

Evaluating Industrial Relations Systems of OECD Countries from 1993 to 2005:
A Two-Dimensional Approach

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ABSTRACT

The purpose of the present study is to develop an evaluation standard of national industrial relations systems based upon two dimensions: efficiency and equity. The present study evaluates national industrial relations systems by both cross-sectional and longitudinal methods from 30 OECD countries for 1993 to 2007. This research has utilized 12 efficiency indicators and 19 equity indicators in order to compute the indexes for efficiency and equity. In terms of efficiency, the U.S.A., Ireland, and Switzerland are among the highest ranked. Regarding equity, the Nordic countries such as Denmark, Sweden, Norway, and Finland rank highly. Denmark, Norway, and Sweden ranked among the top performers in the combined analysis. OECD nations were classified into three clusters: (1) high on both equity and efficiency (Group 1), or (2) high on efficiency but low on equity (Group 2), or (3) moderate on equity and low on efficiency (Group 3). Policy implications were mentioned.

INTRODUCTION

As economic globalization has accelerated and the need for social regulation has escalated, progress has been made in collecting and adding the economic and social indexes of different nations to international databases. Various international organizations, such as OECD, ILO, WEF, and IMD, have undertaken this work. Scholars too have classified, measured, and analyzed the labor relations of countries, prompted at times by various theoretical debates, such as the one over corporatism. Hence, in recent years, there has been an accumulation of comparative quantitative studies of labor relations for a variety of nations. However, most studies deal with only partial aspects of national industrial relations systems such as union centralization or collective bargaining centralization (Aidt and Tzannatos, 2008; Golden, Lange, and Wallerstein, 1997; Kenworthy, 2000 and 2001; Kuruvilla et al, 2002; OECD, 1994 and 2004); corporatism or social dialogue (Kenworthy and Kittel, 2003; Traxler, 1994; Traxler, Blaschke and Kittel, 2001); or the quality in work or decent work (Bescond, Chataignier, and Mehran, 2003; Bonnet, Figueiredo, and Standing, 2003; Davoine, Erhel, and Guergoat-Larivière 2008; Ghai, 2003; Weiler, 2004). Few studies have addressed the national industrial relations systems as a whole.

The purpose of the present study is to develop an evaluation standard of national industrial relations systems based upon two dimensions: efficiency and equity. Our purpose is (1) to help scholars make more valid classifications of national industrial relations systems by providing an evaluation model based upon well-accepted theoretical elements, and (2) to assist in the pursuit of equity, efficiency, and balanced growth of each country's labor relations – along with the protection of each nation's labor force. The present study evaluates national industrial relations systems by both cross-sectional and longitudinal methods from 30 OECD countries for 1993 to 2007.

CONCEPTUAL FRAMEWORK

In evaluating national industrial relations systems, we utilized the pluralistic view of industrial relations that equally recognizes the goals of employers (i.e., primarily efficiency) and that of employees (i.e., primarily equity). We also adopted a general systems model consisting of input, process, and output.

Goals of Industrial Relations: Efficiency and Equity

Efficiency and equity are both ultimate goals of industrial relations (Fox, 1974; Barbash, 1984). The concepts of efficiency and equity are elaborated in Table 1. Efficiency involves producing products and services with a minimum number of inputs. As the wants of humans are infinite, but the resources to satisfy these wants are limited, an important duty of management is to make continuous progress toward greater efficiency in production, and thereby enhance profitability if the enterprise is privately-owned. Increased international competition due to globalization has made efficiency particularly important insofar as inefficient organizations are more likely to fail. Hence, employees and unions are also concerned with maintaining business efficiency.

Table 1 Concepts of Efficiency and Equity

Category	Efficiency	Equity
Main Outcome Interest	Economic Outcome	Social Outcome
Main Value Pursued	Revenue maximization by efficient distribution of resources	Respecting human rights through distribution and procedural justice
Main Subject Interest	User	Worker
Mechanism of Mediating Labor Relations	Market competition according to the policy of liberty of contract.	Institutional regulations by minimum wage conditions and rights to participate in management, etc.
Main Right Pursued	Property rights	Right to labor

Second is the issue of ensuring equity. In labor relations, equity can be said to involve labor standards that promote human dignity and freedom. For instance, by establishing minimum labor standards (minimum wages; maximum work hours; minimum safety conditions; restriction of unreasonable discharge; eliminating child labor; etc.) employees can be assured of having the basis of a decent life, and a fair share of the proceeds of their labor (distributive justice). Furthermore, equal opportunity and prohibition of discrimination is part of equity between different parts of the working population. While realizing equity is a main concern for workers and labor unions, it is also, in the long run, a way to also augment the organization's efficiency by giving it equal access to the talents of all population groups, and therefore it is a matter of interest to management as well.

In a market economy, efficiency is closely related to organizations' efforts to enhance economic profit; on the other hand, equity focuses on achieving social well-being. Efficiency prioritizes economic factors like labor productivity and economic growth; however equity puts employee's standard of living and employee's quality of life first. Therefore, the method and process of achieving efficiency differs from that of achieving equity. In a market economy, efficiency has been enhanced by a legal regime emphasizing contracts, market-based compensation, and relatively free trade. On the other hand, the dangers and imperfections of really-existing markets, lead those concerned with equity to emphasize legally-mandated minimum labor standards and employee voice. These provide for distributive and procedural justice, and eventually guarantee humane life. In short, efficiency prioritizes property rights while equity emphasizes human and labor rights.

Efficiency and equity should not be seen as contradictory concepts, but rather objectives that should be jointly pursued. While sometimes there may be tradeoffs, one does not have to be sacrificed entirely for the sake of the other. Rather, they can both be developed and advanced together. In the labor relations system, emphasizing only

efficiency can result in many strikes or other forms of employee resistance at the workplace, which will harm efficiency. Similarly, focusing on equity alone can weaken the base of economic activity and, in the long run, reduce the economic foundation that is needed to realize equity.

Sequence of Industrial Relations: Input, Process, and Output

Labor relations can be characterized on a national level as a system made up of inputs, processes, and outputs. This type of categorization is widely used not only in the study of labor relations, but also in evaluations of other social conditions.

First, input includes the characteristics of regulations related to industrial relations in each country, and the structure of the people involved. In the input to the system, the regulations related to industrial relations acts as the basis on which employment relations are formed and managed. One element is the degree of legal restriction related to employment and discharge. The organizational characteristics of the people involved in labor relations are also included here. The degree of organization and centralization of power in labor unions and employer associations (the structure of the key actors) plays an important part in determining the characteristics of how a country's labor relations operate. The government's policies relating to labor relations are also an input factor.

Second, the process of labor relations signifies an interaction process and system between the people involved. One main interaction system is the method of collective bargaining. While in some countries collective bargaining occurs on a nationwide scale, in others it takes place on the level of an individual business. Collective bargaining tends to be recurring; its structure affects the tactics adopted by both labor and management, another process element of labor relations. Also, interaction through employee participations would be part of the process area. So too would be labor management interactions in national institutions of consultation.

Finally, the output area of labor relations includes labor market outcomes such as the level of wages, the ratio of part-time workers, or the amount of industrial conflict that occurs. It also includes results such as the rate of economic growth, changes in consumer prices, and the degree of equality between men and women.

Our research utilizes input, process, output indicators in the respective indexes for efficiency and equity. We look at 6 groups of indicators – three that are closely related to equity and 3 that are more primarily related to efficiency.

RESEARCH METHODS

Time-series Analysis

A time series analysis permits us to observe developments that take place as time passes. We evaluate the various OECD countries' relative standings in the years 1993, 1999, and 2005 along a number of dimensions related to equity and/or efficiency. This is done for a variety of reasons.

First, it allows us to evaluate the relative changes of each nation's labor relations, with regard to its base level of efficiency and equity. That is, by looking at three specific points in time, we can assess the evolution of the labor relations in each OECD country. In this research we have examined numerous variables over time that relate to the input, process, and output of labor relations.

Second, it allows us to indirectly confirm the usefulness of the labor relations evaluation index that we developed. By comparing nations that had large calculated

changes in their labor relations indexes with qualitative knowledge about what occurred in those same nations in different time periods, it is possible to indirectly confirm (or deny) the usefulness of the proposed indexes.

Third, by uncovering the changes in the labor relations of various countries, we have the basis for recommendations as to the direction which the labor relations of each country should take in the future. The general objective of the labor relations evaluation standards used in this research is the "simultaneous pursuit of both efficiency and equity." This forms the basis for conclusions about what most needs to be improved. For instance, if a given nation originally had high efficiency and low equity, and then between 1993 and 2005 improved efficiency but had decreasing equity, then one might conclude that this country should focus on equity in the future, in order to attain greater balance.

An ideal time series analysis would be based on data covering all the evaluation standards for all years for all countries. Unfortunately for many of the labor relations indexes, data is available for only select years. Therefore, in this research we have adopted the following strategy. First, in order to observe the changes in each country's labor relations level since the 1990s, we have selected the years 1993, 1999, and 2005 as our basic points in time. We wanted to have a minimum of three years to be sure that we were observing a true trend, and to observe separately trends in our two dimensions (equity and efficiency). When the data needed does not exist in for these specific years (1993, 1999, and 2005) we use the data existing in a time period close to the standards years: t_1 (1990-1996), t_2 (1997-2001), t_3 (2002-2006)].

Data

In this research we have utilized 12 efficiency indicators, and 19 equity indicators in order to compute the indexes for efficiency and equity. Much of the data came from official data sources such as the ILO and the OECD, as seen in Table 2. Most variables are composed of multiple measures. For example, the variable, freedom of dismissal, was constructed from 3 measures indicating the difficulty of dismissal, the notice and severance pay required for non-fault individual dismissals, and the degree of regular procedural inconveniences. In order to compute indexes through these diverse measures, a process of standardizing the individual indexes was necessary. We have used standardization methods that adjust the averages and standard deviations so that comparison is possible. That is to say, we have utilized the formula [standardization number = (original number – average) / standard deviation], and converted the original numbers into standardized numbers with the average of 0 and a standard deviation of 1, and therefore regularized the distribution traits (See Table 3). The indexes for each nation are broken into sub-periods, using 1993 (t_1), 1999 (t_2), and 2005 (t_3) as anchors. This allows us to discern changes over time.

As shown in Table 3, factor analyses produced 6 factors that correspond to the 6 subsets of indicators of the present study (i.e., efficiency-input, equity-input, efficiency-process, equity-process, efficiency-output, equity-output).

STUDY RESULTS

We will explain the results of the time series analysis as follows. First, we will rank each country in terms of efficiency and equity. Second, we will combine efficiency and equity for a total ranking. Finally, we will classify the labor relations of OECD countries into three types, based on a labor relations chart that shows the positions of efficiency and equity in relation to one another.

Table 2 Data Sources

Subsets	Variables	Measures	Sources ^a
Efficiency-Input	Freedom of dismissal	Difficulty of dismissal [*]	http://stats.oecd.org/wbos/ Strickness of EPL(Employment Protection Legislation) Traxler et al.(2001) http://www.ksdc.re.kr/databank/ (OECD in Figures) ILO SES DB (D1) OECD Employment outlook 2004
		Notice and severance pay for no-fault individual dismissals [*]	
		Regular procedural inconveniences [*]	
		Fixed-term contracts [*]	
		Temporary work agencies [*]	
		Centralization of peak union	
Equity-Input	Union decentralization	Union density	ILOLEX(http://www.ilo.org/iloex/) http://stats.oecd.org/wbos/ OECD Employment outlook 2004 ILO SES DB OECD Employment outlook 2004
		Ratification status of ILO fundamental conventions	
		Expenditure on ALMP(Active labour market policies)	
		Public social expenditure	
		Centralization of wage setting institution	
		Coordination of wage setting institution	
Efficiency-Process	Labor relations	Duration of maternity leave(weeks)	ILO SES DB OECD Employment outlook 2004
		Law or regulation guaranteeing employed women maternity leave	
		Maternity leave Index	
Equity-Process	Labor-employer relations	Maternity benefit(% of average wages)	IMD (IMD executive opinion survey) WEL (WEL Executive Opinion Survey) http://stats.oecd.org/ OECD Employment outlook 2004 ILO SES DB(F9a) Botero et al.(2004) Kucera(2004)
		Hostile ↔ productive	
		Confrontational ↔ cooperative	
Efficiency-Output	Unit labor cost [*]	Collective bargaining coverage	OECD Productivity Database, September 2006 http://laborsta.ilo.org ILO SES DB OECD Productivity Database 2006 World Income Inequality Database V 2.0b May 2007 http://stats.oecd.org/ World Development Indicators The Bank of Korea (http://www.bok.or.kr/) OECD, Population and Labour Force Statistics
		National Tripartite Board or Council for labour policies	
		Worker participation in management	
Equity-Output	Trade union right index	Labor Productivity	OECD, Population and Labour Force Statistics
		Economic growth rates	
		Strikes and lockouts [*]	
		Workers involved [*]	
		Injuries:Deaths [*]	
		Average hours worked per person [*]	
Equity-Output	Minimum relative to median wages of full-time workers	GDP per Hour worked	OECD Employment outlook 2006
		GDP at constant prices	
		Gini coefficient [*]	
		Ratio of estimated female to male earned income	
		Income distribution	
		Employment rates	
Equity-Output	Ratio of estimated female to male earned income	Ratio of compensation of employees to NI	OECD Employment outlook 2006
		Compensation of employees	
		Unemployment Replacement Rates	
Equity-Output	Unemployment insurance benefit duration	Initial net replacement rate	OECD Employment outlook 2006
		Average of net replacement rates over 60 months of unemployment	
		Unemployment Replacement Rates	

^{*} Item was reverse-coded. ^a References are available from the authors.

Table 3 Results of Factor Analyses

Input	Variables	Factor1	Factor2
Efficiency-Input	Freedom of dismissal	-.282	.697
	Freedom of employing temporary workers	-.131	.775
	Union decentralization	-.388	.423
	Expenditure on Education	-.006	.521
	Literacy rate	.299	.709
Equity - Input	Union density	.674	.146
	Ratification status of ILO fundamental conventions	.729	-.353
	Expenditure on ALMP	.828	.067
	Public social Expenditure	.770	.253
	Centralization of wage setting Institution	.727	-.345
	Coordination of wage setting Institution	.747	-.242
	Maternity leave Index	.523	-.265
Eigen value		4.27	2.20
Proportion of variance accounted for		35.54	18.32
Process	Variables	Factor1	Factor2
Efficiency-Process	Labor relations	.042	.967
	Labor-employer relations	-.062	.939
	Unit labor cost*	-.492	.430
Equity - Process	Collective bargaining coverage	.860	.029
	National Tripartite Board or Council for labour policies	.519	-.139
	Worker participation in management	.766	-.135
	Trade union right index	.743	.282
Eigen value		2.48	2.04
Proportion of variance accounted for		35.40	29.11
Output	Variables	Factor1	Factor2
Efficiency-Output	Labor Productivity	-.516	.418
	Economic growth rates	-.376	.583
	Strikes and lockouts*	.074	.913
	Workers involved*	.125	.936
	Injuries:Deaths*	.603	.002
	Average Hours Worked per person*	.809	-.242
Equity - Output	Gini coefficient*	.530	-.023
	Minimum relative to median wages of full-time workers	.460	-.339
	Ratio of estimated female to male earned income	.682	-.085
	Income distribution	.786	-.050
	Employment rates	.740	.133
	Unemployment Replacement Rates	.686	-.086
Eigen value		4.29	2.19
Proportion of variance accounted for		35.71	18.24

* Item was reverse-coded.

** Bold type indicates that the associated item loads at .40 or greater on a single factor.

Table 4 Rankings of IR Systems of OECD Nations 1993-2005

Country	Efficiency Ranking			Equity Ranking			Final Ranking			Changes by Time		
	t1	t2	t3	t1	t2	t3	t1	t2	β	t1→t2	t2→t3	t1→t3
AUSTRALIA	16	23	21	20	19	19	20	22	21	-2	1	-1
AUSTRIA	15	15	15	8	8	9	10	10	10	0	0	0
BELGIUM	22	24	24	13	15	13	18	19	19	-1	0	-1
CANADA	6	7	12	16	18	17	9	12	14	-3	-2	-5
CZECH	18	20	10	17	23	22	19	23	17	-4	6	2
DENMARK	9	8	5	4	2	1	4	3	2	1	1	2
FINLAND	8	11	8	3	5	5	3	7	6	-4	1	-3
FRANCE	24	29	30	15	21	20	21	27	28	-6	-1	-7
GERMANY	19	22	23	9	12	12	15	17	18	-2	-1	-3
GREECE	30	26	25	27	26	25	30	28	26	2	2	4
HUNGARY	26	17	16	28	20	23	29	18	20	11	-2	9
ICELAND	17	4	1	7	7	4	11	5	1	6	4	10
IRELAND	7	1	3	14	9	8	7	4	5	3	-1	2
ITALY	29	28	29	22	24	27	26	29	30	-3	-1	-4
JAPAN	4	16	6	11	13	11	5	14	8	-9	6	-3
KOREA	12	9	17	30	30	30	22	21	24	1	-3	-2
LUXEMBOURG	14	14	20	10	10	10	12	11	15	1	-4	-3
MEXICO	20	19	22	26	29	28	24	24	27	0	-3	-3
NETHERLANDS	11	10	18	6	6	7	6	8	11	-2	-3	-5
NEW ZEALAND	5	3	13	24	16	18	16	9	16	7	-7	0
NORWAY	3	6	9	1	1	2	2	2	4	0	-2	-2
POLAND	25	21	19	21	28	26	23	25	23	-2	2	0
PORTUGAL	28	25	28	18	14	16	25	20	22	5	-2	3
SLOVAK	10	18	7	12	11	14	8	13	9	-5	4	-1
SPAIN	27	27	27	25	22	21	28	26	25	2	1	3
SWEDEN	21	12	14	5	3	3	14	6	7	8	-1	7
SWITZERLAND	1	2	4	2	4	6	1	1	3	0	-2	-2
TURKEY	23	30	26	29	27	29	27	30	29	-3	1	-2
UK	13	13	11	19	17	15	17	15	13	2	2	4
US	2	5	2	23	25	24	13	16	12	-3	4	1

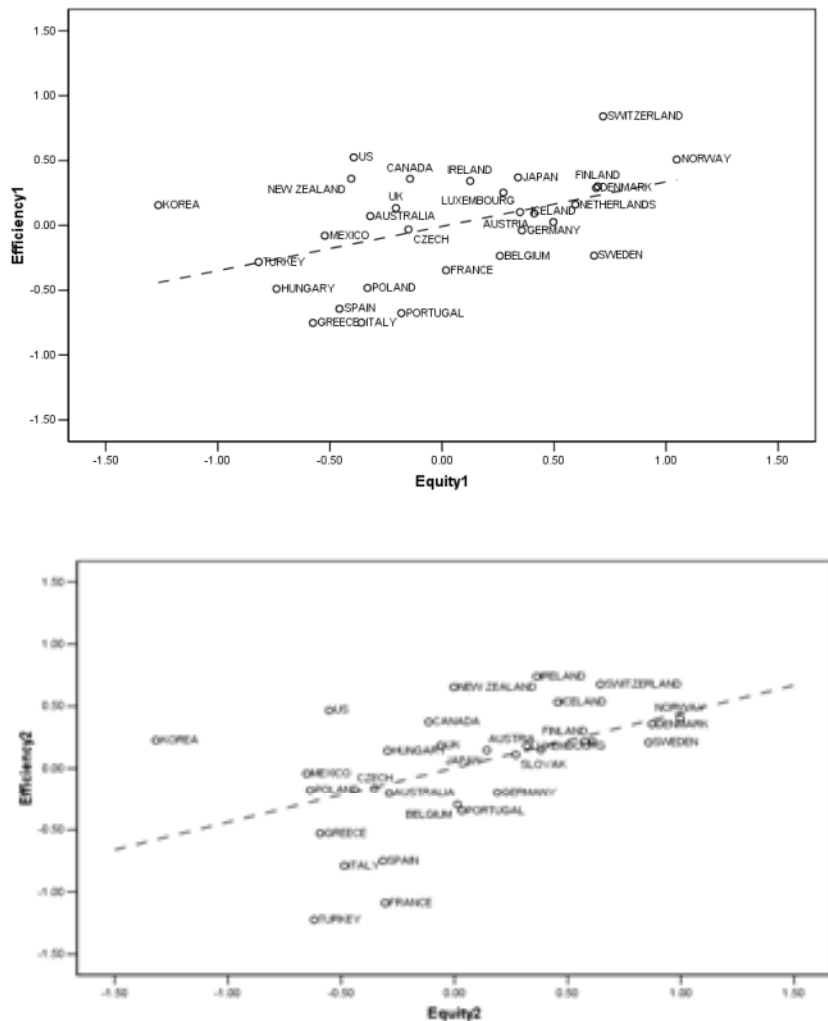
The rankings of OECD nations

Table 4 shows the ranking of industrial relations, in terms of efficiency and equity for the OECD countries (for details of findings, see Appendix 1). In terms of efficiency, the U.S.A., Ireland, and Switzerland are among the highest ranked, while France, Italy, and Portugal rank towards the bottom. Regarding equity, the Nordic countries such as Denmark, Sweden, Norway, and Finland rank highly, while Korea, Mexico, and Turkey were ranked towards the bottom.

Table 4 also shows the final rankings for each time period, as well as the changes that took place. For computing the final rankings we evaluated the average score for efficiency and equity. Denmark, Norway, and Sweden ranked among the top performers in the combined analysis. Iceland ranked 11th during t_1 , however rose to 5th in t_2 , and 1th in t_3 , showing a growth of 10 levels. This sharp climb is mainly due to the great improvement in labor market efficiency during this time. Turkey, Mexico, Greece, and Italy continued to rank very poorly, due to their low equity and efficiency indexes.

Changes in the Graphic Illustrations of Industrial Relations

Figure 1 Graphic Illustrations of IR Systems of OECD Nations 1993-2005



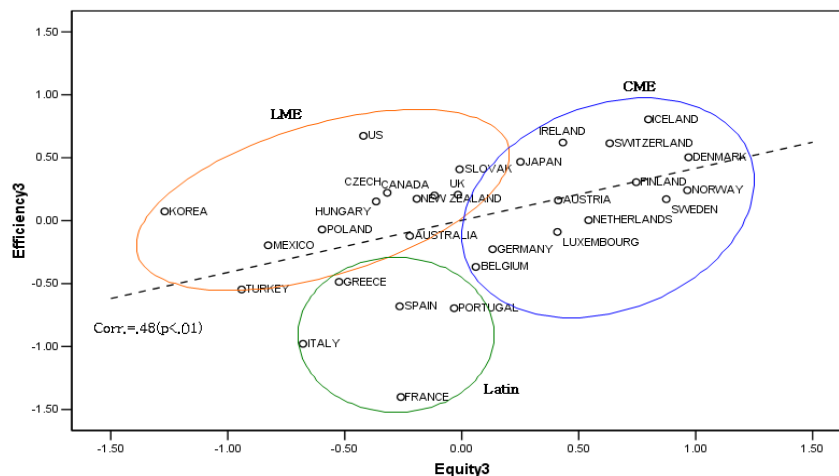


Figure 1 is a graphic illustration of labor relations, which utilized efficiency and equity along the two axes. A few patterns are evident. First, while the positions of each country change slightly over time, they typically remain in the same section. Even though we consider a relatively long period of time, from the early 1990s to the mid 2000s, the fundamental nature of labor relations in each nation evinces considerable stability in a comparative sense as (1) high on both equity and efficiency (Group 1), or (2) high on efficiency but low on equity (Group 2), or (3) moderate on equity and low on efficiency (Group 3).

Second, the few countries that ranked the highest, including 1st place Denmark, ranked highly on both efficiency and equity, while the lowest countries, Turkey, Italy, and Mexico, ranked poorly on both. Indeed, there is a positive correlation between efficiency and equity (coefficient of correlation = .48, significant at the .01 level) in this time period. This itself is an important finding in that it tends to disprove the common idea that greater efficiency always requires sacrificing equity.

CONCLUSION AND DISCUSSION

A key aspect of our analysis should be recognized. Our final indexes of equity and efficiency reflect the relative position of OECD countries. Hence, if there are common patterns or trends in all nations simultaneously those changes will not register in the indexes. For instance, if economic crisis produces rising unemployment (for example) in all OECD countries simultaneously, then a change in one particular country that is average in international terms but large in absolute terms will show up as “no change” in our index. In short, a substantial change could seem relatively small in comparison to other matters changing in that same nation that did not affect other OECD countries. In short, our research is not designed for the comparison of the magnitude of the change of various parts of the indexes in one particular nation. Rather it is designed for comparative international purposes in a period reasonably characterized as one of increasing globalization and a political trend toward labor market deregulation in many nations (neo-liberalism).

Iceland, the nation that made great strides in labor market efficiency in this period, also followed a “neo-liberal path” with regard to its financial markets, and as a result of inadequate regulation of those markets, has suffered serious economic setbacks in the current worldwide economic downturn. This highlights the fact that there may be a third dimension of concern to policy-makers that we do not consider in our

analysis: stability. Economic stability could reasonably be considered to be a third goal, along with equity and efficiency. A more thorough investigation of how labor market characteristics affect economic stability must be left to future research.

During the 15 years observed in this time series analysis, most countries do not stray far from one of the three sections in the graphic illustration of labor relations. Does that indicate that the characteristics of the labor relations of a specific country do not change, even when a long period of time has passed? It is possible to explain this phenomenon by the theory of path dependence, mentioned in historic institutionalism theory by Thelen (1999). Path dependence suggests that historic conditions restrict the choice of decisions in the future, and that labor relations maintain a steady pattern according to their origins, and cannot easily change.

As scholars in the area of political economy point out, capitalism does not have a single pattern in the globalized economic world – there are at present “varieties of capitalism.” Hall & Soskice (2001) divide capitalism into two major patterns, the Liberal Market Economy (LME), and the Coordinated Market Economy (CME), and argue that each pattern has characteristic performance.

The present study tells a somewhat different story. The 30 OECD countries were divided into three groups: (1) high on both equity and efficiency (Group 1), or (2) high on efficiency but low on equity (Group 2), and (3) moderate on equity and low on efficiency (Group 3). Group 1 countries (i.e., Switzerland, Netherlands, Germany, Denmark, Japan) are close to the CMEs while Group 2 countries are mostly LMEs (i.e., the U.S., Canada, the U.K., Korea). However, we find there also is a third cluster, Group 3, that are mostly Latin countries (i.e., Greece, Italy, France, Spain, and Portugal); this group has been relatively unrecognized and unstudied. We also note that Group 1 countries perform better than Group 2 countries in the final ranking due to their high performance on both efficiency and equity.

The positive correlation between efficiency and equity (coefficient of correlation = .48, significant at the .01 level) suggests that efficiency and equity are not entirely contradictory goals, and it is a realistic ideal to develop both efficiency and equity. The positive correlations in this time period also add credence to the pluralistic perspective of industrial relations that recognizes the existence of multiple goals held by a variety of social groups and emphasizes the simultaneous accomplishment of them (Fox, 1974; Barbash, 1984).

The policy implications are of great importance. Government policies that pursue a balanced accomplishment of both efficiency and equity should be high priority and our measures suggest some specific areas for policy initiatives. For instance, in the case of Korea, as Korea ranks highly in efficiency but poorly in equity, it is urgent that the formation and execution of a policy that improves equity takes place. This need not make Korea less competitive in an international sense. As seen in Figure 1, the simultaneous pursuit of both efficiency and equity is not impossible. We need to recognize that Group 1 countries (similar to CME) are achieving balanced growth by pursuing both efficiency and equity.

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<Appendix 1> Efficiency Indexes and the Rankings. (The number inside the parenthesis represents the ranking for the country)

	Efficiency-Input			Efficiency-Process			Efficiency-Output			Efficiency Index		
	t1	t2	t3	t1	t2	t3	t1	t2	t3	t1	t2	t3
AUSTRALIA	0.338 (10)	0.168 (13)	0.271 (9)	-0.425 (21)	-0.321 (20)	-0.093 (18)	0.302 (7)	-0.451 (25)	-0.543 (26)	0.072 (16)	-0.201 (23)	-0.122 (21)
AUSTRIA	-0.419 (24)	-0.320 (22)	-0.380 (23)	0.698 (5)	0.560 (9)	0.788 (7)	0.000 (15)	0.217 (10)	0.076 (14)	0.093 (15)	0.153 (15)	0.161 (15)
BELGIUM	-0.245 (20)	-0.105 (16)	0.114 (15)	-0.187 (18)	-0.922 (25)	-0.991 (26)	-0.274 (23)	0.139 (18)	-0.225 (22)	-0.235 (22)	-0.296 (24)	-0.367 (24)
CANADA	0.933 (2)	0.754 (4)	0.727 (4)	0.007 (16)	0.213 (14)	0.384 (12)	0.137 (12)	0.157 (17)	-0.511 (25)	0.359 (6)	0.375 (7)	0.200 (12)
CZECH	-0.264 (21)	-0.331 (24)	-0.396 (24)	0.197 (14)	-0.327 (21)	-0.174 (19)	-0.028 (16)	0.172 (15)	1.235 (2)	-0.031 (18)	-0.162 (20)	0.222 (10)
DENMARK	0.740 (3)	0.906 (3)	0.850 (3)	0.217 (13)	0.666 (8)	0.931 (5)	-0.093 (19)	-0.499 (26)	-0.270 (24)	0.288 (9)	0.357 (8)	0.503 (5)
FINLAND	0.445 (8)	0.250 (10)	0.261 (10)	0.283 (10)	0.291 (13)	0.694 (8)	0.174 (10)	0.113 (19)	-0.038 (17)	0.300 (8)	0.218 (11)	0.306 (8)
FRANCE	0.057 (13)	-0.123 (17)	-0.271 (20)	-0.542 (23)	-1.700 (30)	-1.479 (29)	-0.555 (26)	-1.441 (30)	-2.454 (30)	-0.347 (24)	-1.088 (29)	-1.401 (30)
GERMANY	0.125 (11)	0.130 (14)	0.080 (16)	0.053 (15)	-0.405 (23)	-0.555 (21)	-0.295 (24)	-0.315 (23)	-0.205 (21)	-0.039 (19)	-0.197 (22)	-0.226 (23)
GREECE	-0.595 (27)	-0.742 (27)	-0.766 (27)	-0.987 (29)	-1.142 (28)	-0.992 (27)	-0.674 (29)	0.299 (8)	0.299 (10)	-0.752 (30)	-0.528 (26)	-0.486 (25)
HUNGARY	0.098 (12)	0.230 (12)	0.157 (13)	-1.653 (30)	0.015 (16)	-0.434 (20)	0.090 (14)	0.184 (13)	0.735 (4)	-0.489 (26)	0.143 (17)	0.152 (16)
ICELAND	-0.321 (22)	1.441 (1)	1.062 (2)	0.248 (11)	-0.009 (17)	0.899 (6)	0.149 (11)	0.172 (14)	0.454 (8)	0.025 (17)	0.535 (4)	0.805 (1)
IRELAND	0.437 (9)	0.287 (9)	0.188 (11)	0.388 (9)	0.886 (4)	1.107 (4)	0.202 (9)	1.048 (2)	0.568 (6)	0.342 (7)	0.740 (1)	0.621 (3)
ITALY	-0.216 (18)	-0.074 (15)	0.159 (12)	-0.452 (22)	-1.083 (27)	-1.585 (30)	-1.580 (30)	-1.210 (27)	-1.509 (29)	-0.749 (29)	-0.789 (28)	-0.978 (29)
JAPAN	-0.106 (15)	-0.187 (19)	-0.177 (18)	1.401 (2)	0.967 (3)	1.355 (1)	-0.184 (21)	-0.337 (24)	0.224 (11)	0.371 (4)	0.148 (16)	0.467 (6)
KOREA	0.468 (7)	0.594 (7)	0.722 (5)	-0.797 (27)	-1.061 (26)	-0.957 (25)	0.797 (2)	1.148 (1)	0.456 (7)	0.156 (12)	0.227 (9)	0.073 (17)
LUXEMBOURG	-0.679 (28)	-0.696 (26)	-0.642 (26)	0.521 (8)	0.446 (11)	0.179 (15)	0.465 (4)	0.798 (3)	0.194 (12)	0.102 (14)	0.183 (14)	-0.090 (20)
MEXICO	-0.582 (26)	-0.981 (29)	-0.803 (28)	0.558 (7)	0.689 (7)	0.209 (14)	-0.216 (22)	0.171 (16)	0.007 (15)	-0.080 (20)	-0.041 (19)	-0.196 (22)
NETHERLANDS	-0.211 (17)	-0.255 (20)	-0.235 (19)	0.753 (4)	0.700 (6)	0.429 (11)	-0.061 (17)	0.216 (11)	-0.183 (20)	0.160 (11)	0.220 (10)	0.004 (18)
NEW ZEALAND	0.728 (4)	0.706 (5)	0.433 (8)	-0.362 (19)	0.801 (5)	0.336 (13)	0.714 (3)	0.457 (5)	-0.249 (23)	0.360 (5)	0.655 (3)	0.174 (13)
NORWAY	-0.113 (16)	-0.162 (18)	-0.313 (21)	1.290 (3)	1.301 (2)	1.153 (3)	0.347 (6)	0.081 (20)	-0.116 (19)	0.508 (3)	0.407 (6)	0.242 (9)
POLAND	0.016 (14)	0.243 (11)	0.122 (14)	-0.796 (26)	-1.274 (29)	-1.003 (28)	-0.667 (28)	0.496 (4)	0.670 (5)	-0.482 (25)	-0.178 (21)	-0.070 (19)
PORTUGAL	-1.003 (29)	-0.947 (28)	-0.866 (29)	-0.613 (25)	-0.290 (19)	-0.610 (22)	-0.415 (25)	0.202 (12)	-0.611 (27)	-0.677 (28)	-0.345 (25)	-0.695 (28)
SLOVAK	-0.235 (19)	-0.368 (25)	-0.042 (17)	0.612 (6)	0.371 (12)	0.132 (16)	0.383 (5)	0.330 (7)	1.134 (3)	0.253 (10)	0.111 (18)	0.408 (7)
SPAIN	-0.367 (23)	-0.323 (23)	-0.491 (25)	-0.929 (28)	-0.661 (24)	-0.705 (23)	-0.634 (27)	-1.265 (28)	-0.845 (28)	-0.643 (27)	-0.749 (27)	-0.680 (27)
SWEDEN	-0.475 (25)	-0.258 (21)	-0.348 (22)	-0.163 (17)	0.557 (10)	0.527 (9)	-0.063 (17)	0.331 (6)	0.333 (9)	-0.233 (21)	0.210 (12)	0.171 (14)
SWITZERLAND	0.657 (5)	0.608 (6)	0.569 (7)	1.983 (1)	1.533 (1)	1.271 (2)	-0.116 (20)	-0.108 (22)	0.004 (16)	0.841 (1)	0.678 (2)	0.615 (4)
TURKEY	-2.015 (30)	-1.938 (30)	-1.976 (30)	-0.590 (24)	-0.400 (22)	-0.948 (24)	1.759 (1)	-1.331 (29)	1.283 (1)	-0.282 (23)	-1.223 (30)	-0.547 (26)
UK	0.591 (6)	0.581 (8)	0.642 (6)	-0.413 (20)	0.038 (15)	0.067 (17)	0.222 (8)	-0.066 (21)	-0.090 (18)	0.133 (13)	0.184 (13)	0.206 (11)
US	1.215 (1)	1.174 (2)	1.374 (1)	0.247 (12)	-0.065 (18)	0.471 (10)	0.112 (13)	0.296 (9)	0.176 (13)	0.525 (2)	0.468 (5)	0.674 (2)

<Appendix 2> Equity Index and the Rankings (The number inside the parenthesis represents the ranking for the country)

	Equity-Input			Equity-Pro cess			Equity-Output			Equity Index		
	t1	t2	β	t1	t2	t3	t1	t2	t3	t1	t2	t3
AUSTRALIA	-0.558 (24)	-0.634 (25)	-0.771 (25)	-0.026 (17)	-0.041 (17)	-0.041 (17)	0.023 (19)	0.091 (17)	0.198 (13)	-0.320 (20)	-0.288 (19)	-0.222 (19)
AUSTRIA	0.418 (9)	0.349 (11)	0.463 (9)	0.874 (3)	0.837 (4)	0.837 (4)	0.119 (16)	0.237 (12)	-0.014 (17)	0.412 (8)	0.382 (8)	0.413 (9)
BELGIUM	0.680 (5)	0.758 (5)	0.774 (5)	0.495 (9)	0.466 (13)	0.466 (13)	0.283 (11)	0.205 (15)	0.397 (11)	0.258 (13)	0.013 (15)	0.060 (13)
CANADA	-0.653 (25)	-0.753 (26)	-0.790 (26)	-0.305 (20)	-0.312 (20)	-0.312 (20)	0.218 (13)	0.198 (16)	0.057 (15)	-0.143 (16)	-0.114 (18)	-0.116 (17)
CZECH	-0.398 (21)	-0.462 (23)	-0.471 (23)	-0.383 (22)	-0.318 (22)	-0.318 (22)	-0.248 (22)	-0.271 (22)	-0.310 (22)	-0.150 (17)	-0.353 (23)	-0.318 (22)
DENMARK	1.000 (3)	1.031 (3)	1.033 (2)	0.403 (13)	0.489 (12)	0.489 (12)	0.848 (3)	0.920 (1)	0.944 (2)	0.688 (4)	0.872 (2)	0.969 (1)
FINLAND	1.121 (2)	1.038 (2)	1.030 (3)	0.550 (8)	0.520 (9)	0.520 (9)	0.679 (5)	0.502 (8)	0.513 (9)	0.694 (3)	0.610 (5)	0.746 (5)
FRANCE	0.138 (13)	0.184 (13)	0.127 (15)	0.915 (1)	0.885 (3)	0.885 (3)	0.459 (7)	0.597 (5)	0.571 (8)	0.018 (15)	-0.306 (21)	-0.260 (20)
GERMANY	0.574 (6)	0.571 (6)	0.523 (7)	0.658 (6)	0.538 (8)	0.538 (8)	0.443 (8)	0.403 (10)	0.428 (10)	0.357 (9)	0.190 (12)	0.132 (12)
GREECE	0.004 (17)	0.087 (16)	0.030 (16)	0.247 (15)	0.247 (15)	0.247 (15)	-0.745 (27)	-0.724 (26)	-0.611 (26)	-0.576 (27)	-0.593 (26)	-0.524 (25)
HUNGARY	-0.166 (18)	-0.346 (19)	-0.340 (20)	-0.386 (23)	-0.329 (23)	-0.329 (23)	-0.395 (23)	-0.554 (25)	-0.324 (23)	-0.738 (28)	-0.295 (20)	-0.366 (23)
ICELAND	0.452 (8)	0.555 (7)	0.638 (6)	0.490 (10)	0.490 (11)	0.490 (11)	0.792 (4)	0.821 (2)	0.856 (4)	0.497 (7)	0.455 (7)	0.797 (4)
IRELAND	0.408 (10)	0.441 (8)	0.314 (11)	0.100 (16)	0.100 (16)	0.100 (16)	-0.418 (24)	-0.237 (21)	-0.124 (18)	0.126 (14)	0.363 (9)	0.432 (8)
ITALY	0.092 (14)	0.367 (10)	0.252 (12)	0.667 (5)	0.652 (6)	0.652 (6)	-0.718 (26)	-0.743 (27)	-0.702 (27)	-0.359 (22)	-0.486 (24)	-0.679 (27)
JAPAN	-0.538 (23)	-0.540 (24)	-0.458 (22)	-0.761 (24)	-0.733 (24)	-0.733 (24)	0.156 (15)	0.002 (19)	-0.145 (20)	0.340 (11)	0.143 (13)	0.251 (11)
KOREA	-1.392 (29)	-1.211 (29)	-1.311 (29)	-0.960 (27)	-0.975 (26)	-0.975 (26)	-1.609 (30)	-1.682 (30)	-1.541 (29)	-1.266 (30)	-1.318 (30)	-1.270 (30)
LUXEMBOURG	0.178 (12)	-0.048 (17)	0.162 (13)	0.355 (14)	0.373 (14)	0.373 (14)	0.346 (10)	0.560 (7)	0.885 (3)	0.348 (10)	0.319 (10)	0.409 (10)
MEXICO	-0.708 (26)	-0.975 (27)	-1.038 (28)	-1.087 (29)	-1.087 (28)	-1.087 (28)	-1.418 (29)	-1.671 (29)	-1.654 (30)	-0.523 (26)	-0.652 (29)	-0.828 (28)
NETHERLANDS	0.495 (7)	0.431 (9)	0.486 (8)	0.636 (7)	0.722 (5)	0.722 (5)	0.538 (6)	0.597 (6)	0.711 (6)	0.595 (6)	0.576 (6)	0.542 (7)
NEW ZEALAND	-0.815 (28)	-1.013 (28)	-1.017 (27)	-0.835 (26)	-1.125 (29)	-1.125 (29)	-0.038 (20)	0.205 (14)	0.104 (14)	-0.405 (24)	-0.002 (16)	-0.192 (18)
NORWAY	0.938 (4)	0.901 (4)	0.949 (4)	0.895 (2)	0.894 (2)	0.894 (2)	0.916 (2)	0.788 (3)	0.791 (5)	1.048 (1)	0.997 (1)	0.964 (2)
POLAND	-0.238 (20)	-0.364 (20)	-0.351 (21)	-0.121 (19)	-0.078 (18)	-0.078 (18)	0.037 (17)	-0.275 (23)	-0.437 (25)	-0.332 (21)	-0.637 (28)	-0.597 (26)
PORTUGAL	0.218 (11)	0.315 (12)	0.458 (10)	0.839 (4)	0.925 (1)	0.925 (1)	-0.148 (21)	0.073 (18)	0.054 (16)	-0.181 (18)	0.033 (14)	-0.032 (16)
SLOVAK	0.005 (16)	0.147 (14)	-0.025 (18)	-1.045 (28)	-1.017 (27)	-1.017 (27)	0.204 (14)	0.295 (11)	-0.135 (19)	0.274 (12)	0.271 (11)	-0.009 (14)
SPAIN	0.089 (15)	0.127 (15)	0.135 (14)	0.455 (11)	0.541 (7)	0.541 (7)	-0.533 (25)	-0.414 (24)	-0.226 (21)	-0.458 (25)	-0.316 (22)	-0.265 (21)
SW EDEN	1.277 (1)	1.239 (1)	1.136 (1)	0.448 (12)	0.520 (9)	0.520 (9)	0.923 (1)	0.776 (4)	0.960 (1)	0.679 (5)	0.857 (3)	0.874 (3)
SWITZERLAND	-0.230 (19)	-0.076 (18)	0.007 (17)	-0.075 (18)	-0.134 (19)	-0.134 (19)	0.405 (9)	0.477 (9)	0.620 (7)	0.719 (2)	0.645 (4)	0.633 (6)
TURKEY	-0.809 (27)	-0.457 (22)	-0.486 (24)	-0.312 (21)	-0.312 (21)	-0.312 (21)	-1.055 (28)	-1.000 (28)	-1.389 (28)	-0.818 (29)	-0.619 (27)	-0.941 (29)
UK	-0.471 (22)	-0.449 (21)	-0.319 (19)	-0.830 (25)	-0.874 (25)	-0.874 (25)	0.269 (12)	0.227 (13)	0.203 (12)	-0.205 (19)	-0.061 (17)	-0.016 (15)
US	-1.461 (30)	-1.450 (30)	-1.378 (30)	-1.787 (30)	-1.748 (30)	-1.748 (30)	0.033 (18)	-0.142 (20)	-0.354 (24)	-0.394 (23)	-0.552 (25)	-0.420 (24)