors. The market related factors include economic growth rate, unemployment rate, female participation rate in the labor market, and globalization. The political and institutional factors include the union density, the feature of wage bargaining, government partisanship, and the social support of the welfare state.

On the other hand, recent researches suggest a new factor which may be related to deterioration in income inequality: the advance in service economy. Dunn(2012) and Yun(2012) document that the advance in service economy is closely related to deterioration in income inequality for the U.S. and Korea, respectively. However, it has not been yet analyzed whether such phenomenon can be systematically observed in other countries.

Thus, this paper intends to study the relationship between service sector's growth and income inequality for 34 OECD countries during the period from 1974 to 2011. From our analysis, we find evidence that the growth in service sector in terms of employment is negatively related to income equality. In other words, the more workers are employed in service sector for a country, the more unequal the distribution of income for the country is. However, we also find that the growth in service sector in terms of value added is positively related to income equality. In other words, the higher the value added for service sector is for

a country, the more equal the distribution of income for the country is. Also, we find that both the labor productivity of service sector compared to manufacturing sector and labor compensation of service sector compared to manufacturing sector are positively related to income equality. Overall, our analysis suggests that the advance in service sector is not necessarily related to deterioration in income inequality. If the labor productivity and compensation in service sector are high enough, the growth in service sector may lead to more equal distribution of income. We can confirm the above findings for both more market-oriented economies (liberal market economies) and less market-oriented economies (coordinated market economies).

The paper is structured as follows. In Chapter II, we explain the importance of income inequality issues. In Chapter III, we document the trend of income equality in OECD countries. In Chapter IV, we provide the literature review on factors which are related to income inequality. In Chapter V, we provide our study's research questions. In Chapter VI, we explain our data and methodology. In Chapter VII, we provide the results of our analyses. In Chapter VIII, we summarize our findings and conclude.

## II. Why Is Income Inequality Issue Important?

### 2.1 Happiness ( Life – Satisfaction ) and Income Inequality

To see individual's or a countries' economic and social circumstances, we usually have used GDP as a measurement index. By using only GDP, however, we could not measure and understand one's life as a whole. Namely, we need new inclusive life measurement index beyond the traditional measurement, GDP. Thus, OECD has researched and developed new inclusive index that influence people's lives such as security, leisure, education, health care, income distribution and a clean environment –namely, OECD's Better Life Index[1] .

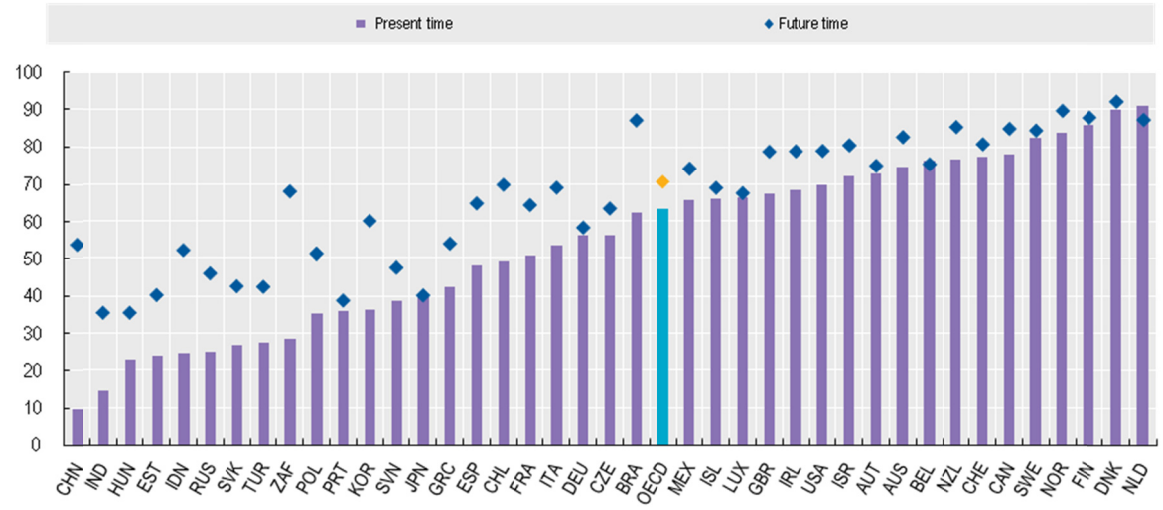
According to OECD, OECD's Better Life Index includes 11 dimensions as being essential to well-being, from health and education to local environment, personal security and overall satisfaction with life, as well as more traditional measures such as income. Among the 11 dimensions, we focused the Life Satisfaction index[2].

[1] See http://www.oecdbetterlifeindex.org/

[2] According to the definition of Life Satisfaction in OECD (2011):
"It measures overall life satisfaction as perceived by individuals. Life satisfaction measures how people evaluate their life as a whole rather than their current feelings. It is measured via the Cantril Ladder (also referred to as the Self-Anchoring Striving Scale), which asks people to rate how they value their life in terms of the best possible life (10) through to the worst possible life (0). The score for each country is calculated as the mean value of responses to the Cantril Ladder for that country."

Figure 1. People reporting high evaluation of their life as a whole

(As a percentage of respondents, 2009 or latest available year)




*source: OECD (2010), "Subjective well-being", in *OECD Factbook 2010: Economic, Environmental and Social Statistics*, OECD Publishing. http://dx.doi.org/10.1787/factbook-2010-91-en

Above Figure 1 shows the satisfaction as a whole of life. Northern Europe, Oceania and North America's have relatively high score. Korea is below OECD average.

In this article, especially in this background review chapter, we want to know the importance of income inequality issue. Thus, we tried to analyze the association of income inequality and life-satisfaction.

To analyze the relationship between income inequality and life satisfaction, we applied linear regression methods by using 34 OECD countries' Gini coefficient indices and Life satisfaction indices in OECD database.

Through combining Gini coefficient and Life satisfaction indices, the relationship of them was drawn as can be seen in the Figure 2-1, 2-2. Through Figure 2-1, we can know that there are weak negative relationships between income inequality and life satisfaction. It means that one countries' life-satisfaction is higher, income inequality is low. Furthermore,

through Figure 2-2, we marked some countries' name on the chart. Because, in the analysis part of this article, we will try comparative analysis about two countries groups, Liberal Market Economies and Coordinated Market Economies[3]. Through Figure 2-2, we can know that USA and Canada representing Liberal Market Economies has more high negative relation between income inequality and life satisfaction, whereas, Sweden, Denmark and Japan representing Coordinated Market Economies has more low negative relation between income inequality and life satisfaction. It means that in the Coordinated Market Economies, the income inequality issue is more important factors that influence people's life satisfaction. Thus, we can see relatively low Gini Coefficeint indices in the Coordinated Market Economies in which institution and policy more focused on the income inequality than Liberal Market Economies.

[3] According to Peter A. Hall and David Soskice, there are two types of welfare capitalism, Liberal market economies and Coordinated market economies. In "liberal market economies" (LMEs), the activities of economic actors are mainly coordinated through market mechanisms. In contrast, coordinated market economies(CMEs) rely on formal institutions to regulate the market and coordinate the interaction of economic actors. Liberal market economies usually include USA, Britain, Australia, Canada, New Zealand and Ireland. Coordinated market economies usually include Germany, Japan, Switzerland, Netherlands, Belgium, Sweden, Norway, Denmark, Finland and Austria. (From "Oxford Dictionary of Human Resource Management" )

Figure 2-1. Relation between income inequality and life satisfaction

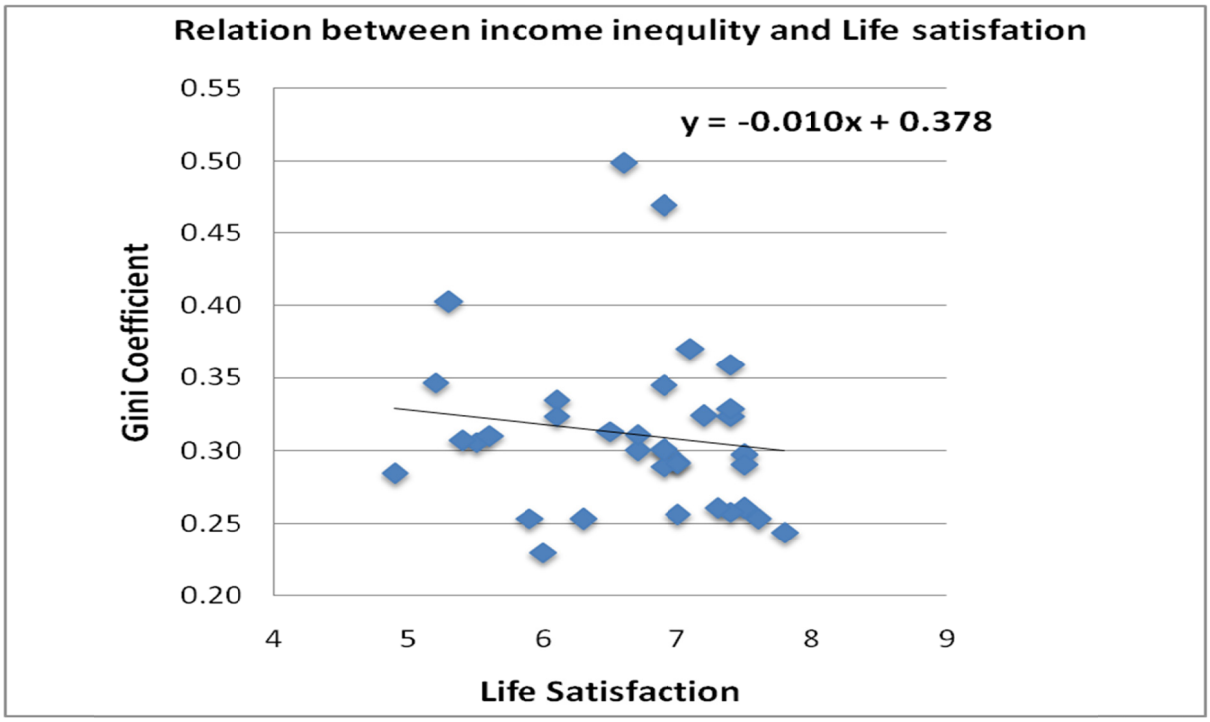
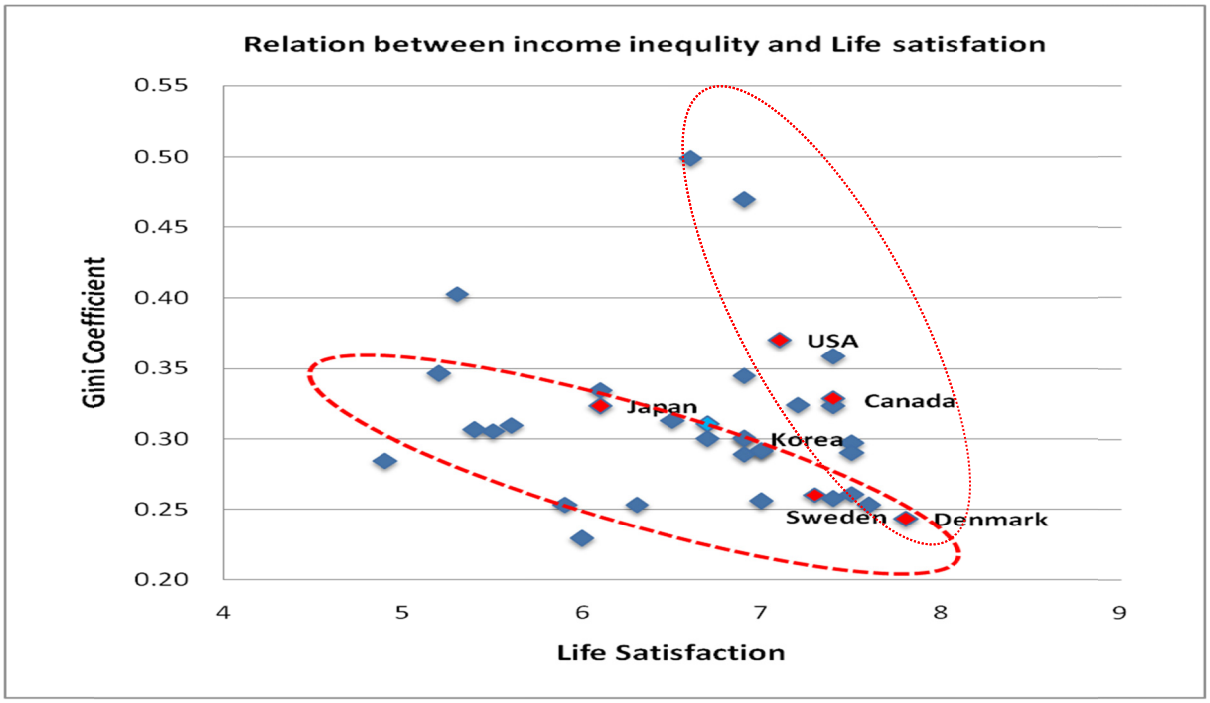



Figure 2-2. Relation between income inequality and life satisfaction




*Edited from the database of " OECD Income Distribution Database (IDD)" and "OECD Better Life Index"
http://stats.oecd.org/Index.aspx?DataSetCode=BLI
http://stats.oecd.org/Index.aspx?DataSetCode=ID

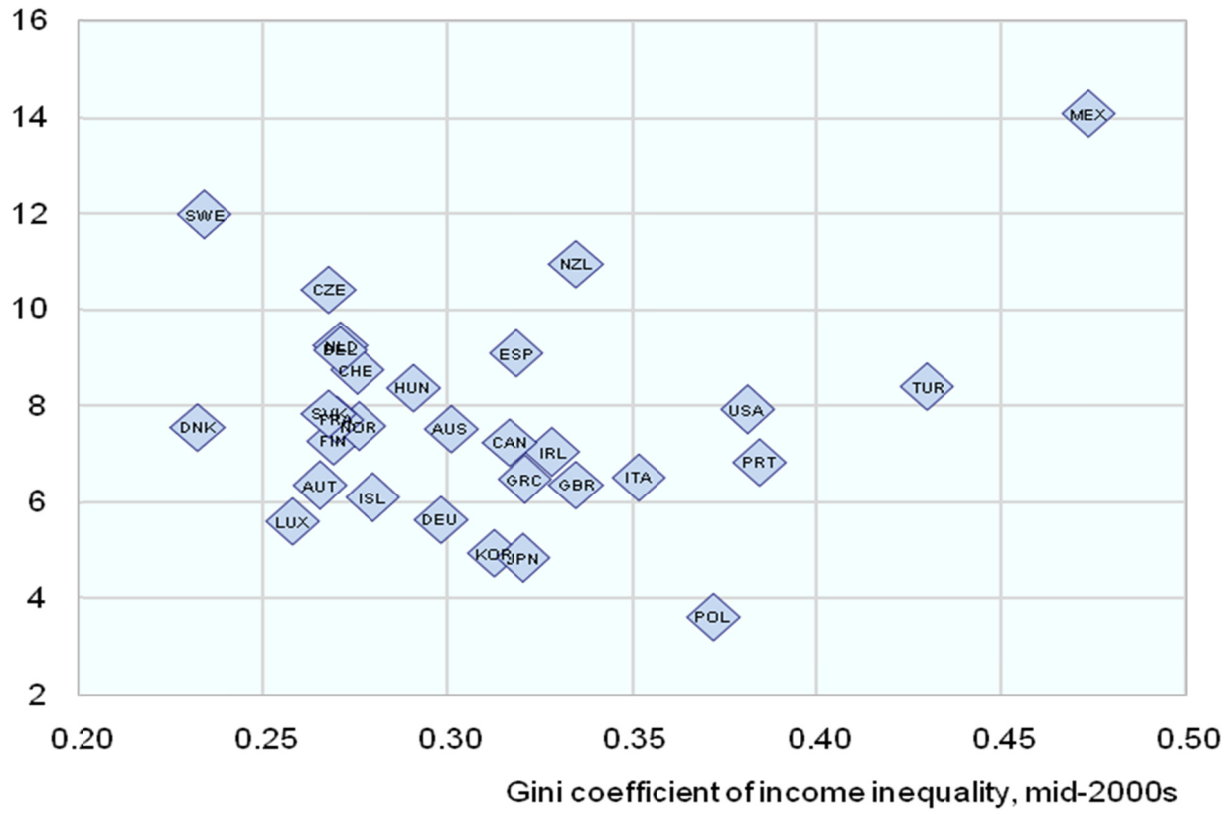
2.2 Social Integration and Income Inequality

As can be seen in Figure 3, there are weak positive relationships between income inequality and anti-social behavior. It means that if Gini coefficient of income inequality is increased, one society's anti-social behavior is increased. Thus, for the sustainable economic and social development, we need solve income inequality issues. One more thing to notice is that the degree of correlation differs from country to country.

Figure 3. A weak positive relationship

between income inequality and anti-social behavior

(Anti-social behavior index, 2010, percentages)




*Source: OECD (2011), "Pro- and anti-social behaviour", in *Society at a Glance 2011: OECD Social Indicators*, OECD Publishing. http://dx.doi.org/10.1787/soc_glance-2011-28-en

## III. Trends of Income Inequality in OECD countries

During twenty years, real household income among total population in OECD countries increased about 1.7% a year as can be seen Table 1. In the bottom decile, the average increment was 1.4% a year. Noteworthy, in the top decile, the average increment was 1.9% a year. It means that top decile's earnings grew faster than those of bottom decile, enlarging income gap between richest10% and poorest10% ( OECD 2011 ).

Table1. Trends in real household income by income group, mid-1980s to late 2000s

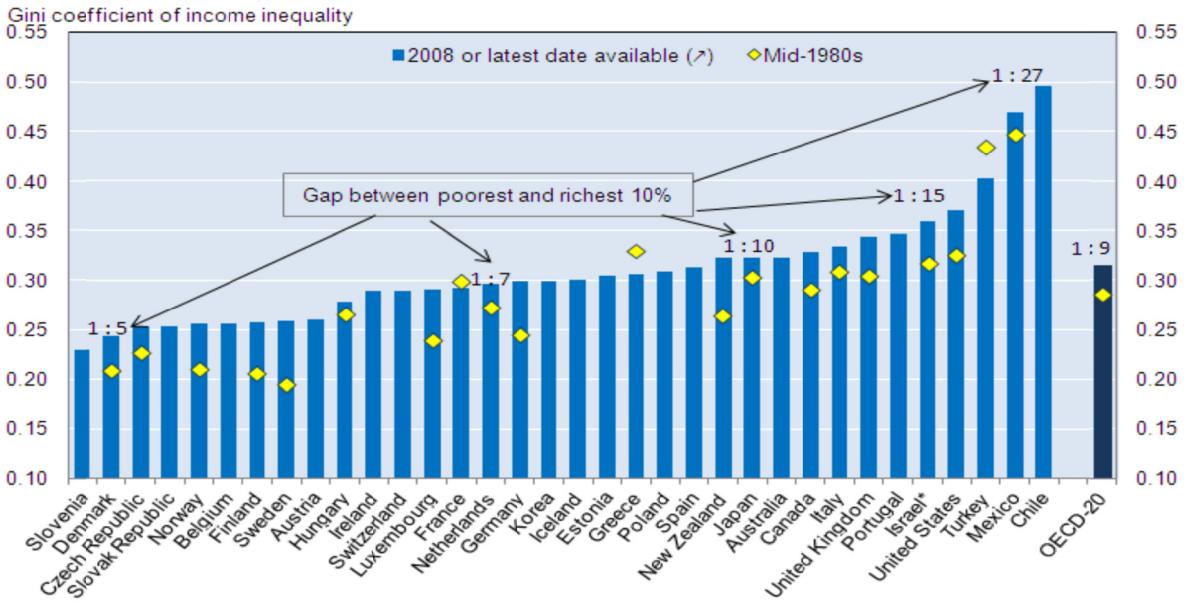
| Average annual change, in percentages | | | |
|---|---|---|---|
| | Total population | Bottom decile | Top decile |
| Australia | 3.6 | 3 | 4.5 |
| Austria | 1.3 | 0.6 | 1.1 |
| Belgium | 1.1 | 1.7 | 1.2 |
| Canada | 1.1 | 0.9 | 1.6 |
| Chile | 1.7 | 2.4 | 1.2 |
| CzechRepubli | 2.7 | 1.8 | 3 |
| Denmark | 1 | 0.7 | 1.5 |
| Finland | 1.7 | 1.2 | 2.5 |
| France | 1.2 | 1.6 | 1.3 |
| Germany | 0.9 | 0.1 | 1.6 |
| Greece | 2.1 | 3.4 | 1.8 |
| Hungary | 0.6 | 0.4 | 0.6 |
| Ireland | 3.6 | 3.9 | 2.5 |
| Israel | 2.3 | 0.8 | 2.8 |
| Italy | 0.8 | 0.2 | 1.1 |
| Japan | 0.3 | -0.5 | 0.3 |
| Luxembourg | 2.2 | 1.5 | 2.9 |
| Mexico | 1.4 | 0.8 | 1.7 |
| Netherlands | 1.4 | 0.5 | 1.6 |
| New Zealand | 1.5 | 1.1 | 2.5 |
| Norway | 2.3 | 1.4 | 2.7 |
| Portugal | 2 | 3.6 | 1.1 |
| Spain | 3.1 | 3.9 | 2.5 |
| Sweden | 1.8 | 0.4 | 2.4 |
| Turkey | 0.5 | 0.8 | 0.1 |
| UnitedKingdo | 2.1 | 0.9 | 2.5 |
| United States | 0.9 | 0.1 | 1.5 |
| **OECD-27** | **1.7** | **1.4** | **1.9** |

*source: *Divided We Stand: Why Inequality Keeps Rising*. Paris: OECD, 2011

As can be seen from Figure 4, in OECD countries, the average gap between poorest and richest 10% was increased from Mid-1980s to 2008 (or latest date available). Nowadays, the average gap between them is about 1:9. Another characteristic of Figure 4 is the difference of gap among OECD countries. In the Nordic and many continental European countries, it is much lower than the OECD average, but in Italy, Japan, Korea, and the United Kingdom, the ratio is about 10 to 1; furthermore, in Israel, Turkey, and the United States, the ratio is around 14 to 1 ; and in Mexico and Chile 27 to 1(OECD 2011).

Figure 4. Huge differences in income gaps between rich and poor across OECD countries

(Levels of inequality in the latest year before the crisis and in the mid-1980s, working-age population)



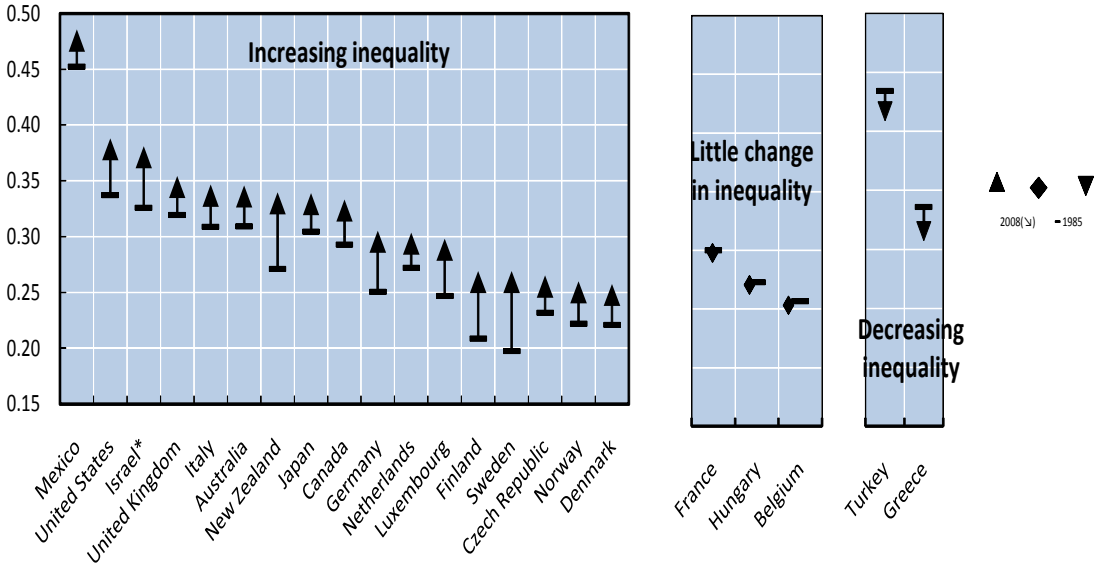

*Gaps between poorest and richest are the ratio of average income of the bottom 10% to average income of the top 10%. Income refers to disposable income adjusted for household size.

*source: *Divided We Stand: Why Inequality Keeps Rising*. Paris: OECD, 2011

The Figure 5 shows that in the mid-1980s, the gini coefficient[4] was an average of 0.29 in OECD countries. It increased by almost 10% to 0.316, however, by the late 2000s. Considerably, it rose in 17 of the 22 OECD countries for which long-term data series are available, in Finland, Germany, Israel, Luxembourg, New Zealand, Sweden, and the United States climbing by more than 4 percentage points. Only Turkey, Greece, France, Hungary, and Belgium recorded no increase or small declines in their Gini coefficients ( OECD 2011).

Figure 5. Income inequality increased in most, but not all OECD countries

(Gini coefficients of income inequality, mid-1980s and late 2000s)




*Source: *Divided We Stand: Why Inequality Keeps Rising*. Paris: OECD, 2011

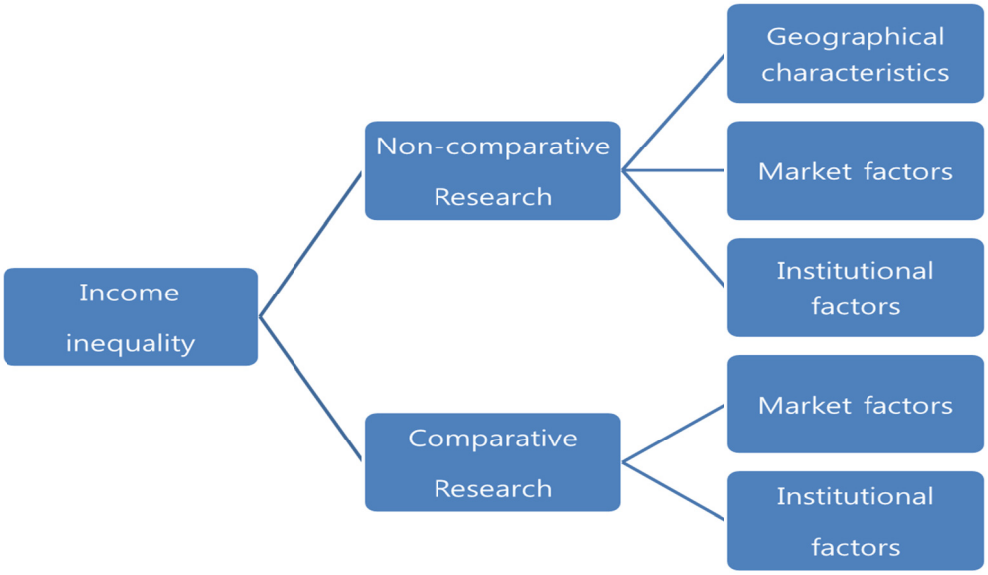
[4] According to the definition of Gini coefficient in OECD (2008):
"The Gini coefficient is defined as the area between the Lorenz curve (which plots cumulative shares of the population, from the poorest to the richest, against the cumulative share of income that they receive) and the 45° line, taken as a ratio of the whole triangle. The values of the Gini coefficient range between 0, in the case of "perfect equality" (i.e. each share of the population gets the same share of income), and 1, in the case of "perfect inequality" (i.e. all income goes to the individual with the highest income)".

## IV. Literature Review on Causes of Income Inequality

### 4.1 Market Related and Institutional Factors

About income inequality there are many views of the causes of income inequality. Overall, there are non-comparative research which usually focuses on one region or society and comparative research which focuses on more than two regions or societies. Looking in more detail, in non-comparative research, there are overall three research areas such as geographical factors, market factors and institutional factors, also, in comparative research, there are usually two research areas like market factors and institutional factors. Thus, the summarized diagram was drawn as like Figure 6.

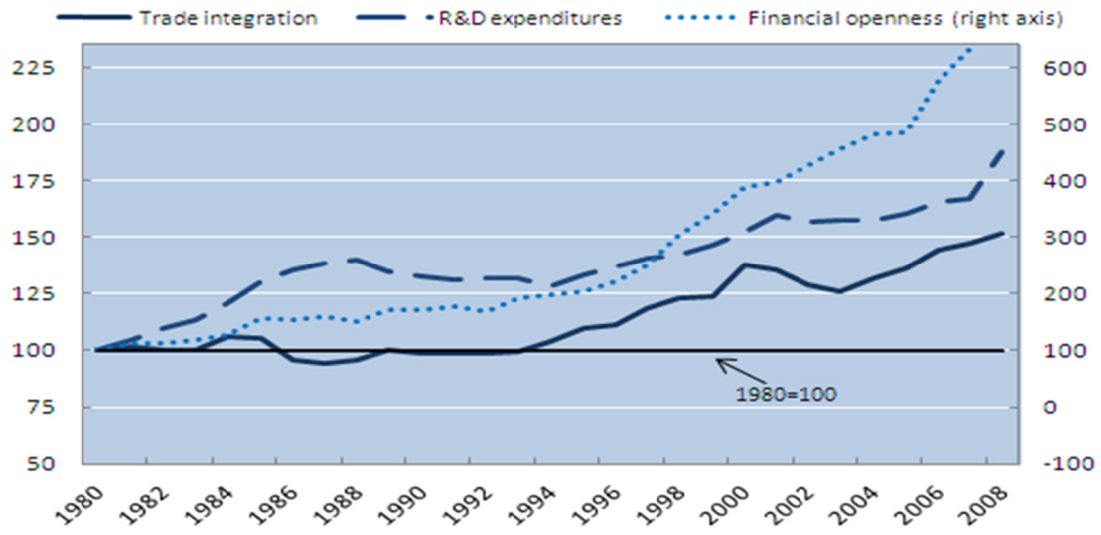
Figure 6. Diverse views on income inequality




In a study of OECD countries, overall views of the causes of income inequality are mainly about 'Globalization, skill-biased technological progress and institutional and regulatory reforms' as we can see Figure 7. In addition, they argue that changes in family formation and household structures have had an impact on household earnings and income

inequality (OECD 2011). According to Kus (2012), in the research of OECD countries, there is strong correlation between several of the financialization indicators and income inequality. In addition, the results also show that although financialization has a positive association with income inequality in nations with strong as well as weak unions, the association is stronger in the latter.

Figure 7. Globalization and skill-biased technological progress




*source: *Divided We Stand: Why Inequality Keeps Rising*. Paris: OECD, 2011

In the articles mentioning to market conditions as the causes of income inequality, unemployment, female participation in the labor market and globalization are mentioned as a main causes ( main independent variables ). First, the rate of unemployment is positively associated with inequality. Unemployment undermines the earnings and the bargaining position within the labor market of low-skilled and low-paid workers who remain more readily substitutable than their high-skilled counterparts (Pontusson, Rueda and Way 2002). Secondly, female participation in the labor market is positively associated with inequality. This is because until quite recently, women in the labor force have remained less educated and less experienced than their male counterparts, and their widespread employment simply

implied a relatively high degree of less skilled, low-paid workers with weak bargaining position in the labor market (Pontusson, Rueda and Way 2002). Thirdly, Globalization has also been debated as a major cause of inequality. According to the traditional international trade theory, increased trade integration remains associated with higher relative wages for skilled workers in advanced countries, whereas it places deflationary pressures on unskilled labor, contributing to an increase in the wage gap (OECD 2011; Kremer and Maskin 2006).

In the articles mentioning to political and institutional conditions as the causes of income inequality, governments, power of labor union and nation's system of wage bargaining are mentioned as a main causes ( main independent variables ). According to Pontusson (2002), greater left party strength being associated with lower levels of income inequality. To another, many scholars have mentioned significantly union density. As the density and the power of labor unions increase, the level of income inequality decreases (Freeman 1980; Freeman and Medoff 1984; Card 1998, 2001; Card, Lemieux and Riddell, 2004; Metcalf et al. 2001). Finally, by bringing more firms or sectors into a single bargaining process, a centralized wage bargaining structure can serve to reduce the inter-firm or inter-sectoral wage differentials, and drive down levels of market-based inequality (Pontusson et al. 2002).

4.2 Growth in Service Sector

Recent research suggests that growth in the service sector may lead to income inequality. In the case of the USA, Dunn (2012) shows that the decline of the manufacturing sector is the major component of the increasing trend of income inequality from 1950 to 2010. As shown in the previous argument, Rizk (2003) also finds that service sector growth has a positive relationship with income inequality. In addition, the main finding of Blum's paper (2008) about 'capital reallocation to skilled workers in service sector' is that from 1970 to 1996, high-skilled worker's wage is increased more than low-skilled worker's wage deteriorating income inequality. This is due to the fact that in the service sector, the more technologically advanced sector needs high skills, which ensures high wage, whereas the less technologically advanced sector needs low skills, which does not ensure high wage. Finally, according to Moore (2009), even though the increase of employment share in service sectors reduced income inequality as a whole, it seems fairly obvious that "depending on the quality of the jobs in the service sector, some categories of the service sector may have strong impacts that increase or decrease income inequality".

In the case of Korea, many scholars pay attention to the increase of service sectors. According to Yun (2012), one of the significant causes behind the deterioration of distribution is the underdevelopment of the service industry and the contraction of the manufacturing industry. Similarly, many researchers found that the widening of the earning inequality was attributed in a large part to the expansion of the service economy: wage gap in sub-service sectors (Park and Yi 2008).

## V. Research Questions

From above background research and literature reviews about the causes of income inequality and one of the causes, the increase of service sector, we can summarize as follows.

First, income inequality is on the rise in most OECD countries in which there are many variations among countries – the degree of income inequality, the increment speed of income inequality and the income gap between top 10% and bottom 10%.

Secondly, there are weak negative relationships between income inequality and life satisfaction in OECD countries. It means that if income inequality is rise, people's life-satisfaction is decreased. In addition, there are weak positive relationship between income inequality and anti-social behavior. It means that if income inequality is rise, anti-social behavior also increased.

Through these findings, we can see that income inequality is on the rise in most OECD countries and reducing income inequality contribute to increase individual life-satisfaction and achieve social integration. Thus, to explore current feature of income inequality in OECD countries, contributes to sustainable long-term socio-economic development

There have been many researches on income inequality (OECD(2008)). The existing literature suggests a set of explanations for income inequality. Those explanations can be largely grouped into two categories: (i) market related factors and (ii) political and institutional factors. The market related factors include economic growth rate, unemployment rate, female participation rate in the labor market, and globalization. The political and institutional factors include the union density, the feature of wage bargaining, government partisanship, and the social support of the welfare state.

On the other hand, recent researches suggest a new factor which may be related to deterioration in income inequality: the advance in service economy. Dunn(2012) and Yun(2012) document that the advance in service economy is closely related to deterioration in income inequality for the U.S. and Korea, respectively. However, it has not been yet analyzed whether such phenomenon can be systematically observed in other countries.

Thus, this paper intends to study the relationship between service sector's growth and income inequality for 34 OECD countries during the period from 1974 to 2011. We firstly focused on the association between service sector's growth and income inequality in 34 OECD countries in aggregate level and secondly we focused on the comparative analysis of the association between service sector's growth and income inequality in both of Liberal Market Economies and Coordinated Market Economies.

More specifically, as one of main causes of income inequality, this study concentrates on the increase of service sector. Because, nowadays, in the industrial composition, especially in the advanced countries like OECD countries, the service sector's share is very high and there are polarization of income between high-skilled and low-skilled worker in service sector. Thus, in our study, we focus on the association between growth of service sector and income inequality. Namely, the service sector-related variables are main independent variable in this study.

Hence, following research questions are proposed.

(1) Research question 1:

"What is the impact of service sector growth on income inequality in OECD countries?"

In the first research question, we examine the influences of service sector growth and the other factors (market and institutional conditions) on income inequality.

(2) Research question 2:

"Is there any difference in the impact of service sector growth on income inequality between more and less market-oriented OECD countries?"

In the second research question, we study comparatively about the association between service sector's growth and income inequality in different types of countries.

## VI. Data and Methodology

### 6.1 Data

#### 6.1.1 Overview

In this study we carried out a panel data analysis to determine the impact of service sector's increase on income inequality in OECD countries using data from 34 OECD countries over a period of 35 years (1974-2011). The units of observation of dependent and independent variables are the country-years. In addition, our raw data are from OECD STAN databases. All the data except GDP growth rate was extracted during Jun 2013 UTC (GMT) from OECD.Stat. In addition, GDP growth rate was extracted during July 2013 UTC (GMT) from International Financial Statistics (IFS).

#### 6.1.2 Dependent Variables

We used annual GINI indices from OECD STAN databases to measure *income inequality,* our dependent variable. We are paying attention in the distribution of net income therefore we used disposable GINI indices instead of gross GINI indices. In addition, we used GINI of working age population (18-65 ages). Our GINI indices of 34 OECD countries are composed of 35 years (1974-2011) annual data.

6.1.3 Independent Variables

*1)* Main variables

Our key variable of interest is *service sector's increase.* In our analysis, we used a variety of indicators measuring 'service economy ( tertiarization )', including :

(1) Service sector's share of value-added in total economy

(2) Service sector's employment share in total economy

(3) Labor productivity in service sector compared to manufacturing sector

(4) Service sector's labor compensation per employee relative to the total economy ( compared to manufacturing sector )

Above service sector's each variables' definition and explanation are as follows (using OECD STAN database's information).

(1) Service sector's share of value-added in total economy: This indicator is calculated as follows; 100 * (nominal value added by service industry / nominal value added by total industry). In addition, in our study, we used available data from 1970 to 2009.

(2) Service sector's employment share in total economy: This indicator is calculated as follows; 100 * (number of persons engaged by service industry / number of persons engaged by total industry). In addition, in our study, we used available data from 1970 to 2009.

(3) Labor productivity in service sector compared to manufacturing sector: Labor productivity represents the amount of output per unit of input, output being here defined as value added while the input measure used is total employment. This

indicator is calculated as follows; 100* (Labor productivity in service sector/ Labor productivity in manufacturing sector). In addition, in our study, we used available data from 1970 to 2009.

(4) Service sector's labor compensation per employee relative to the total economy (compared to manufacturing sector): Labor compensation per employee relative to the total economy is calculated as the ratio of labor compensation for a particular industry (or industry group) to the number engaged divided by the ratio of labor compensation for the total economy to the number of persons engaged for the total economy. This indicator is calculated as follows; 100* (Labor compensation per employee relative to the total economy in service sector/ Labor compensation per employee relative to the total economy in manufacturing sector). In addition, in our study, we used available data from 1970 to 2009.

Certainly, these four variables that we use do not measure the full nature and extent of the service economy process.

*2)* Control Variables ( Market conditions and Institutional conditions )

In our analysis, to avoid the omitted variable bias, we controlled for various factors that might affect the levels of income inequality, which have to do with market conditions and the political institutional system. These include: Trade, Technology, Unemployment, Female Labor Force Participation Rate, GDP growth rate, Social Expenditure, Employment Protection, Minimum Wage, and Union Density.

In these control variables, we can see them as a two groups, market condition variables and institutional condition variables.

First, market condition variables are Trade, Technology, Unemployment, Female Labor Force Participation Rate and GDP growth rate.

(1) Trade: this indicator represents sum of export and import as a percentage of GDP in each country. In addition, in our study, we used available data from 1970 to 2011.

(2) Technology: this indicator represents gross domestic expenditure on R&D in million current PPP$. In addition, in our study, we used available data from 1981 to 2012.

(3) Unemployment rate: this represents annual one country's working age's (15-64 ages) unemployment rate. In addition, in our study, we used available data from 1960 to 2011.

(4) Female Labor Force Participation Rate: this represents annual one country's working age's (15-64 ages) female labor force participation rate. In addition, in our study, we used available data from 1960 to 2011.

(5) GDP growth rate: this represents the growth rate of real Gross Domestic Product in International Financial Statistics (IFS). In addition, in our study, we used available data from 1950 to 2012.

Second, institutional condition variables are Social Expenditure, Employment Protection, Minimum Wage, and Union Density.

(1) Social Expenditure: It means public aggregate social expenditure in percentage of Gross Domestic Product. In addition, in our study, we used available data from 1980 to 2012.

(2) Employment Protection: It means strictness of employment protection. It's scale is from 0 (least stringent) to 6 (most restrictive). In addition, in our study, we used available data from 1985 to 2009.

(3) Minimum Wage: It means real minimum wage in US $ PPP. In addition, in our study, we used available data from 1960 to 2012.

(4) Union Density: Trade union density corresponds to the ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners (OECD Labour Force Statistics). Density is calculated using survey data, wherever possible, and administrative data adjusted for non-active and self-employed members otherwise. In addition, in our study, we used available data from 1960 to 2011.

Table 2 provides the summarized variable definitions included in the analysis.

Table 2. Variable Definitions

| Dependent variable | IncomeInequality | Gini Index | Gini at disposable income ( Working age population: 18-65) |
|---|---|---|---|
| Independent variables | Service sector variables | Service sector's share of value-added in total economy | 100 * (Nominal value added by service industry / Nominal value added by total industry) |
| | | Service sector's employment share in total economy | 100 * (Number of persons engaged by service industry / Number of persons engaged by total industry) |
| | | Labor productivity in service sector compared to manufacturing sector | 100* (Labor productivity in service sector/ Labor productivity in manufacturing sector) |
| | | Service sector's labor compensation per employee relative to the total economy (compared to manufacturing sector) | 100* (Labor compensation per employee relative to the total economy in service sector/ Labor compensation per employee relative to the total economy in manufacturing sector) |
| | Other control variables | Trade | Sum of export and import as a percentage of GDP |
| | | Technology | Gross Domestic Expenditure on R&D (million current PPP $) |
| | | Unemployment rate | Unemployment rate ( age 15 to 64 ) |
| | | Female Labor Force Participation Rate | Female participation in the labor market ( age 15 to 64 ) |
| | | GDP growth rate | Real Gross Domestic Product growth rate |
| | | Social Expenditure | Public Social Expenditure ( In percentage of Gross Domestic Product ) |
| | | Employment Protection | Stricness of employment protection : Scale from 0 (least stringent) to 6 (most restrictive) |
| | | Minimum Wage | Real minimum wage , US $ PPP |
| | | Union Density | The ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners |

6.2 Methodology

In this study we carried out a panel data analysis to determine the impact of service sector's increase on income inequality in OECD countries using data from 34 OECD countries over a period of 35 years (1974-2011). The units of observation of dependent and independent variables are the country-years.

Among various panel data analysis, we used 'panel data analysis fixed effect model' to fix various countries' own characteristics. In addition, we used STATA program as a appropriate statistical package. In each of panel data analysis we analyzed the model in six cases. From model 1 to model 4, we focused on each of service sector related variables. In model 5 we focused on aggregate influence of independent variables on income inequality. Finally, model 6 we again focused on aggregate influence of independent variables on income inequality due to the number of observations of minimum wage and union density is too small.

Our base line model takes the following form:

- $\text{Gini}_{it} = \alpha_{it} + \beta_1 \text{Service sector's share of value-added in total economy}_{it} + \beta_2 \text{Service sector's employment share in total economy}_{it} + \beta_3 \text{Labor productivity in service sector compared to manufacturing sector}_{it} + \beta_4 \text{Service sector's labor compensation per employee relative to the total economy compared to manufacturing sector}_{it} + \beta_5 \text{Trade}_{it} + \beta_6 \text{Technology}_{it} + \beta_7 \text{Unemployment rate}_{it} + \beta_8 \text{Female Labor Force Participation Rate}_{it} + \beta_9 \text{GDP growth rate}_{it} + \beta_{10} \text{Social Expenditure}_{it} + \beta_{11} \text{Employment Protection}_{it} + \beta_{12} \text{Minimum Wage}_{it} + \beta_{13} \text{Union Density}_{it} + \varepsilon_{it}$

  ( $\alpha$: Constant terms, $\beta$ : Correlation coefficient, $\varepsilon$: Error term, $_{it}$: country-year )

As can be seen in above base line model, there are one dependent variable, Gini index and thirteen independent variables. In addition, as mentioned in the data part, our interesting independent variables are service sector related variables: Service sector's share of value-added in total economy, Service sector's employment share in total economy, Labor productivity in service sector compared to manufacturing sector, Service sector's labor compensation per employee relative to the total economy compared to manufacturing sector.

## VII. Results

### 7.1 Full Sample (34 OECD countries)

Table 3 provides the descriptive statistics for the variables included in the analysis.

Table 3. Descriptive Statistics

| Variables | Observation | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Gini | 358 | 0.298 | 0.053 | 0.195 | 0.519 |
| Value Added of Service Sectors | 309 | 67.432 | 6.928 | 48.511 | 86.597 |
| Employment of Service Sectors | 300 | 68.633 | 8.105 | 46.012 | 82.149 |
| Labor Productivity of Service Sectors compared to manufacturing sectors | 300 | 104.738 | 30.753 | 0.000 | 216.491 |
| Labor Compensation of Service Sectors compared to manufacturing sectors | 297 | 85.689 | 18.120 | 0.000 | 161.850 |
| Trade | 357 | 80.222 | 50.124 | 16.800 | 319.500 |
| Technology | 315 | 33,397.40 | 67,332.24 | 170.20 | 408,657.00 |
| Unemployment rate | 350 | 7.253 | 3.082 | 1.587 | 20.183 |
| Female Labor Force Participation Rate | 350 | 63.231 | 9.970 | 25.198 | 84.233 |
| GDP growth rate | 358 | 2.438 | 3.413 | -14.258 | 10.731 |
| Social Expenditure | 334 | 19.811 | 6.613 | 2.728 | 32.200 |
| Employment Protection | *248* | 1.827 | 0.978 | 0.210 | 3.760 |
| Minimum Wage | *265* | 5.697 | 2.567 | 0.790 | 10.829 |
| Union Density | 314 | 30.676 | 19.832 | 5.861 | 83.115 |

Table 4. Service Sector and Income Inequality in OECD countries:

Panel Data Analysis (1974 ~ 2011)

| Dependent variable | income inequality | Gini Index | Model1 | Model2 | Model3 | Model4 | Model5 | Model6 |
|---|---|---|---|---|---|---|---|---|
| Independent variables | Service Sector variables | Value Added of Service Sectors | -0.0042337*** | | | | -0.0022501** | 0.0004854 |
| | | | (-5.26) | | | | (-2.46) | (0.88) |
| | | Employment of Service Sectors | | 0.001998** | | | -0.0018122 | 0.0003726 |
| | | | | (2.07) | | | (-1.27) | (0.46) |
| | | Labor Productivity of Service Sectors compared to manufacturing sectors | | | -0.0002326*** | | -0.0003829*** | -0.0001835*** |
| | | | | | (-3.2) | | (-2.58) | (-2.54) |
| | | Labor Compensation of Service Sectors compared to manufacturing sectors | | | | -0.0002587** | -0.0004189* | -0.0002518 |
| | | | | | | (-2.44) | (-1.71) | (-1.19) |
| | Other Control variables | Trade | -0.0001103 | 0.0001397 | 0.0001176 | 0.0002012 | -0.0000236 | 0.000189* |
| | | | (-0.73) | (0.97) | (0.84) | (1.46) | (-0.16) | (1.88) |
| | | Technology | 0.000000271*** | 0.000000129*** | 0.000000089** | 0.000000156*** | 0.000000125*** | 0.0000000983*** |
| | | | (7.34) | (3.6) | (2.38) | (4.78) | (2.99) | (3.52) |
| | | Unemployment rate | 0.0032144*** | 0.0024781*** | 0.0024524*** | 0.0025676*** | 0.0025706*** | 0.0018885*** |
| | | | (4.4) | (3.73) | (3.8) | (3.92) | (4.17) | (4.6) |
| | | Female Labor Force Participation Rate | 0.0025695*** | 0.0005808 | 0.0010454*** | 0.0010912*** | 0.0022008*** | 0.0003352 |
| | | | (5.28) | (1.22) | (2.75) | (2.83) | (3.78) | (1.04) |
| | | GDP growth rate | -0.0005748 | 0.0003374 | 0.0001053 | 0.0003762 | -0.0001781 | -0.0000353 |
| | | | (-1.16) | (0.71) | (0.23) | (0.81) | (-0.39) | (-0.13) |
| | | Social Expenditure | -0.001407 | -0.0021883* | -0.0009534 | -0.0010443 | 0.00056 | -0.0013392* |
| | | | (-1.1) | (-1.77) | (-0.85) | (-0.94) | (0.43) | (-1.8) |
| | | Employment Protection | -0.0194196*** | 0.0030027 | 0.002844 | -0.0040963 | -0.0003919 | |
| | | | (-2.77) | (0.39) | (0.43) | (-0.66) | (-0.05) | |
| | | Minimum Wage | 0.009902*** | -0.0002234 | -0.0012332 | 0.000829 | 0.0010869 | |
| | | | (3.51) | (-0.08) | (-0.45) | (0.31) | (0.39) | |
| | | Union Density | -0.0007902* | -0.0001137 | -0.0004109 | -0.0005315 | -0.0008462** | -0.0005397* |
| | | | (-1.84) | (-0.28) | (-1.14) | (-1.46) | (-2.07) | (-1.71) |
| | | N | 158 | 157 | 157 | 156 | 153 | 246 |
| | | R-squared | 0.483 | 0.468 | 0.498 | 0.474 | 0.559 | 0.584 |

*Note:* Numbers in parentheses are standard errors.

*,** , and *** represent 10%,5% and 1% of statistical significance, respectively.

7.1.1 The impact of service sector on income inequality

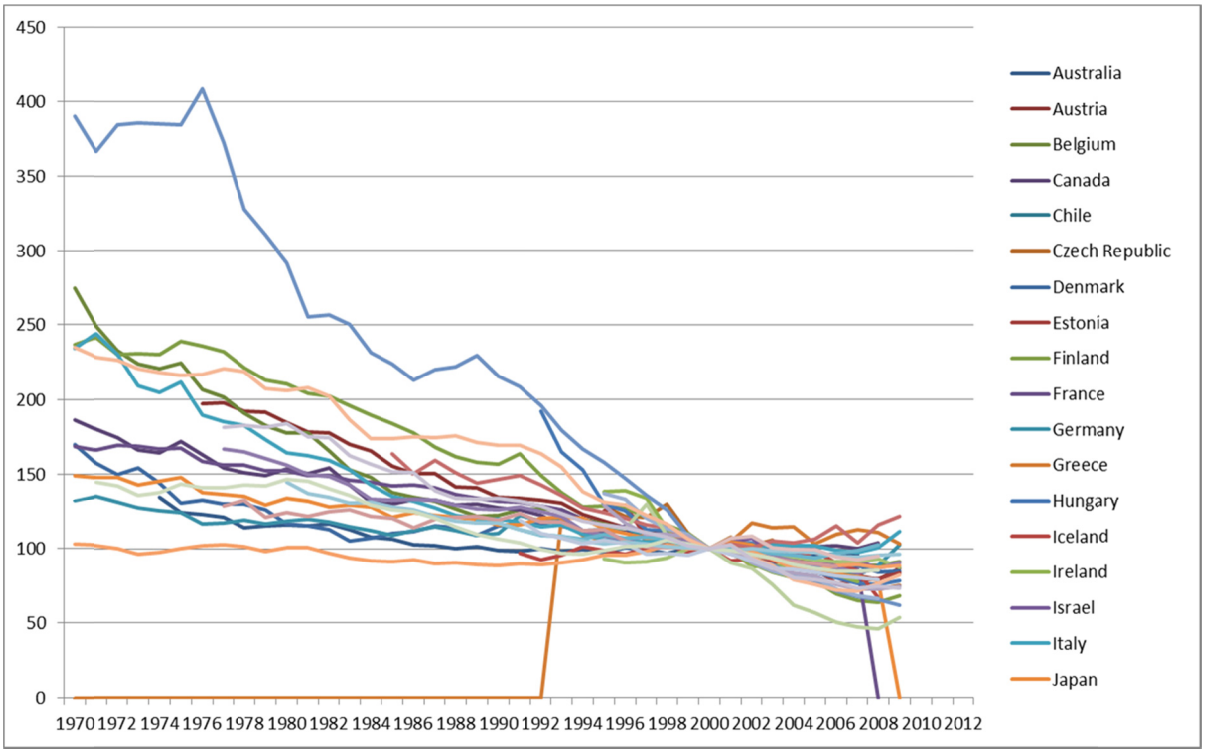
According to Table 4, in the independent variables, there are this study's main variables, four service sector related variables. The three major indicators of Service economy, except 'Employment of Service Sectors', including Value Added of Service Sectors, Labor Productivity of Service Sectors compared to manufacturing sectors and Labor Compensation of Service Sectors compared to manufacturing sectors , all display a statistically significant weak negative relations with the level of inequality.

First, from model 1 and 5, we can see weak negative relations between 'value added of service sectors' and income inequality in the 1% ~5% statistical significance. It means if 'value added of service sectors' is increased, income inequality is decreased (improved). Namely, it suggests OECD countries need to increase the value added of service sectors. Second, contrary to this result, from model 2, there are weak positive association between 'employment of service sectors' and income inequality in the 5% statistical significance. It means if 'employment of service sectors' is increased, income inequality is also increased (deteriorated ). And ultimately the result explain that the big portion of service sectors' employment increase was low-skilled occupation. It suggests OECD countries need enhanced policies to improve the quality of employment of service sectors. From these two results about value added and employment of service sectors, we can argue that through enhancing the quality of employment, labor productivity will be increased and then more value-added will be created. Eventually income inequality will be improved.

Third, from model 3,5 and 6, we can see weak negative relations between 'labor productivity of service sectors compared to manufacturing sectors and income inequality in the 1% statistical significance. It means if 'labor productivity of service sectors compared to

manufacturing sectors' is increased, income inequality is decreased (improved). Namely, it suggests OECD countries need to enhance labor productivity of service sectors compared to manufacturing sectors. For most OECD countries, because, labor productivity in manufacturing is higher than labor productivity in the service sector as can be seen in Figure 12.

Figure 8. Labor Productivity of Service Sectors compared to manufacturing sectors



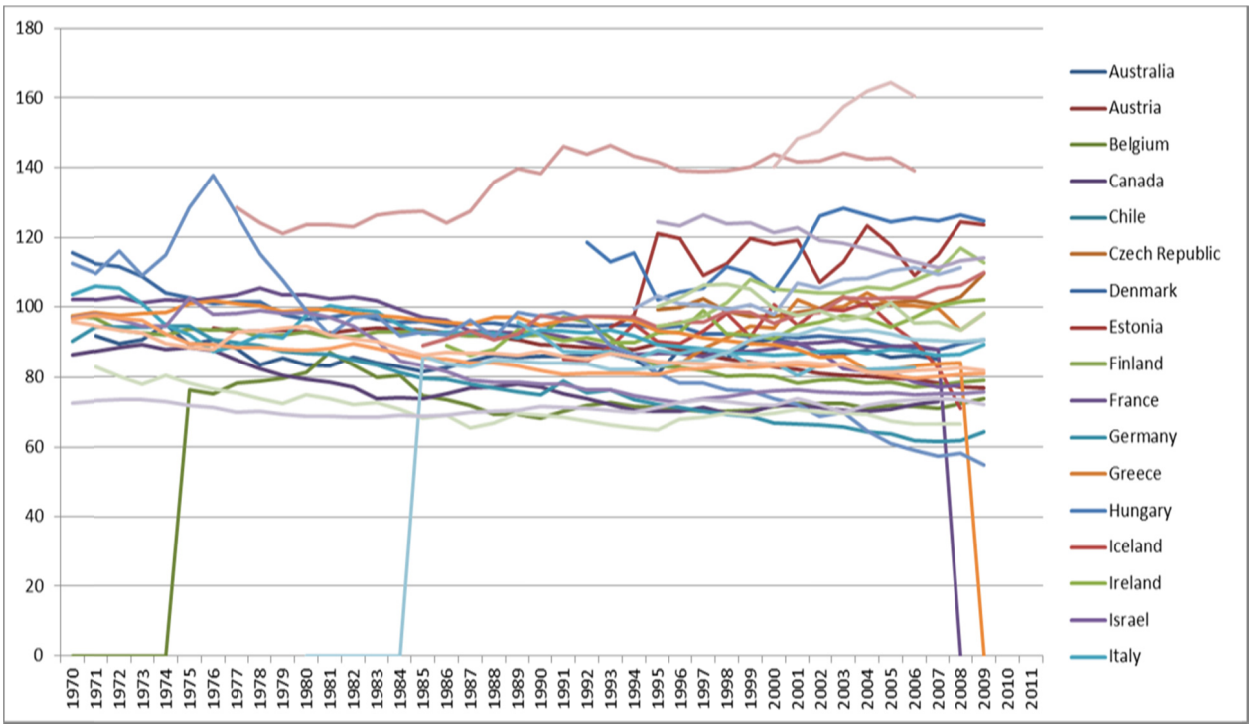

*Edited form raw data of OECD STAN database

(Dataset: STAN Database for Structural Analysis (ISIC Rev. 4))

Fourth, from model 4 and 5, we can see weak negative relations between 'labor compensation of service sectors compared to manufacturing sectors' and income inequality in the 5% statistical significance. It means if 'labor compensation of service sectors compared to manufacturing sectors' is increased, income inequality is decreased (improved). Namely, it suggests OECD countries need to enhance labor compensation of service sectors compared to

manufacturing sectors. For most OECD countries, because, labor compensation in manufacturing is higher than labor compensation in the service sector as can be seen in Figure 13.

Figure 9. Labor Compensation of Service Sectors compared to manufacturing sectors




*Edited from raw data of OECD STAN database

(Dataset: STAN Database for Structural Analysis (ISIC Rev. 4))

To summarize so far, the individual influence of each service sector related independent variables is as follows. Namely, Value Added of Service Sectors, Labor Productivity of Service Sectors compared to manufacturing sectors and Labor Compensation of Service Sectors compared to manufacturing sectors have negative relation with income inequality, Gini Index. Employment of Service Sectors, whereas, have positive relation with income inequality, Gini Index.

Finally, adding one more thing, we analyses correlations among services sector

related independent variables as follows.

Table 5. Correlation among service sectors related independent variables

| | Value Added of Service Sectors | Employment of Service Sectors | Labor Productivity of Service Sectors compared to manufacturing sectors | Labor Compensation of Service Sectors compared to manufacturing sectors |
|---|---|---|---|---|
| Value Added of Service Sectors | **1** | | | |
| Employment of Service Sectors | **0.6968** | **1** | | |
| Labor Productivity of Service Sectors compared to manufacturing sectors | **-0.2247** | **-0.1837** | **1** | |
| Labor Compensation of Service Sectors compared to manufacturing sectors | **-0.0823** | **-0.6111** | **-0.0988** | **1** |

Table 5 means that if value-added of service sector is increased employment of service sector also increased by 0.7. However, the big portion of employment increase was low-skilled occupations. Because, the association between employment increase of service sector and labor productivity (or labor compensation) of service sector compared to manufacturing is - 0.18 and -0.6.

*Implications of the results*

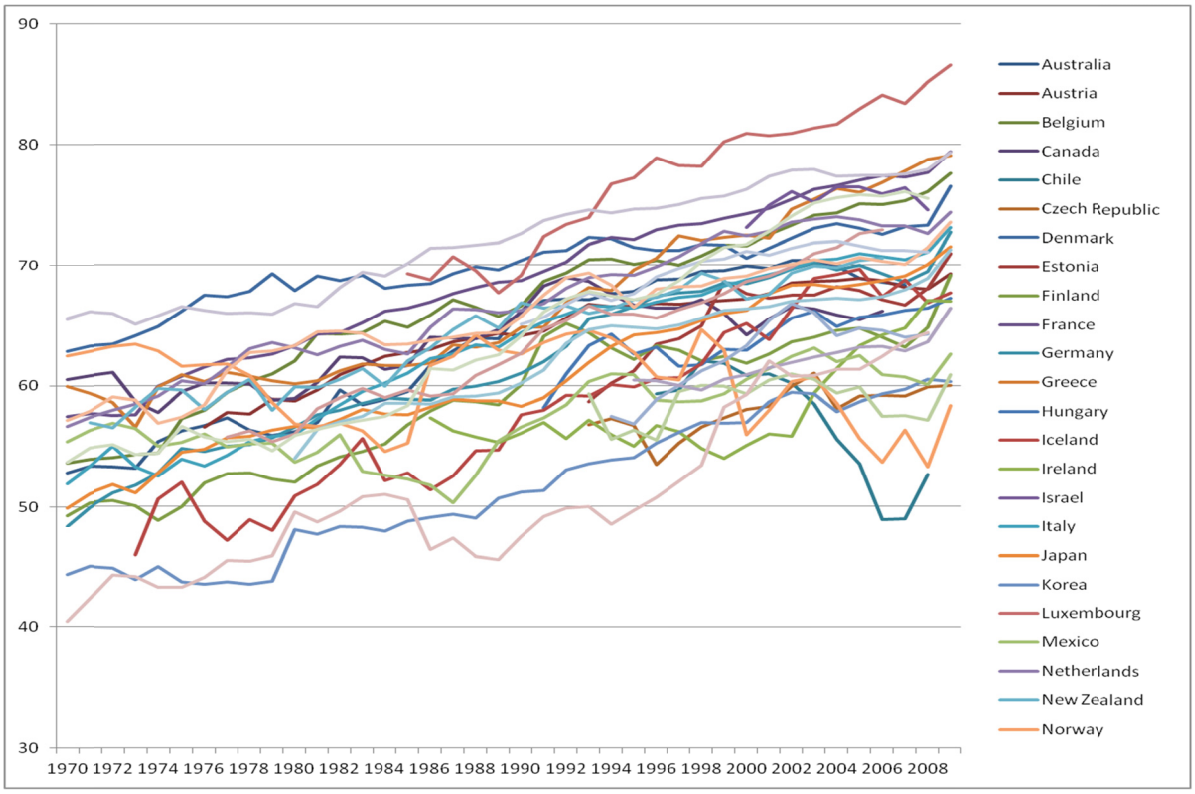
From above results of impact of service sector on income inequality, we can explain as follows.

*Service Sector*

According to Hwang (2011),"Service economy (tertiarization)" refers to the phenomenon that the center of the economy moves to service sectors producing service from manufacturing sectors producing goods. The structural change of economy, teriarization,

appears in almost of all countries. According to the data of World Bank (2012), the average 'share of value added of service sectors in GDP' has increased from 53.4% (1970) to 70.9% (2010), about 17.4% increase, in the world. In the case of OECD countries, it has increased from 54.6% to 74.4%, by 18.6% increase as we can see below figure 14.

Figure 10. Value added shares relative to total economy: total services




*Edited from the raw data of OECD

(Dataset: STAN Database for Structural Analysis (ISIC Rev. 4))

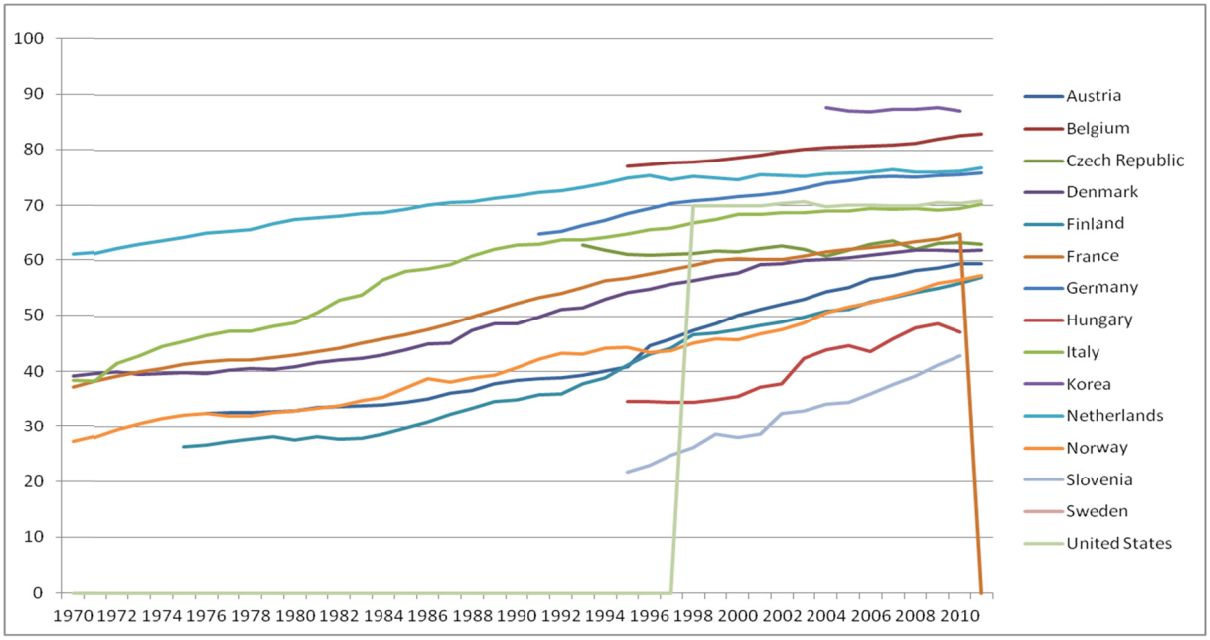
For this reason, the interest of the service sectors' impact on the distribution of income has been increased. Especially since the global financial crisis, widening productivity and wage gap in the service sectors such as high-income financial sector and low-income whole sale sector has emerged as an international issue. Subsequently, the public opinion that require solving expansion of income inequality (for example, occupy wall street, etc.) has

been prevalent.

In summary, after 1970, income inequality has been deteriorated in the world. The cause of it could be the expansion of service sectors.

In the case of advanced countries, as the result of the cavitations of domestic manufacturing sector (the offshoring of production facilities and technological innovation), the expansion of low-productivity and low-wage service sector is likely to have had a negative impact on of the distribution of income (Rizk 2003, Sassen2000). Increasing self-employed workers in the service sector as we can see in the below Figure 15 (Lohmann, Luber and Mu¨ller 1999) is negative effect on income inequality (Rowthorn and Ramaswamy1997, Rani 2008, Kang, Park and Cho 2012). Increasing premium on high-skilled workers by technological progress, also, has negative effect on income inequality (Jaumotte, Lall and Papageorgiou, 2008).

Figure 11. The Share of service sector's self-employed workers in total industry




*Edited from the raw data of OECD

(Dataset: STAN Database for Structural Analysis (ISIC Rev. 4))

Impact of progress in the service sector on income distribution differs among nations according to various welfare states. In this article, thus, especially, research question 2 deals the association between the expansion of service sector and income inequality according to various welfare states.

*Labor market*

In addition, in the case of Korea, there are dual structures of the labor market as can be seen in Table 6. According to the KDI labor market policy forum (2013), there are increasing "job-quality gap" between core and periphery deteriorating the income inequality. Usually, core labor markets include large companies, public sectors and manufacturing sectors. Core labor markets, in which employment law and social insurance mostly applied, have characteristics such as high labor productivity, monopolistic market structure and strong power of labor union. Whereas, periphery labor markets usually include SMEs, self–employment and service sectors. Periphery labor markets, in which employment law and social insurance mostly not applied, have characteristics such as law labor productivity, competitive market structure and weak power of labor union. Through this, according to our concern about service sector, we can conjecture strong association between service sector and income inequality. Because of those characteristics of service sector, they usually have low productivity, low wage and low employment protection. Furthermore, we can apply this causality between service sector and income inequality to our analysis of OECD countries.

Table 6. The dual structure of the labor market in Korea

| Sector | Composition | Characteristics | Employment Law and Social Insurance |
|---|---|---|---|
| Core | Large companies<br>Public sectors<br>Manufacuring sectors | High labor productivity<br>Monopolistic market structure<br>Strong power of labor union | Mostly applied |
| Periphery | SMEs n Self-employment<br>Service Sectors | Low labor productivity<br>Competitive market structure<br>Weak power of labor union | Mostly not applied |

* source: KDI Labor market policy forum, 2013

7.1.2 The impact of other control variables on income inequality

According to Table 4, in the control variables, there are market condition variables and institutional condition variables.

Market condition variables are Trade, Technology, Unemployment, Female Labor Force Participation Rate and GDP growth rate. In the above analysis results, from model 1 to model 6, there are no statistically significant relations between trade and income inequality (Only in the model 6, there are weak positive relation between trade and income inequality in the 10% statistical significance ).From model 1 to model 6, there are strong positive relations between technology and income inequality in the 1% statistical significance. Namely, it means, if technology develops, income inequality deteriorate (is increased).In addition, from model 1 to model 6, there are weak positive relations between unemployment and income inequality in the 1% statistical significance. Namely, it means, if unemployment is increased , income inequality deteriorate(is increased). Like these results, from model 1 to model 6, there are weak positive relations between female labor force participation rate and income inequality in the 1% statistical significance. Namely, it means, if female labor force participation rate is increased, income inequality deteriorate (is increased). Finally, from model 1 to model 6, there are no statistically significant relations between GDP growth rate and income inequality.

Institutional condition variables are Social Expenditure, Employment Protection, Minimum Wage, and Union Density. In the above analysis results, in the model 2 and 6, there are weak negative relations between social expenditure and income inequality in the 10% statistical significance. It means if social expenditure is increased, income inequality is decreased (improved). In addition, only in the model 1, we can see weak negative relation

between employment protection and income inequality in the 1% statistical significance. It means if employment protection is increased, income inequality is decreased (improved). Also, from model 1, 5 and 6, we can see weak negative relations between union density and income inequality in the 1%~5% statistical significance. It means if union density is increased, income inequality is decreased (improved). Contrary to our expectations, in the model 1, we can see weak positive relation between minimum wage and income inequality in the 1% statistical significance. It means if minimum wage is increased, income inequality is increased (deteriorated).

In summary, whereas market condition variables can deteriorate income inequality, institutional condition variables like social expenditure, employment protection and union density can improve income inequality to some extent

7.2 Liberal Market Economies vs. Coordinated Market Economies

The effect of it is well known that the effects of large scale socio-economic shifts such as ‘service sector’s increase may differ across backgrounds by virtue of interacting with certain market and institutional conditions. On that point, we sought to examine whether the impact of service economy on income inequality might depend on country group. In order to answer this question, we explored our OECD countries by grouping into two groups according to welfare capitalism theory[5] like below Table 7.

Table 7. The country groups

| | |
|---|---|
| Group 1 ( LMEs ) representing the Liberal Market Economies | Australia |
| | Canada |
| | Ireland |
| | New Zealand |
| | United Kingdom |
| | United States |
| Group 2 ( CMEs ) representing the Coordinated Market Economies | Germany |
| | Japan |
| | Switzerland |
| | Netherlands |
| | Belgium |
| | Sweden |
| | Norway |
| | Denmark |
| | Finland |
| | Austria |

[5]According to Peter A. Hall and David Soskice, there are two types of welfare capitalism, Liberal market economies and Coordinated market economies. In “liberal market economies” (LMEs), the activities of economic actors are mainly coordinated through market mechanisms. In contrast, coordinated market economies(CMEs) rely on formal institutions to regulate the market and coordinate the interaction of economic actors. Liberal market economies usually include USA, Britain, Australia, Canada, New Zealand and Ireland. Coordinated market economies usually include Germany, Japan, Switzerland, Netherlands, Belgium, Sweden, Norway, Denmark, Finland and Austria. (From “Oxford Dictionary of Human Resource Management”)

Table 8-1. Service Sector and Income Inequality in Liberal Market Economies (Group1):

Panel Data Analysis (1974 ~ 2011)

| Dependent variable | income inequality | Gini index | Model1 | Model2 | Model3 | Model4 | Model5 | Model6 |
|---|---|---|---|---|---|---|---|---|
| Independent variables | Service Sector variables | Value Added of Service Sectors | 0.0002642 | | | | -0.0017579 | -0.0017032 |
| | | | (0.27) | | | | (-1.52) | (-1.48) |
| | | Employment of Service Sectors | | 0.0037651*** | | | 0.0030404 | 0.0042255** |
| | | | | (2.76) | | | (1.48) | (2.32) |
| | | Labor Productivity of Service Sectors compared to manufacturing sectors | | | -0.0007241*** | | -0.0005455* | -0.0005795** |
| | | | | | (-2.69) | | (-1.75) | (-2.01) |
| | | Labor Compensation of Service Sectors compared to manufacturing sectors | | | | -0.0020576*** | -0.0004146 | 0.0004195 |
| | | | | | | (-3.05) | (-0.49) | (0.53) |
| | Other Control variables | Trade | 0.0005324*** | 0.0002711 | 0.0002359 | 0.0001964 | -0.0000373 | 0.0000143 |
| | | | (2.89) | (1.47) | (1.15) | (1.02) | (-0.15) | (0.06) |
| | | Technology | 0.000000117*** | 0.000000109*** | -4.75E-08 | 0.000000145*** | -1.67E-08 | -1.53E-08 |
| | | | (4.29) | (4.37) | (-0.8) | (5.51) | (-0.23) | (-0.21) |
| | | Unemployment rate | 0.0017193 | 0.0036954** | 0.001897 | -0.0005892 | 0.0012555 | 0.0030716* |
| | | | (0.97) | (2.45) | (1.58) | (-0.42) | (0.66) | (1.99) |
| | | Female Labor Force Participation Rate | 0.0027203*** | 0.0022733*** | 0.0013282 | 0.0022916*** | 0.0010264 | 0.000744 |
| | | | (3.16) | (2.92) | (1.54) | (2.96) | (1.11) | (0.92) |
| | | GDP growth rate | -0.0000475 | -0.0002422 | -0.0017301** | -0.0006032 | -0.0014747* | -0.001171* |
| | | | (-0.07) | (-0.37) | (-2.32) | (-0.89) | (-1.91) | (-1.79) |
| | | Social Expenditure | -0.0027712 | -0.0063702*** | -0.0035373*** | -0.0018246* | -0.0030293 | -0.0053388*** |
| | | | (-1.21) | (-3.45) | (-2.85) | (-1.63) | (-1.33) | (-2.75) |
| | | Employment Protection | -0.0304715 | -0.0393212** | -0.0383255** | -0.046072** | -0.0451593** | |
| | | | (-1.57) | (-2.17) | (-2.25) | (-2.49) | (-2.52) | |
| | | Minimum Wage | | | | | | |
| | | | | | | | | |
| | | Union Density | -0.0005892 | 0.0001619 | -0.0006606 | -0.0003874 | -0.0004695 | 0.0001237 |
| | | | (-1.01) | (0.3) | (-1.46) | (-0.83) | (-0.81) | (0.23) |
| | | N | 69 | 71 | 70 | 70 | 68 | 76 |
| | | R-squared | 0.722 | 0.767 | 0.792 | 0.768 | 0.798 | 0.816 |

*Note:* Numbers in parentheses are standard errors.

*,** , and *** represent 10%,5% and 1% of statistical significance, respectively.

Table 8-2. Service Sector and Income Inequality in Coordinated Market Economies (Group2):

Panel Data Analysis (1974 ~ 2011)

| Dependent variable | income inequality | Gini index | Model1 | Model2 | Model3 | Model4 | Model5 | Model6 |
|---|---|---|---|---|---|---|---|---|
| Independent variables | Service Sector variables | Value Added of Service Sectors | 0.00106 | | | | -0.0008188 | -0.0003419 |
| | | | (1.16) | | | | (-0.91) | (-0.43) |
| | | Employment of Service Sectors | | 0.0045699*** | | | 0.0018409 | 0.0012455 |
| | | | | (4.07) | | | (1.11) | (0.89) |
| | | Labor Productivity of Service Sectors compared to manufacturing sectors | | | -0.0004154*** | | -0.0003122** | -0.0002494** |
| | | | | | (-4.37) | | (-2.31) | (-2.25) |
| | | Labor Compensation of Service Sectors compared to manufacturing sectors | | | | -0.0024667*** | -0.0006881 | -0.0009449 |
| | | | | | | (-3.42) | (-0.74) | (-1.16) |
| | Other Control variables | Trade | 0.0004321** | -0.0000571 | 0.0000276 | 0.0001677 | -0.0001389 | -0.000069 |
| | | | (2.41) | (-0.29) | (0.15) | (0.92) | (-0.7) | (-0.39) |
| | | Technology | -3.15E-08 | -0.000000141 | -0.000000133 | -0.000000223 | -0.000000199 | -0.000000141 |
| | | | (-0.18) | (-0.91) | (-0.88) | (-1.32) | (-1.26) | (-0.98) |
| | | Unemployment rate | 0.0006953 | 0.0008907 | 0.0005657 | 0.000638 | 0.0006929 | 0.0011209* |
| | | | (0.87) | (1.27) | (0.82) | (0.88) | (1.01) | (1.77) |
| | | Female Labor Force Participation Rate | -0.0003242 | -0.0011617** | 0.0000048 | -0.0004586 | -0.0003275 | -0.0005206 |
| | | | (-0.65) | (-2.6) | (0.01) | (-1.22) | (-0.56) | (-1.05) |
| | | GDP growth rate | -0.0000945 | -0.0001575 | -0.0001294 | -0.001193 | -0.000416 | -0.0004927 |
| | | | (-0.09) | (-0.17) | (-0.14) | (-1.16) | (-0.42) | (-0.86) |
| | | Social Expenditure | -0.0000989 | -0.0026144** | 0.0010633 | -0.0010121 | -0.0003094 | -0.0010978 |
| | | | (-0.1) | (-2.36) | (1.32) | (-1.07) | (-0.21) | (-0.83) |
| | | Employment Protection | 0.0005989 | 0.0078906 | 0.0024042 | -0.0006274 | 0.0040084 | |
| | | | (0.1) | (1.46) | (0.49) | (-0.12) | (0.71) | |
| | | Minimum Wage | | | | | | |
| | | | | | | | | |
| | | Union Density | -0.0010509 | -0.000712 | -0.0014329** | -0.0006753 | -0.0011463 | -0.0011317* |
| | | | (-1.33) | (-1.02) | (-2.13) | (-0.93) | (-1.59) | (-1.78) |
| | | N | 69 | 69 | 69 | 69 | 69 | 78 |
| | | R-squared | 0.528 | 0.635 | 0.648 | 0.606 | 0.679 | 0.729 |

*Note:* Numbers in parentheses are standard errors.

*,** , and *** represent 10%, 5% and 1% of statistical significance, respectively.

As can be seen in the table 8-1 and 8-2, we can analysis the result comparatively in the perspective of liberal market economies vs. coordinated market economies.

In the above comparative analysis results about service sector related independent variables, there are no statistically significant relations between value added of service sectors and income inequality in both of LMEs and CMEs. Secondly, in both of LMEs and CMEs, if employment of service sectors is increased, it can deteriorate income inequality. In the mature stage of service economy, because, the quality of employment is more important than the quantity. Finally, 'labor productivity and compensation of service sectors compared to manufacturing sectors' serves as to improve income inequality in both of the country groups. Therefore, enhancing labor productivity and heightening the level of compensation of service sector is very important policy implication.

In the above comparative analysis results about market conditions independent variables, there are statistically significant relations between trade and income inequality only in the model 1. There are weak positive relation between trade and income inequality in LMEs (Liberal Market Economies) and CMEs (Coordinated Market Economies). Namely, in both LMEs and CMEs, if trade is developed it can increase income inequality as a Hirschman's tunnel effects[6]. Because, often trade brings income growth biased to high-skilled worker. So, it induces income inequality. Secondly, technology serves as to increase income inequality in LMEs. Whereas, the relation is not statistically significant in CMEs. It means that supporting training to the low-skilled people is very important. Thirdly, unemployment

[6] In the two roads at the entrance of the tunnel, if one road is passed smoothly and the other road undergoes congestion, the driver of a stagnant side may feel relatively deprived. If these phenomena are applied to developing economy, the more income gap is deeper, the more the poor will feel relative deprivation.
For more detailed thing, See: Hirschman, A. O.(1973), "The changing tolerance for income inequality in the course of economic development(with a mathematical appendix by Rothschild, Michael)", Quarterly Journal of Economics 87(4).

serves as to increase inequality in all of two country groups. Fourthly, female labor force participation rate can increase income inequality in LMEs. However, in CMEs, female labor force participation rate serves as to be lower income inequality. Such opposite results of 'female labor force participation rate' in both countries group can be attributed to the difference of each country's institutional context. Finally, GDP growth rate serves as to lower income inequality in LMEs ; but in CMEs, there are no statistically significant relationship between them . Namely, in LMEs, Kuznets Inverted-U Hypothesis[7] is satisfied and the trickling-down effect[8] is supported.

In the above comparative analysis results about institutional conditions independent variables, there are weak negative relation between social expenditure and income inequality in LMEs and CMEs. It means that in each country social welfare policies fitted to each situation is very important. Secondly, employment protection serves as to lower income inequality in LMEs. However, there are no statistically significant relations in CMEs. Thirdly, union density serves as to lower income inequality in CMEs. In LMEs, there are no statistically significant relations between union density and income inequality.

[7] Kuznets Inverted-U Hypothesis is related with the correlation of economic development and income inequality. It shows income inequality increase during the period of economic development but after achieving the economic development it would fall with economic growth.

[8] trickling-down effect refer to the theory that economic benefits provided by economic growth will benefit poorer members of society by improving the economy as a whole. (http://en.wikipedia.org/wiki/Trickle-down_economics)

## VIII. Conclusion

This paper intends to study the relationship between service sector's growth and income inequality for 34 OECD countries during the period from 1974 to 2011.

We find evidence that the growth in service sector in terms of employment is negatively related to income equality. However, our analysis suggests that the advance in service sector is not necessarily related to deterioration in income inequality. If the labor productivity and compensation in service sector are high enough, the growth in service sector may lead to more equal distribution of income. We can confirm the above findings for both more market-oriented economies (liberal market economies) and less market-oriented economies (coordinated market economies).

Thus, what is more important to us is "how" the service sector will grow than the growth of service sector itself. In other words, the quality of employment in service sector- in terms of labor productivity and compensation - is more important than the level of employment. Thus, through the policy effort to enhance labor productivity and the level of compensation of service sector, we can reduce income inequality. Especially, capacity build-up and empowerment of low-skilled people are very important policy goals if we intend to reduce income inequality. The increase in labor productivity and higher compensation of low-skilled workers who work for service sector will eventually reduce income inequality.

## References


Alderson, Auther and Francois Nielsen. 2002 “Income Inequality Trends in OECD Countries”. *American Journal of Sociology*. 197(5): 1244-99.

Atkinson, A.B. 2001. “A Critique of the Transatlantic Consensus on Rising Income Inequality”. *UNESCO*. Blackwell Publishers.

Blum, Bernardo S. "Trade, technology, and the rise of the service sector: The effects on US wage inequality." *Journal of International Economics* 74, no. 2 (2008): 441-458.

Caminada, Koen and Kees Goudswaard. 2001. “International Trends in Income Inequality and Social Policy”. *International Tax and Public Finance*. 8:395-415.

Card, D., 1998. “Falling Union Membership and Rising Wage Inequality. What’s the Connection?” NBER Working Paper 6520.

Card, D., 2001. “The Effect of Unions on Wage Inequality in the US Labor Market”, *Industrial and Labor Relations Review*, Vol. 54, No. 2, pp. 296-315.

Card, D., T. Lemieux and W. C. Riddell, 2004. “Unions and Wage Inequality”, *Journal of Labor Research,* p. 25.

Choi, In Bang, and Sang Woo Park. "The impact and implications of progress in the service economy to income inequality." *BOK Issue Paper Series* 2012, no. 13 (2012) (In Korean)

Evans, Peter B. and Michael Timeberlake. 1980. “Dependence, Inequality, and the Growth of the Tertiary: A Comparative Analysis of Less Developed Countries”. *American Sociological Review*. 45(4): 531-552.

Freeman, R. and J. L. Medoff, 1984. *What Do Unions Do?* New York: Basic Books.

FreemaAn, R., 1980. “Unionism and the Dispersion of Wages”, *Industrial and Labor*

Glenn, Jerome C., Theodore J. Gordon, and Elizabeth Florescu. *State of the future, 2012*. Washington D.C: Millennium Project, 2012.

Hall, Peter A., and David W. Soskice. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford [England]: Oxford University Press, 2001.

Harrison, Bennett and Barry Bluestone. 1988. *The Great U-Turn: Corporate Restructuring and the Polarizing of America.* New York: Basic Books.

Hirschman, A. O.(1973), “The changing tolerance for income inequality in the course of economic development(with a mathematical appendix by Rothschild, Michael)”, Quarterly Journal of Economics 87(4).

Hwang, Su Kung. *Features and problems of service sector employment structure in Korea*. Seoul: Korea Labor Institution, 2011. (In Korean)

Jaumotte F., Lall S. and C. Papageorgiou (2008), "Rising Income Inequality: Technology, or Trade and Financial Globalization?", IMF Working Paper 08/185

John H. Dunn, Jr. "The Decline Of Manufacturing In The United States And Its Impact On Income Inequality." *The Journal of Applied Business Research* 28, no. 5 (2012)

Kang, Jong-Ku, Chang-Gui Park, and Yoon-Je Cho. "Analysis on the Causes of Increase in Income Inequality using Country Panel Data." *Economic Analysis of Bank of Korea* 18, no. 1 (2012): 85-115. (In Korean)

Knapp, Peter and Alan Spector. 1991. *Crisis and Change: Basic questions of Marxist Sociology*. Chicago: Newlson-Hall Publishers.

Koh, Young Sun. *Policy issues in response to increased poverty of working age*. Seoul: KDI, 2011. (In Korean)

Kremer, M. and E. Maskin, 2006. "Globalization and Inequality", Working Paper 2008-0087, Weatherhead Center for International Affairs, Harvard University.Available at: http://www.wcfia.harvard.edu/sites/default/files/Kremer_GlobalizationInequality.pdf

Kus, Basak. "Finacialisation and income inequality in OECD Nations : 1995-2007." *The Economic and Social Review* 43, no. 4 (2012): 477-495.

Lee, Woojin, and Cheolbeom Park. *Inequality and Redistribution among OECD Countries*. Seoul: OECD Korea Social Policy Department, 2012. (In Korean)

Levy, Frank and Richard C. Michel. 1991. *The Economic Future of American Families: Income and Wealth Trends.* Washington, DC: Urban Institute.McClelland, David. 1964. "Business Drive and National Achievement." Pp. 165-178 in Amitai Etzioni and Eva Etzioni (eds.) *Social Change*. New York: Basic Books.

Lohmann H., Luber S. and W. Mu¨ller(1999),″ Who is Self-Employed in France, the United Kingdom and West Germany? Patterns of Male Non-Agricultural Self-Employment″Arbeitspapiere, Nr. 11, Mannheimer Zentrum fu¨r Europa¨ische Sozialforschung.

Metcalf, D., K. Hansen and A. Charlwood, 2001. "Unions and the Sword of Justice: Unions and Pay Systems, Pay Inequality, Pay Discrimination and Low Pay", *National Institute Economic Review,* Vol. 176, pp. 61-75.

Moore, William S. "Income Inequality and Industrial Composition." (2008)

OECD (2010), ″Subjective well-being″, in *OECD Factbook 2010:Economic, Environmental and Social Statistics*, OECD Publishing. http://dx.doi.org/10.1787/factbook-2010-91-en

OECD (2011), *″Pro- and anti-social behaviour″, in Society at a Glance 2011: OECD Social Indicators,* OECD Publishing. http://dx.doi.org/10.1787/soc_glance-2011-28-en

OECD Better Life Index. "Executive Summary." Accessed March 1, 2013. http://www.oecdbetterlifeindex.org/.

Organisation for Economic Co-operation and Development. *OECD Economic Surveys Korea*. Paris: OECD, April 2012.

Organisation for Economic Co-operation Development. *Divided We Stand: Why Inequality Keeps Rising*. Paris: OECD, 2011

Organisation for Economic Co-operation Development. *Growing Unequal?: Income Distribution and Poverty in OECD Countries*. Paris: OECD, Organisation for Economic Co-operation and Development, 2008.

Organisation for Economic Co-operation Development. *Society at a glance 2011: OECD social indicators*. Paris: OECD, 2011.

Organisation for Economic Co-operation Development. *Technology, Productivity, and Job Creation: Best Policy Practices*. Paris: OECD, 1998.

Park, Hun Joo. "Toward People-centered Development: A Reflection on the Korean Experience." *KDI school* (2006).

Park, Ki Jeong, and Hyun Chang Yi. "The Effects of the Expansion of the Service Economy on the Income Inequality in Korea:Focused on the Sectoral Contribution Analysis." (2008)

Peskar-Johnson, Cheryl L. "An Analysis of Service Sector Growth Effects on Income Inequality : a Comparison Model of Metropolitan and Non-Metropolitan Areas of the Appalachia." (2001):

Pontusson, J., D. Rueda and C. R. Way, 2002. “Comparative Political Economy of *Relations Review*, Vol. 34 (October 1980), pp. 3-23.

Rani U. (2008), ″Impact of Changing Work Patterns on Income Inequality,″ Discussion Paper 193/2008, International Institute for Labour Studies

Rizk, Stephanie Carissa. "Service Sector Growth and Income Inequalities: A Longitudinal Analysis from an International Sample." (2003)

Rowthorn R. and R. Ramaswamy (1997), ″Deindustrialization: Its Causes and Implications″, Economic Issues, No. 10, IMF

Sassen, Saskia. 2000. *Cities in a World Economy: Second Edition*. London: Pine Forge.

Schettkat, R., and L. Yocarini. "The Shift to Services: A Review of the Literature." *Structural Change and Economic Dynamics* 17, no. 2 (2006): 127-147.

Shen, Ce and John B. Williamson. 1997. “Child Mortality, Women’s Status, Economic Dependency, and State Strength: A Cross-National Study of Less Developed Countries”. *Social Forces*. 76(2): 667-700.
Wage Distribution: The Role of Partisanship and Labour Market Institutions”, *British Journal of Political Science*, Vol. 32, No. 2, pp. 281-308

Yoo, Kung Jun. *In order to solve income polarization*. Seoul: KDI, 2012. (In Korean)

Yoon, Hee suk. *For ‘welfare achievement through employment’, reorganization direction of the of social assistance*. Seoul: KDI, 2012. ( In Korean )

Yun, Heesuk. "The Impact of Korea’s Economic Structural Changes since the 1990s on the Poverty Structure and Policy Implicati ons." *KDI Focus* 14 (2012)

<Web Site >

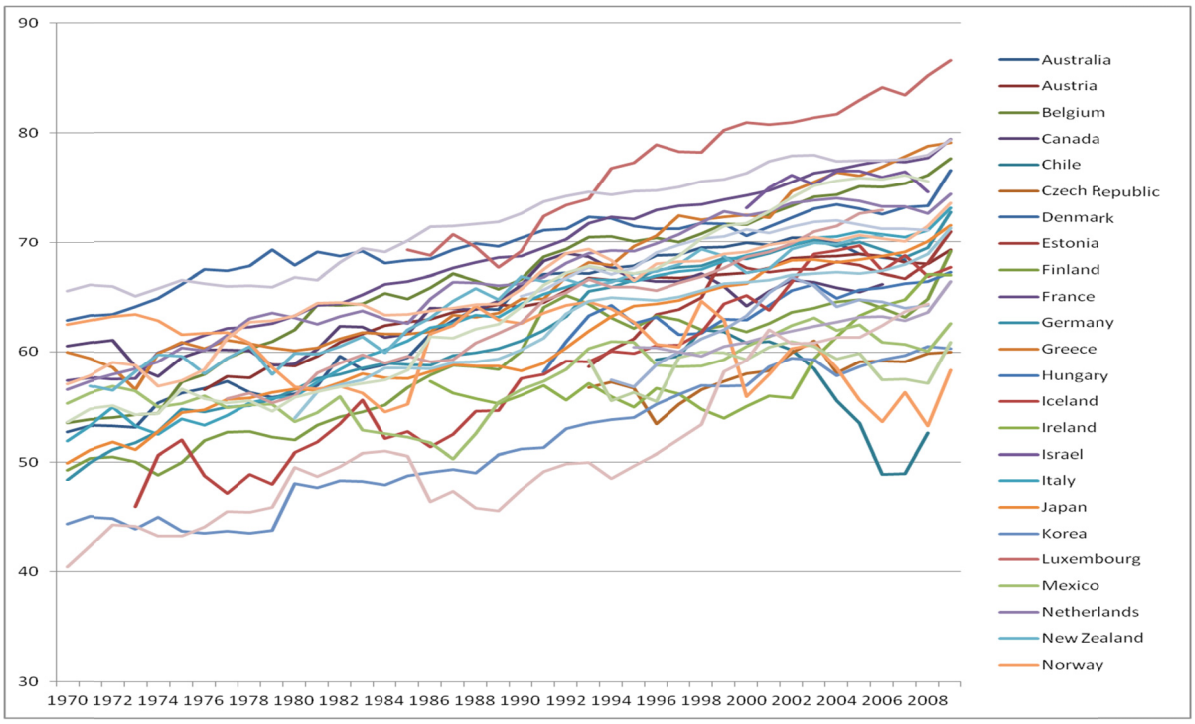
"Gini coefficient." In *Wikipedia, the free encyclopedia*. n.d. Accessed September 25, 2013. http://en.wikipedia.org/wiki/Gini_coefficient.

## Appendices

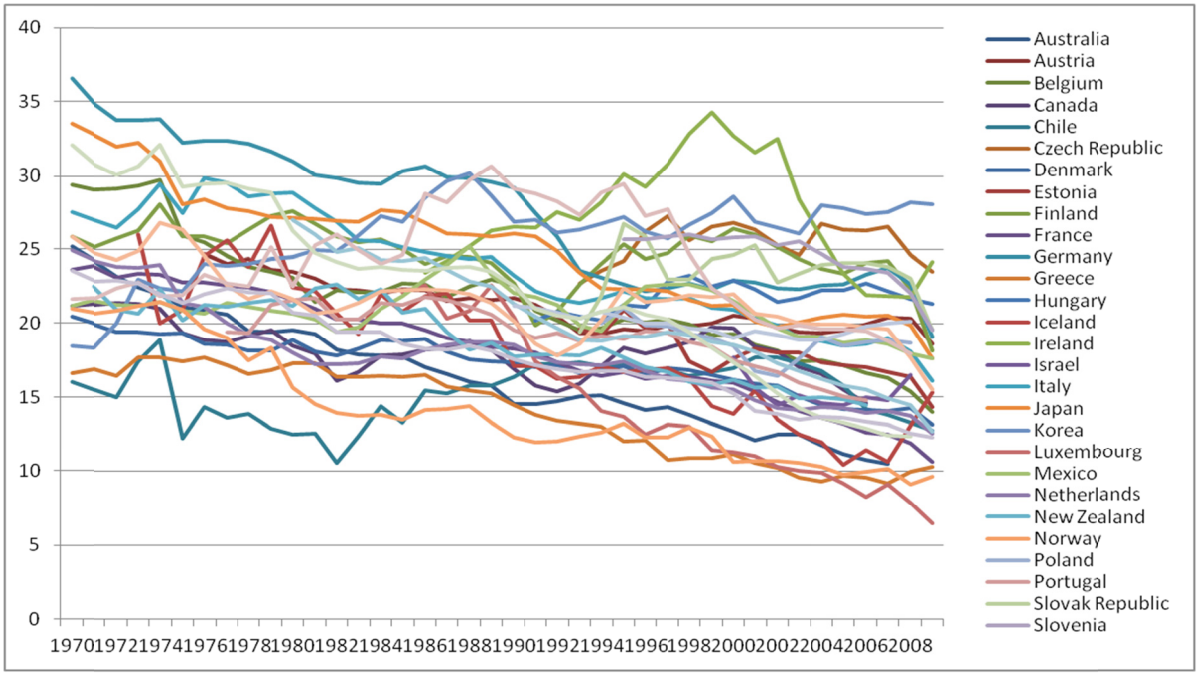
**All the Appendices were drawn from OECD STAN DATA (raw data).**

**(Data extracted on 21 May 2013 08:51 UTC (GMT) from OECD.Stat)**

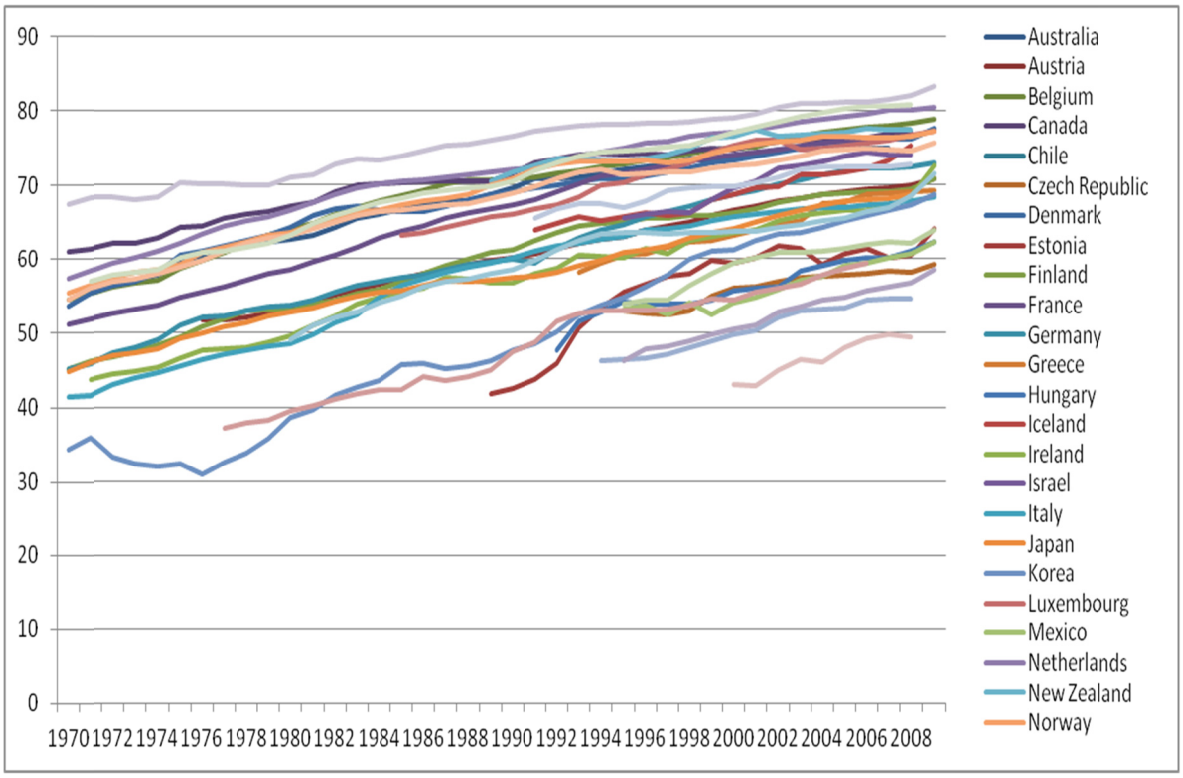
1. Value added shares relative to total economy : total service



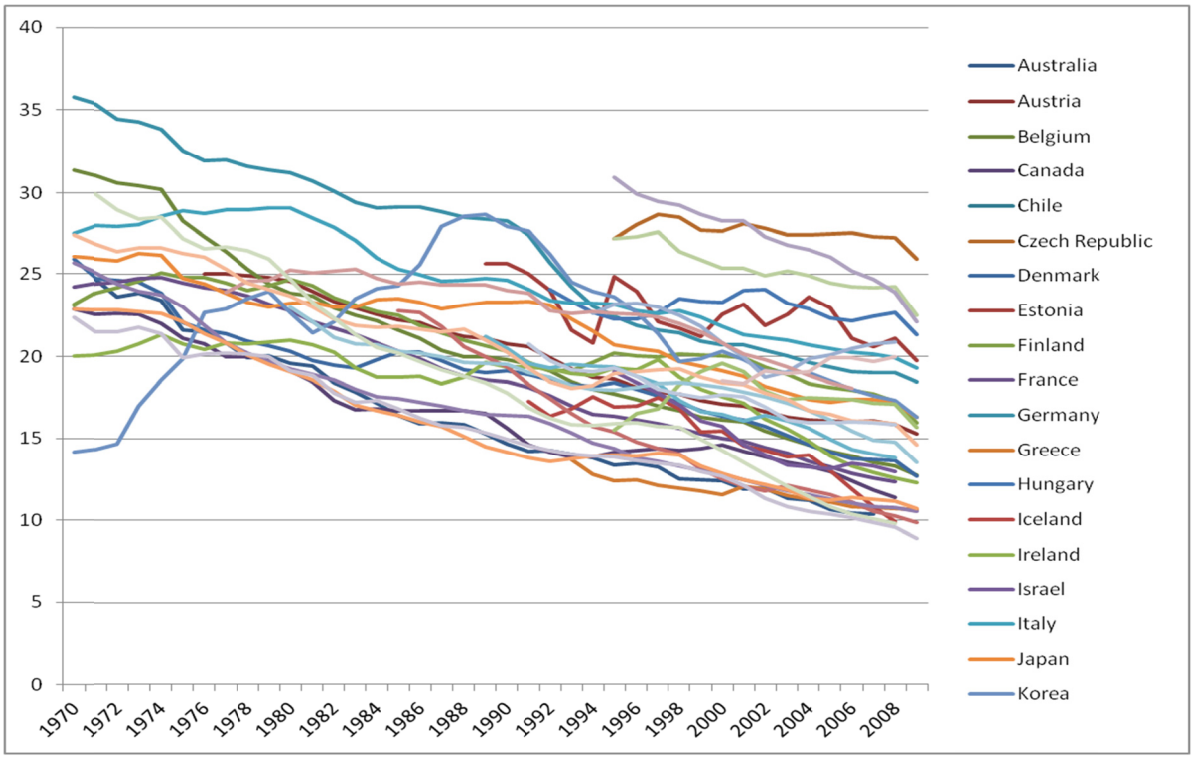

2. Value added shares relative to total economy : manufacturing



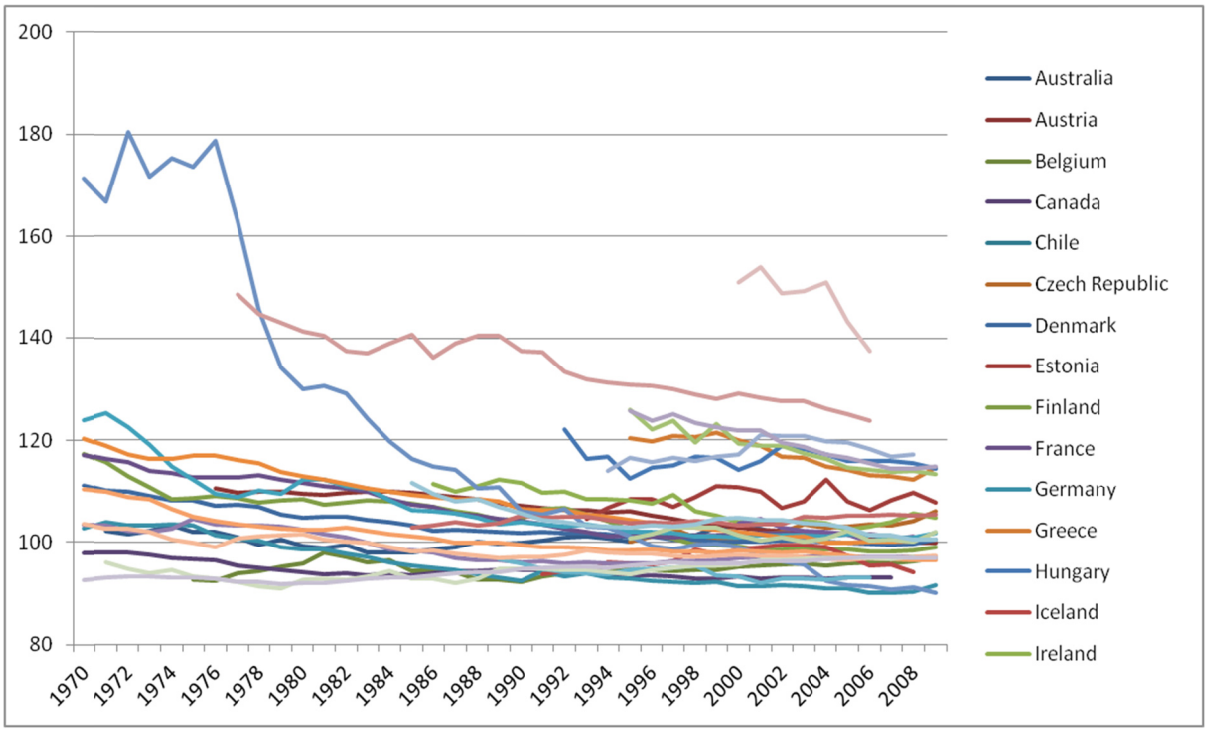
3. Employment shares in total economy: total services



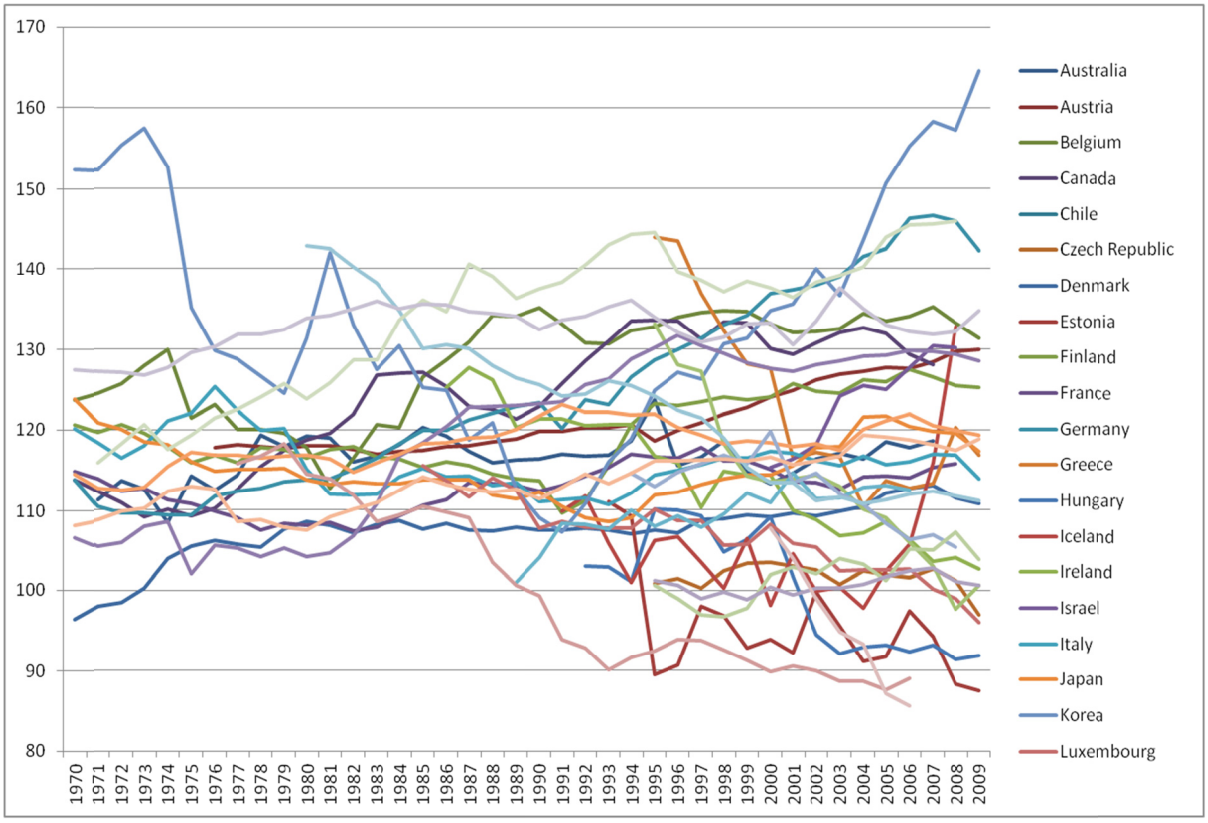

4. Employment shares in total economy : manufacturing



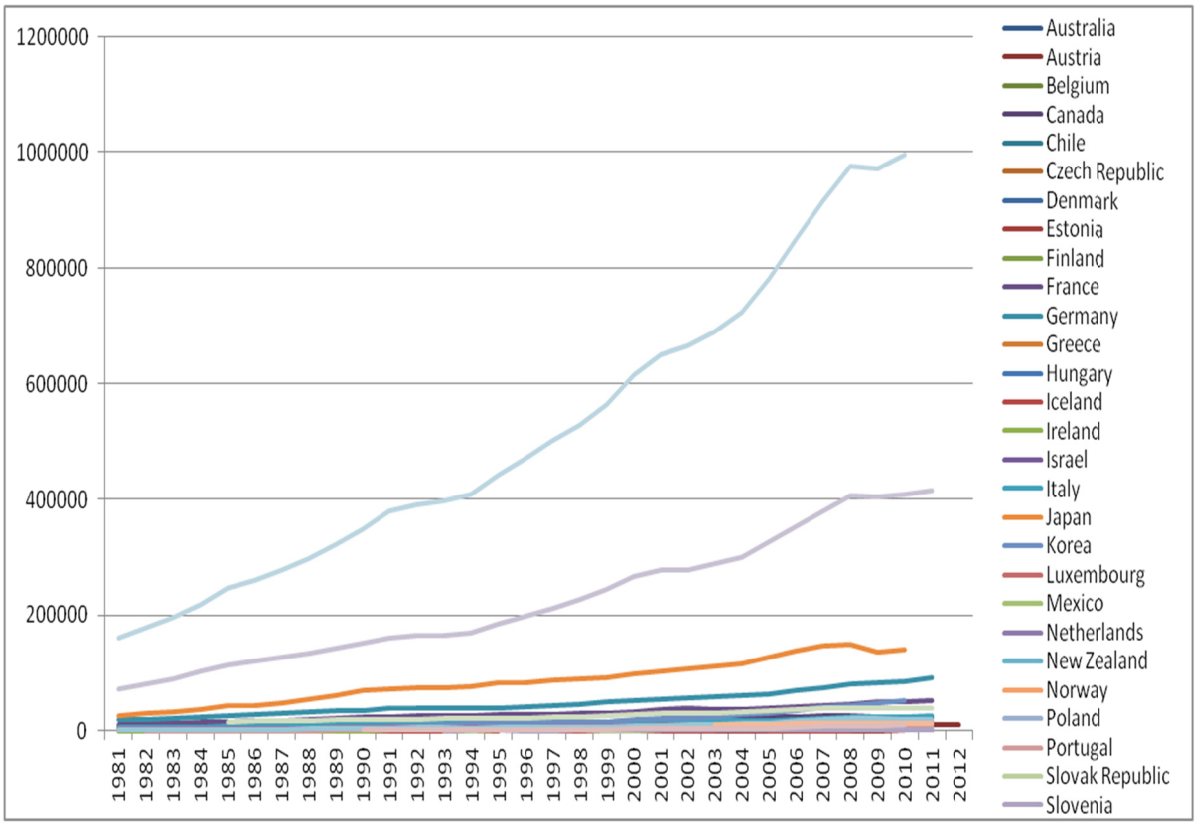
5. Labor compensation per employee in total economy: total services



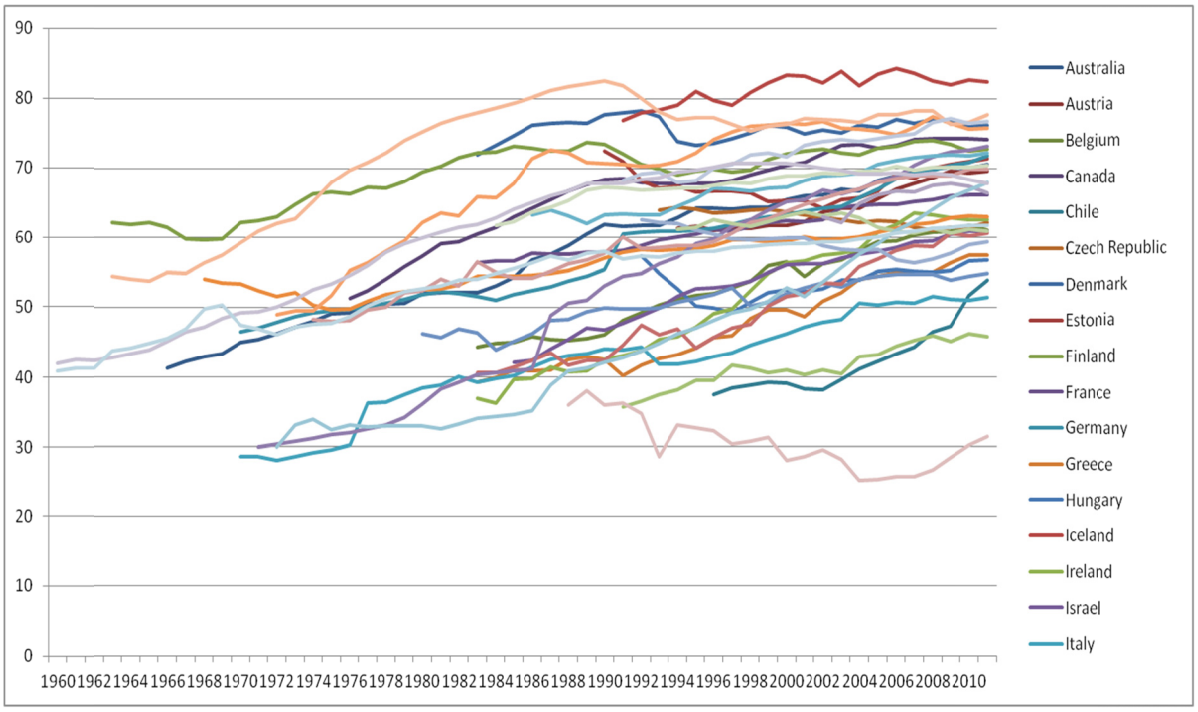

6. Labor compensation per employee in total economy: manufacturing



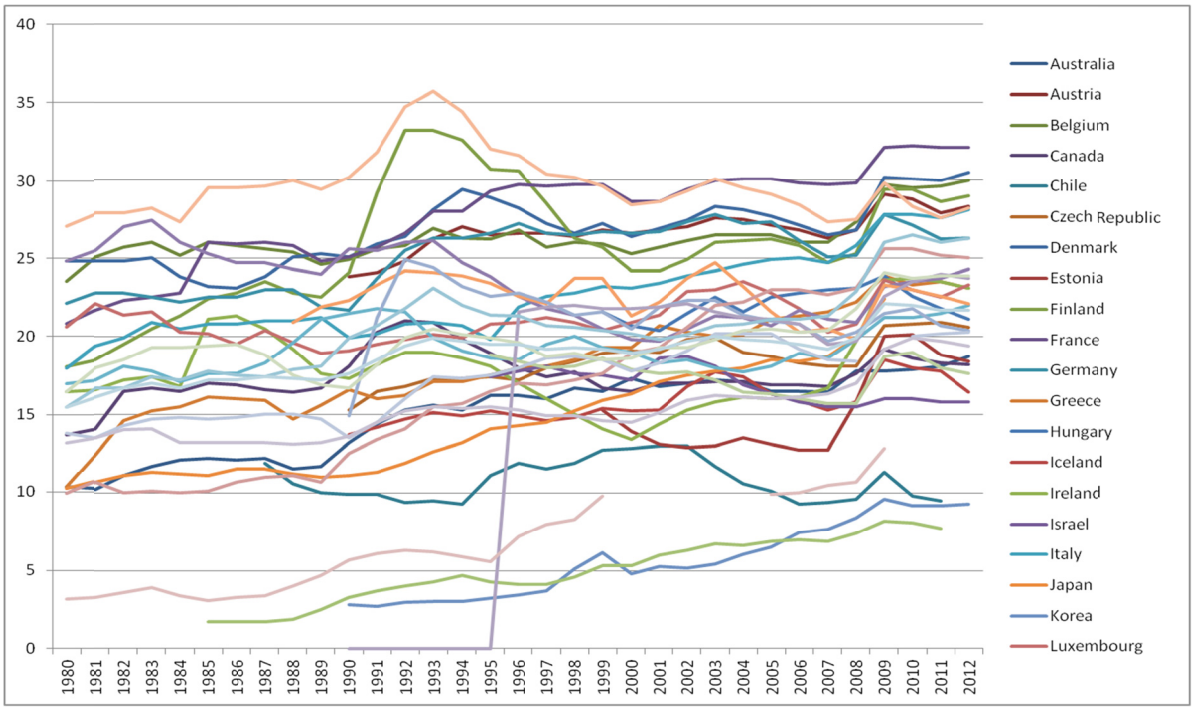
7. Gross Domestic Expenditure on R&D -- GERD (million current PPP $)



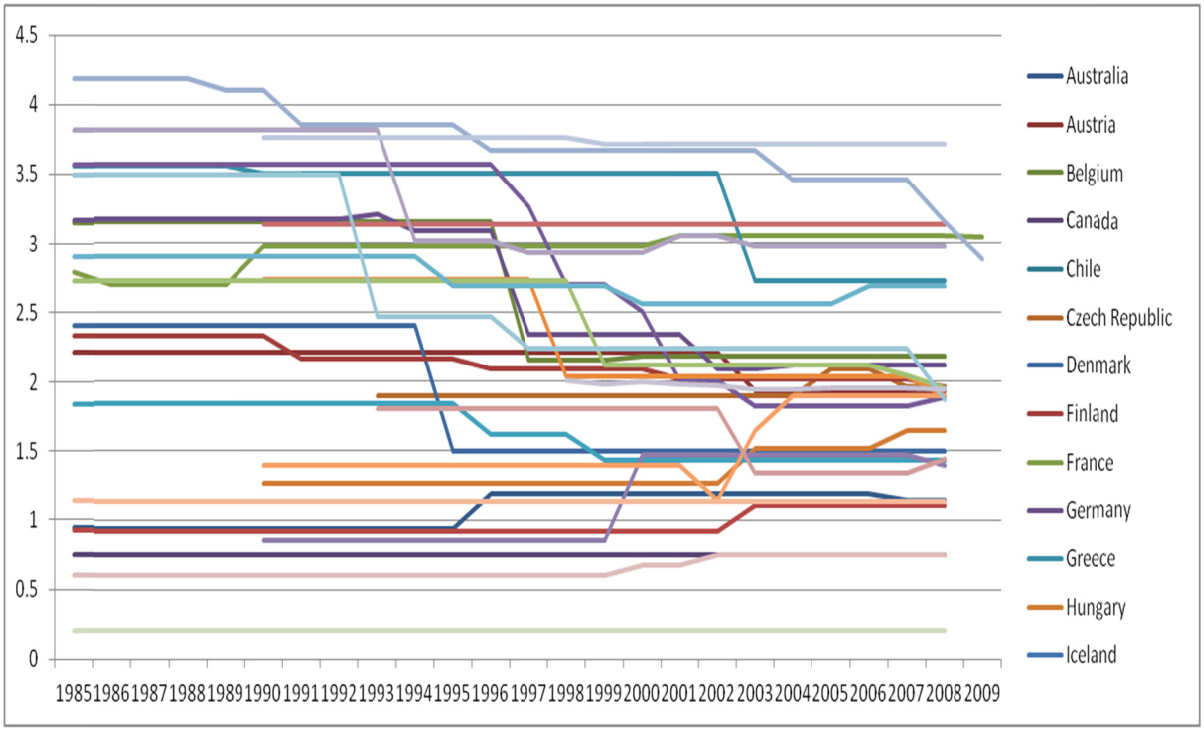

8. Labour force participation rate : Women ( age of 15 to 64 )



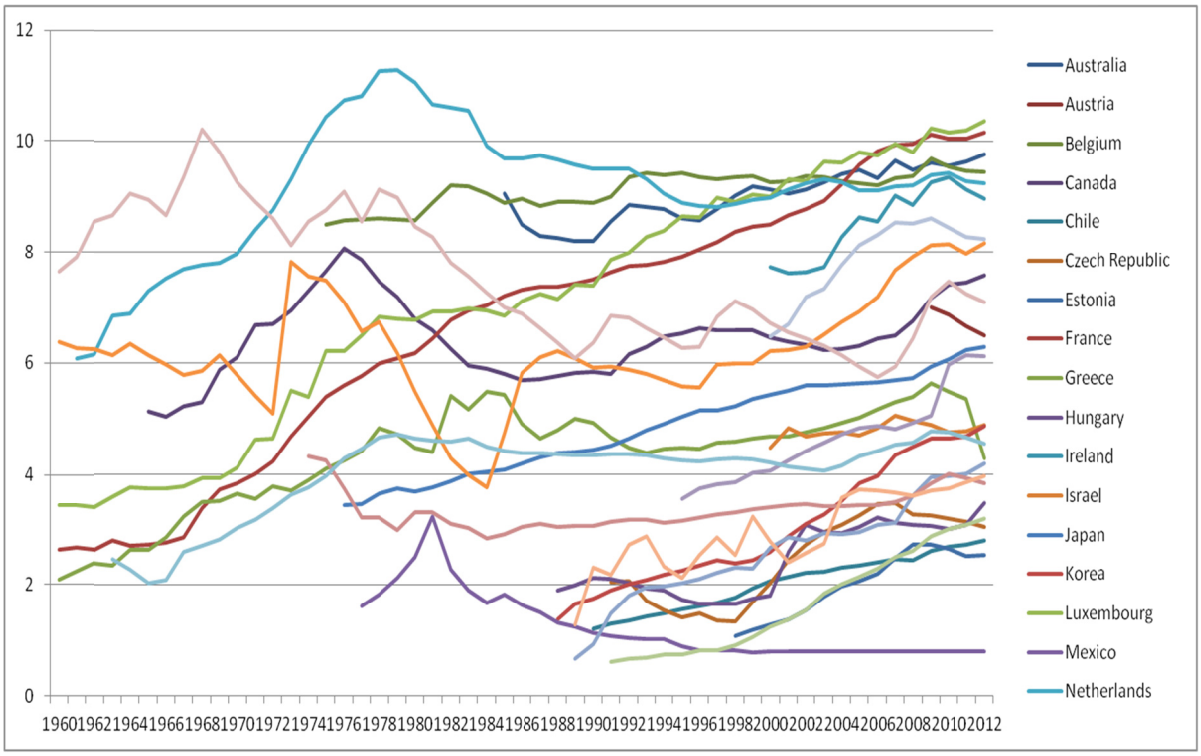
9. Social Expenditure: Public ( in % of GDP )



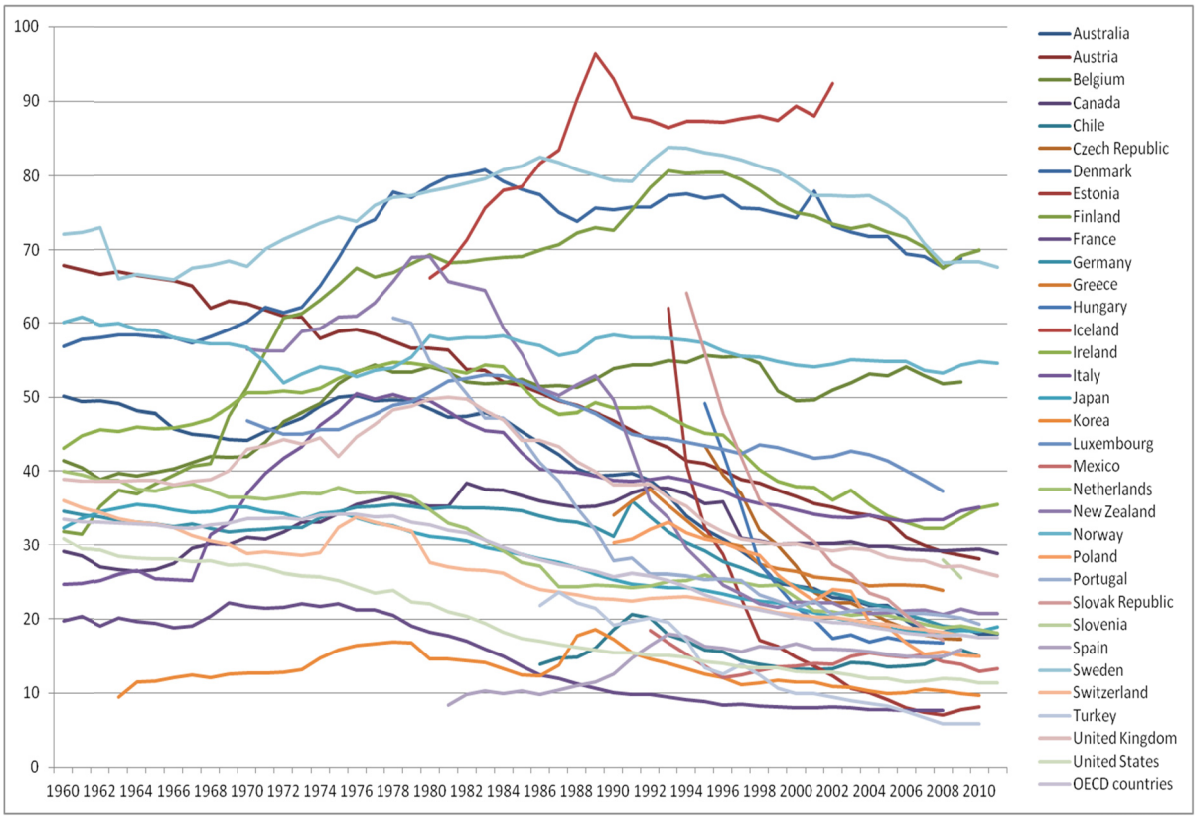

10. Employment Protection: Scale from 0 (least stringent) to 6 (most restrictive)



11. Minimum wage: US$PPP




12. Union Density



13. The Share of service sector's self-employed workers in total industry