

The Impact of Public Education and Social Security Expenditure on Economic Inequality: A Legal Origins and Welfare Regime Theory Perspective

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Abstract

This paper analyzes the impact of public education and social security expenditures on economic inequality depending on the origins of a particular state's legal system using data from 36 countries. We examine the different marginal effects of public education and social security expenditures on economic inequality. We based our inquiry on the theoretically-informed hypothesis that as origins of a country's legal system influence the formation of the welfare state, differences in legal origins lead to varying institutions among states. The results of our study suggest that directing public social investment into public education expenditure reduces economic inequality in states with English legal origins. Our findings also recommend that states with French legal origins expand both their public education and social security expenditures in order to address economic inequality. Furthermore, increasing social security expenditures might reduce economic inequality in states with German and Scandinavian legal origins.

Key words : Public education expenditure, Social security expenditure, Economic inequality, Legal origins, Welfare state

JEL Classifications : E61, H52, H60, K15

1 . Introduction

This study examines whether different legal origins among countries have different impacts on economic inequality due to public education and social security expenditure factors.¹⁾ The overall hypothesis is that if countries' legal origins vary, then the effective legal environments in those countries will correspondingly vary, leading to variations in the outcomes of social policies. According to Means (1980), the legal system is a "cognitive institution" as formal institutions, like the legal environment, interact dynamically with endogenous institutions such as customs and informal systems.²⁾ In this study, we will statistically verify the results using international data published by the Organization for Economic Co-operation and Development (OECD) as well as from other sources. We categorize legal systems into four types of legal origin: English, French, German, and Scandinavian.

The public education and social security expenditures in each country are important variables in the perception of public social investment. The impact of these variables on economic inequality is a vital issue in the public social investment literature. For instance, according to Alvaredo et al. (2018), the national wealth of countries (total private and public property within a country) tends to increase over time. However, they showed that while private wealth is generally increasing, public wealth is decreasing. In particular, the ratio of net public and net private wealth to national income is negative in the United States and the United Kingdom, and slightly positive in Japan, Germany, and France. Therefore, Alvaredo et al. (2018) pointed out that the ability of national governments to decrease economic inequality through regulation of the economy and income redistribution has been reduced. In a review of the discussion in Alvaredo et al.

(2018), we noticed that the findings for Anglo-Saxon countries such as the United States and the United Kingdom differ from those for countries that adopted Continental European law, such as France, Germany, and Japan.

Esping-Andersen (1990, 1999) describes these differences in public social investment by categorizing welfare states into three types: social democratic, conservative, and liberal regimes. These three categories were created based on a decommodification index that considers benefit levels and the generosity of eligibility requirements. The social democratic regime has the highest welfare level, followed by the conservative regime and finally the liberal regime. Meanwhile, Castles and Mitchell (1992), Lewis (1992), Siaroff (1994), Ferrera (1996), and Sainsbury (1996) suggest other types of classifications.³⁾ We use Esping-Andersen's framework

Table 1. Classification by welfare state type and legal origins

Esping-Andersen (1990)	La Porta et al. (1998)
Liberal regime Australia, Canada, Ireland, New Zealand, <u>Switzerland</u> , United Kingdom, United States	English legal origins Australia, Canada, Hong Kong, India, Ireland, Israel, Kenya, Malaysia, New Zealand, Nigeria, Pakistan, Singapore, South Africa, Sri Lanka, Thailand, United Kingdom, United States, Zimbabwe
Conservative regime Belgium, France, Italy, Netherlands, Austria, German, Japan	French legal origins Argentina, Belgium, Brazil, Chile, Colombia, Ecuador, Egypt, France, Greece, Indonesia, Italy, Jordan, Mexico, Netherlands, Peru, Philippines, Portugal, Spain, Turkey, Uruguay, Venezuela
	German legal origins Austria, German, Japan, South Korea, <u>Switzerland</u>
Social democratic regime Denmark, Finland, Norway, Sweden	Scandinavian origin Denmark, Finland, Norway, Sweden

Source: The categories presented in this table are based on Esping-Andersen (1990) and La Porta et al. (1998).

because of its pioneering implications for the study of the welfare state. However, the aforementioned research on diversity in social welfare does not focus on the sources of diversity in each country but merely categorizes the resulting status quo. Therefore, this paper will focus on legal origins as a possible source of diversity.

In this paper, we posit that legal origins have a certain influence on the formation of the welfare state. We compare Esping-Andersen's (1990, 1999) classification based on welfare regime theory with La Porta et al.'s (1998) classification based on legal origins (Table 1). The table below shows that the welfare regime and legal origins theories are similar, except for Switzerland which is classified as a liberal regime. Therefore, this study will focus on the similarities between Esping-Andersen's (1990) classification and the classification of the legal origins and subsequently proceed with the analysis.

Hall and Soskice (2001) classify countries as liberal market economies and coordinated market economies based on the coordination between their institutions and firm-level practices. Meanwhile, Amable (2003) classifies countries by focusing on five sectors: product market competition, wage and labor relations, financial sector, social security, and education. This classification scheme emphasizes institutional complementarity. According to Batifoulier (2001), customs (conventions) enhance social benefits under various social constraints and play a key role in economic coordination. In essence, he argues that high economic performance can be achieved by removing institutional discrepancies and increasing institutional complementarity according to each country's institutions, supporting the overall argument for the variety of capitalism theses. In this context, Batifoulier (2001) states that it is important to analyze how conventions lead to economic coordination. Finally, North (1990, 2005) contends that

the “informal constraints” of customary practices broadly compensate for the “formal constraints” of the legal system and can lower transaction costs.

This paper explores the institutional complementarity of national institutions by comparing states’ legal origins as the basis of their legal institutions. A distinctive feature of our paper is that we consider legal origins to be the fundamental reason for the classification in Esping-Andersen’s (1990) theory of welfare regimes. Concurrently, we suggest that public social investment in each country differs because legal origins affect national institutions. Therefore, we employ the aforementioned four types of legal origins as dummy variables in this paper. We then attempt to clarify the relationship through a regression model with economic inequality as the dependent variable and public education and social security expenditure as the independent variables. We also add into the model an intersection term between the dummy variables representing the legal origins and public education expenditure, and an intersection term between the dummy variables representing legal origins and social security expenditure. This approach allows us to estimate the marginal effects of public education and social security expenditures on economic inequality across states with different legal origins.

2. Public education, social security, and economic inequality

This section discusses economic inequality’s relationship with public education expenditure and social security expenditure. Heidenheimer (1981) examined social security and education expenditures in Western Europe and North America and identified differences in the development of welfare states. According to Heidenheimer (1981), the foundations of citizenship were laid with the enactment of national social security laws in both

Germany and the United States. However, he concluded that the bureaucratic tradition in Germany and the pluralistic tradition in the United States have each been effective in the development of education and social security in their respective countries.

Similarly, Hokenmaier (1998) presented an international comparison of economic inequality based on public education and social security expenditure. Hokenmaier (1998) found a trade-off between education and social security in public social investment. Furthermore, he suggested that the share of public social investment on education in 18 OECD countries differs when classified according to the welfare regime theory proposed by Esping-Andersen (1990), with each country differing in the share of public social investment on education. According to Hokenmaier (1998), the ratio of public education expenditure to public social investment is relatively large in countries with liberal regimes. Further, the proportion of public education expenditure is greater in countries with social democratic regimes and lower in countries with conservative regimes.

Korpi and Palme (1998) classified 18 developed countries according to whether they were “Encompassing” (Sweden, Norway, and Finland), “Corporatist” (France, Germany, Austria, Belgium, and Italy), “Basic security” (the United States, the United Kingdom, Ireland, Switzerland, Canada, and Denmark) or “Targeted” (Australia).⁴⁾ “Encompassing” countries are more effective at income redistribution because of their extensive social benefits and the scale of public social investment. Conversely, in “Basic security” and “Targeted” countries, which provide minimum social benefits to low-income earners, the scale of social security expenditure is small and income redistribution is less effective. Korpi and Palme (1998) suggest that economic inequality can be ameliorated by social security with a benefit slope, even in “Basic security” and “Targeted” countries.⁵⁾

Informed by these studies, this paper sets out to:

- [1] Statistically verify whether increases in public education and social security expenditure have the effect of reducing economic inequality in general. Those effects will test whether different results have been derived by each country based on legal origins.
- [2] Statistically ascertain whether, for each legal origin, there is a trade-off between public education expenditure and social security expenditure for economic inequality.

We can then compare methods [1] and [2] to elucidate which countries' policies are most effective in reducing economic inequality, despite differences in legal origins. This paper makes a significant contribution to the literature, as it focuses on the need for countries to adopt policies to tackle economic inequality that are tailored to their own legal origins.

3. Data and models

This section presents the study's data and regression model. Table 2 shows the countries covered in this paper and their respective legal ori-

Table 2. Legal origins and target countries

Legal Origins	Countries
<i>English</i>	Australia, Canada, Ireland, Israel, New Zealand, United Kingdom, United States
<i>French</i>	Belgium, Chile, France, Greece, Italy, Lithuania, Luxembourg, Mexico, Netherlands, Portugal, Spain, Turkey
<i>German</i>	Austria, Czech Republic, Estonia, Germany, Hungary, Japan, South Korea, Latvia, Poland, Slovak Republic, Slovenia, Switzerland
<i>Scandinavian</i>	Denmark, Finland, Iceland, Norway, Sweden

Note: *English*, *French*, *German*, and *Scandinavian* refer to legal origins. The target countries number 36 in all.

Table 3. Definition of variables and data sources

Variables	Definition	Source
<i>Gini</i>	Gini index (0 to 1)	OECD (2020a)
<i>Education</i>	ln (Government expenditure on education / GDP) (%) [Public education expenditure]	UNESCO (2020)
<i>Social security</i>	ln (Public social security expenditure / GDP) (%)	OECD (2020b)
<i>English</i>	English legal origin (Dummy variables) 1 if legal origin = English, otherwise 0	La Porta et al. (2008)
<i>French</i>	French legal origin (Dummy variables) 1 if legal origin = English, otherwise 0	La Porta et al. (2008)
<i>German</i>	German legal origin (Dummy variables) 1 if legal origin = English, otherwise 0	La Porta et al. (2008)
<i>Scandinavian</i>	Scandinavian legal origin (Dummy variables) 1 if legal origin = English, otherwise 0	La Porta et al. (2008)
<i>Inflation</i>	Average of consumer prices (%)	IMF (2020)
<i>Unemployment</i>	Unemployment rate (%)	IMF (2020)
<i>Labor productivity</i>	ln (Labor productivity: Output per worker) (USD in PPP)	ILO (2020)
<i>Industrial structure</i>	Manufacturing, value added / GDP (%)	World Bank (2020)

Note: The data are from 2004 to 2015. We used data from the previous year for missing values. If data from the previous year did not exist, data from the next year were used. Where both the previous year's and next year's data existed for missing values, we used the arithmetic mean of both. If no data existed for either the previous or next year, the data for the year are missing values. Therefore, the data used are unbalanced panel data.

gins. The target countries were OECD members, and data were available for 36 countries. The classification for the legal origins is based on La Porta et al. (2008). Table 3 shows the definitions of the variables and the sources of the data. Descriptive statistics for the variables are listed in Table 4.

We test whether each variable of economic inequality, public education expenditure, and social security expenditure is differentiated by its legal

Table 4. Descriptive statistics

	Mean	Median	S.D.	Min.	Max.	C.I. 95%	Obs.
<i>Gini</i>	0.317	0.312	0.056	0.227	0.511	0.005	419
<i>Education</i>	1.642	1.630	0.197	1.012	2.147	0.019	420
<i>Social security</i>	2.496	2.548	0.331	1.508	3.025	0.031	431
<i>English</i>	0.194	0.000	0.396	0.000	1.000	0.037	432
<i>French</i>	0.333	0.000	0.472	0.000	1.000	0.045	432
<i>German</i>	0.333	0.000	0.472	0.000	1.000	0.045	432
<i>Scandinavian</i>	0.139	0.000	0.346	0.000	1.000	0.033	432
<i>Inflation</i>	2.454	2.199	2.245	-1.684	15.253	0.212	432
<i>Unemployment</i>	7.861	7.124	4.128	2.292	27.475	0.390	432
<i>Labor productivity</i>	11.218	11.237	0.325	10.506	12.332	0.031	432
<i>Industrial structure</i>	14.626	14.192	4.788	3.953	34.566	0.453	432

Note: S.D. means standard deviation. 95% C.I. means 95% confidence interval. Obs. means number of observations. For missing values, data from the previous year were used. If data from the previous year did not exist, data from the next year were used. Where both the previous year's and next year's data existed for missing values, we used the arithmetic mean of both. If no data existed for either the previous or next year, the data for the year are missing values.

Table 5. T-test of mean difference for Gini index

	<i>Gini</i>			Obs.	
	Average	T-test			
<i>English vs French</i>	0.342	0.348	-0.824	84	139
<i>English vs German</i>	0.342	0.295	11.112***	84	136
<i>English vs Scandinavian</i>	0.342	0.259	22.612***	84	60
<i>French vs German</i>	0.348	0.295	8.166***	139	136
<i>French vs Scandinavian</i>	0.348	0.259	14.517***	139	60
<i>German vs Scandinavian</i>	0.295	0.259	9.679***	136	60

Note: T-tests are estimated by a test of difference that does not assume homogeneity of variance. The number of observations for each of the four types of samples is small because the sample is classified into four types. Therefore, we used Welch's estimation method, which does not assume homogeneity of variances, as it may not be possible to assume such homogeneity. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively. Obs. is the number of observations.

origins. Table 5 is the estimated result of a t-test to confirm if the difference in legal origins leads to a difference in the mean of the Gini index.⁶⁾

Table 5 shows that *Gini* is not significant between *English* and *French*, so

no difference exists.⁷⁾ To summarize Table 5, the average value of the Gini index was higher in countries with French and English legal origins, and these countries had greater degrees of economic inequality. Countries with German legal origins followed next, and countries with Scandinavian legal origins had the lowest degree of economic inequality.

In discussing Table 5, the following two relationships were analyzed further due to possible overlaps. The first relationship concerns the classification system of Esping-Andersen (1990), which detects whether economic inequality differs between countries depending on their legal origins because of the decommodification index. The second relationship is between economic inequality and the rule of law. Taken together, the classification system of Esping-Andersen (1990) and the one based on legal origins contain many similarities and may directly affect economic inequality. That is, we should consider the possibility that liberal competitive markets can create economic inequality. On the other hand, according to Silkenat, Hick-

Table 6. T-test of mean difference for public education expenditure

	<i>Education</i>				
	Average		T-test	Obs.	
<i>English vs French</i>	1.687	1.554	6.833***	84	133
<i>English vs German</i>	1.687	1.563	7.454***	84	143
<i>English vs Scandinavian</i>	1.687	1.958	-15.516***	84	60
<i>French vs German</i>	1.554	1.563	-0.473	133	143
<i>French vs Scandinavian</i>	1.554	1.958	-20.561***	133	60
<i>German vs Scandinavian</i>	1.563	1.958	-23.441***	143	60

Note: T-tests are estimated by a test of difference that does not assume homogeneity of variance. The number of observations for each of the four types of samples is small because the sample is classified into four types. Therefore, we used Welch's estimation method which does not assume homogeneity of variances, as it may not be possible to assume such homogeneity. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively. Obs. is the number of observations.

ey, and Barenbořm (2014), the rule of law is based on the notion of removing, as much as possible, a ruler's arbitrary will from the legal system. The rule of law is justified by the ethical principle of normative individualism – that is, even a ruler is equal before the law.⁸⁾ Tomita and Kimura (2021) found that the level of the rule of law in a country differs depending on its legal origins, resulting in different levels of economic inequality. Therefore, the differences in economic inequality due to the legal origins could to an extent be driven by both the decommodification index and/or the influence of the rule of law.

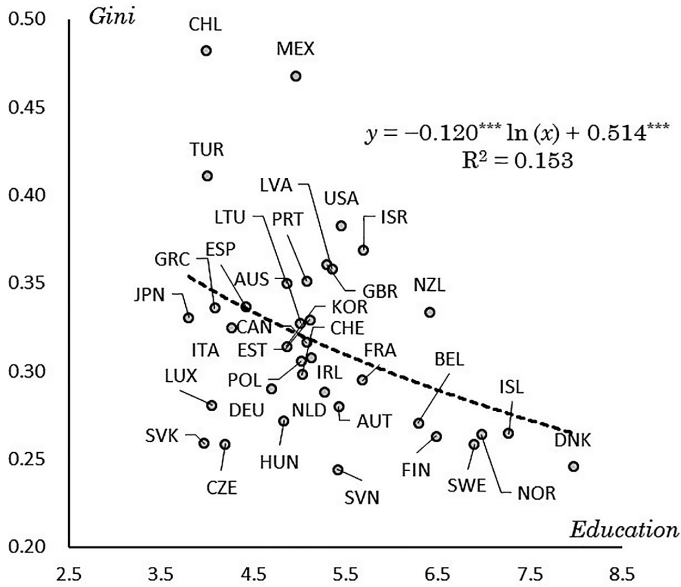
Table 6 uses the same methodology as Table 5 to estimate whether the legal origins influence the average value of public education expenditure. It shows that countries with Scandinavian legal origins have the highest values for public education expenditure, followed by countries with English legal origins. Public education expenditure for countries with French and German legal origins were comparatively low, and there was no signif-

Table 7. T-test of mean difference for public social security expenditure

	<i>Social security</i>				
	Average		T-test	Obs.	
<i>English vs French</i>	2,887	2,901	-0.353	84	144
<i>English vs German</i>	2,887	2,889	-0.079	84	143
<i>English vs Scandinavian</i>	2,887	3,140	-8.208***	84	60
<i>French vs German</i>	2,901	2,889	0.253	144	143
<i>French vs Scandinavian</i>	2,901	3,140	-5.128***	144	60
<i>German vs Scandinavian</i>	2,889	3,140	-6.479***	143	60

Note: T-tests are estimated by a test of difference that does not assume homogeneity of variance. The number of observations for each of the four types of samples is small because the sample is classified into four types. Therefore, we used Welch's estimation method which does not assume homogeneity of variances, as it may not be possible to assume such homogeneity. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively. Obs. is the number of observations.

Figure 1. Relationship between Gini index and public education expenditure



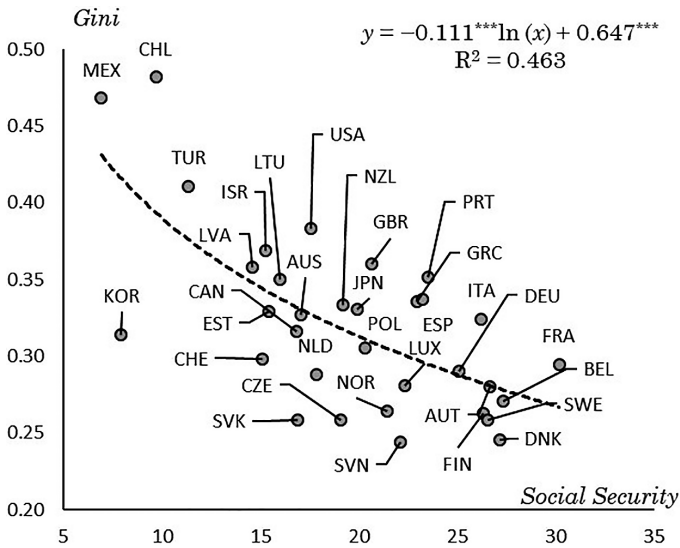
Note: This graph plots the relationship between the Gini index and public education expenditure. These values use the arithmetic means from 2004 to 2015 in each country. The regression model is a logarithmic approximation curve that converts public education expenditure to the natural logarithm. Country names are given in accordance with ISO 3166-1 alpha 3. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively.

icant difference between them in this regard.

Table 7 shows the results of a t-test to estimate whether a country's legal origins influence the average value of its social security expenditure using the same methodology as Tables 5 and 6. It shows that there are no significant differences between countries with English and French, English and German, and French and German legal origins, and that countries with Scandinavian legal origins had higher social security expenditures.

Figure 1 was plotted to observe the relationship between the Gini index and public education expenditure. This regression model is a log-approximation curve estimated by the least-squares method with the independent

Figure 2. Relationship between Gini index and public social security expenditure



Note: This graph plots the relationship between the Gini index and public social security expenditure. These values use the arithmetic means from 2004 to 2015 in each country. The regression model is a logarithmic approximation curve that converts public social security expenditure to the natural logarithm. Country names are given in accordance with ISO 3166-1 alpha 3. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively.

variable public education expenditure as the natural logarithm. According to Figure 1, there is a negative relation between the Gini index and public education expenditure.

We plotted Figure 2 to observe the relationship between the Gini index and social security expenditures. This regression model was also estimated by the least-squares method, and its log-approximation curve uses the independent variable (social security expenditure) as the natural logarithm. According to Figure 2, there is a negative relation between the Gini index and social security expenditures.

We use the following model to test whether the impact of public education and social security expenditures on economic inequality varies de-

pending on a country's legal origins:

$$Gini_{it} = \alpha_0 + \alpha_1 Education_{it} + \alpha_2 Education_{it} \times Origin_i + \alpha_3 Social\ security_{it} + \alpha_4 Social\ security_{it} \times Origin_i + \alpha_5 Origin_i + \alpha_6 Control\ variables_{it} + \varepsilon_{it} \quad (1)$$

Here, the variables used are the values defined in Table 3. *Gini* is the Gini index. *Education* refers to public education expenditure. *Education*×*Origin* is the interaction term of public education expenditure and legal origin (for instance, the interaction term for public education expenditure and a country with English legal origins would be *Education*×*English*). In the model, we estimate three types of legal origins as a base category in order to compare the four types of legal origins. By using a model with an interaction term, we can estimate the different effects of public education expenditure on economic inequality in countries with different legal origins.

Social security is a social security expenditure. Likewise, *Social security* × *Origin* is an interaction term (of social security expenditure and legal origins), as is *Education*×*Origin*. Using a model with an interaction term, we can estimate the effect of social security expenditure on economic inequality through past adoption of a legal origin. Simultaneously, we can also estimate the marginal effects of these two types of interaction terms. By measuring marginal effects, we can compare the impact of public education expenditure and social security expenditure on economic inequality via each of the legal origins.

The control variables are *Inflation*, which is the rate of inflation; *Unemployment*, which is the rate of unemployment; *Labor productivity*, which is output per worker; and *Industrial structure*, which is the proportion of manufacturing.⁹⁾ In addition, a dummy year, *Year*, is added, and ε is the error term, where i is the country and t the period. The model is estimat-

ed by a random effects model.¹⁰⁾

4. Estimation results and discussion

This section presents the estimation results of the model described above and its marginal effects. Table 8 shows the results of the estimates in equation (1).

First, we describe a model in which *English* is the base category for the dummy variables. Next, we describe the model with *French* as the base category for the dummy variables. Finally, we discuss the model with *German* as the base category for the dummy variables. The estimates in Table 8 show that the impact of an increase in public education expenditure on the Gini index is similar in countries with English and French legal origins. It also shows that public education expenditure is less effective in lowering the Gini index in countries with German legal origins than it is in countries with English legal origins, and that public education expenditure tends to be less effective in lowering the Gini index in countries with Scandinavian legal origins than in countries with English legal origins. The table also shows that public education expenditure is less effective in lowering the Gini index in countries with German legal origins than in countries with French legal origins, and that it also tends to be less effective in lowering the Gini index in countries with Scandinavian legal origins than in countries with French legal origins.

The results regarding social security expenditure in Table 8 are summarized below. Table 8 shows that increases in social security expenditure reduce the Gini index more in countries with French legal origins than it does in countries with English legal origins. It also shows that the impact of increases in social security expenditure on the Gini index is similar in countries with English and German legal origins. Furthermore, increases

Table 8. Estimated result

Dependent variable	<i>Gini</i>		
Variables	Model 1	Model 2	Model 3
<i>Education</i>	-0.054*** (-2.502)	-0.048*** (-4.019)	-0.002 (-0.152)
<i>Education</i> × <i>English</i>		-0.005 (-0.212)	-0.051** (-1.996)
<i>Education</i> × <i>French</i>	0.005 (0.212)		-0.046*** (-2.532)
<i>Education</i> × <i>German</i>	0.051** (1.996)	0.046*** (2.532)	
<i>Education</i> × <i>Scandinavian</i>	0.054* (1.626)	0.048* (1.653)	0.002 (0.074)
<i>Social security</i>	-0.006 (-0.329)	-0.068*** (-5.260)	-0.031*** (-2.475)
<i>Social security</i> × <i>English</i>		0.062*** (2.985)	0.024 (1.160)
<i>Social security</i> × <i>French</i>	-0.062*** (-2.985)		-0.038*** (-2.471)
<i>Social security</i> × <i>German</i>	-0.024 (-1.160)	0.038*** (2.471)	
<i>Social security</i> × <i>Scandinavian</i>	-0.074*** (-2.492)	-0.012 (-0.471)	-0.050** (-1.916)
<i>English</i>		-0.164*** (-3.310)	0.064 (1.234)
<i>French</i>	0.164*** (3.310)		0.228*** (5.373)
<i>German</i>	-0.064 (-1.234)	-0.228*** (-5.373)	
<i>Scandinavian</i>	0.065 (0.851)	-0.099 (-1.381)	0.128* (1.760)
<i>Inflation</i>	0.001*** (2.514)	0.001*** (2.514)	0.001*** (2.514)
<i>Unemployment</i>	0.001*** (3.204)	0.001*** (3.204)	0.001*** (3.204)
<i>Labor productivity</i>	-0.036*** (-3.127)	-0.036*** (-3.127)	-0.036*** (-3.127)
<i>Industrial structure</i>	-0.002*** (-3.515)	-0.002*** (-3.515)	-0.002*** (-3.515)
<i>Constant</i>	0.881*** (6.604)	1.045*** (8.435)	0.817*** (6.558)
<i>Year</i>	Yes	Yes	Yes
Adj. R ²	0.717	0.717	0.717
LM test	340.627***	340.627***	340.627***
Obs.	406	406	406

Note: Each model is estimated using a random effects model, as the variables of the legal origins do not change over time and therefore cannot be measured in a fixed effects model. The figures in parentheses indicate the t-value. ***, **, and * imply significance at the 1%, 5%, and 10% levels, respectively. Obs. is the number of observations.

in social security expenditure reduce the Gini index more in countries with Scandinavian legal origins than in countries with English legal origins, and that social security expenditure is less effective in lowering the Gini index in countries with German legal origins than in countries with French legal origins. The impact of increased social security expenditure on the Gini index is the same for countries with French and Scandinavian legal origins, and increases in social security expenditure reduce the Gini index more in countries with Scandinavian legal origins than in countries with German legal origins.

Table 9 shows the marginal effect of public education expenditure on the Gini index for each type of legal origin. The strongest marginal effect of public education expenditure on lowering economic inequality was -0.054 (countries with English legal origins), followed by -0.048 (French). No differences were detected between countries with English and French legal origins in this regard. The strength of the marginal effect of public

Table 9. Marginal effect of *Education* on *Gini*

Interaction term with <i>Education</i>	<i>Gini</i>		
	Marginal effect		<i>Legal Origins</i>
<i>English vs French</i>	-0.054	-0.048	Not significant
<i>English vs German</i>	-0.054	-0.001	German ^[a]
<i>English vs Scandinavian</i>	-0.054	0.000	Scandinavian ^[c]
<i>French vs German</i>	-0.048	-0.001	German ^[a]
<i>French vs Scandinavian</i>	-0.048	0.000	Scandinavian ^[c]
<i>German vs Scandinavian</i>	-0.001	0.000	Not significant

Note: The table shows the marginal effects of the intersection term between public education expenditure and the legal origin, with the Gini index as the dependent variable. The column for Legal origins shows which legal origin has the greater marginal effect. ^[a] indicates that both the base category and the intersection term are significant at the 5% level. ^[b] indicates that either the base category or the intersection term is significant at the 5% level. ^[c] indicates that it is significant at the 10% level.

Table 10. Marginal effect of Social security on Gini

Interaction term with <i>Social security</i>	<i>Gini</i>		
		Marginal effect	<i>Legal Origins</i>
<i>English vs French</i>	-0.006	-0.068	English ^[a]
<i>English vs German</i>	-0.006	-0.031	Not significant
<i>English vs Scandinavian</i>	-0.006	-0.081	English ^[b]
<i>French vs German</i>	-0.068	-0.031	German ^[a]
<i>French vs Scandinavian</i>	-0.068	-0.081	Not significant
<i>German vs Scandinavian</i>	-0.031	-0.081	German ^[a]

Note: The table shows the marginal effects of the intersection term between public social security expenditure and the legal origin, with the Gini index as the dependent variable. The column for Legal origins shows which legal origin has the greater marginal effect. ^[a] indicates that both the base category and the intersection term are significant at the 5% level. ^[b] indicates that either the base category or the intersection term is significant at the 5% level. ^[c] indicates that it is significant at the 10% level.

education expenditure on economic inequality was weaker for countries with German (-0.001) and Scandinavian (0.000) legal origins. According to Table 9, the marginal effect of public education expenditure on economic inequality is weak for countries with legal origins that have relatively low Gini index values (as shown in Table 5, above).

Table 10 shows the marginal effects of social security expenditure on the Gini index by type of legal origin. The strongest marginal effect of social security expenditure on lowering economic inequality was -0.081 (countries with Scandinavian legal origins), followed by -0.068 (French). No differences were detected between countries with Scandinavian and French legal origins in this regard. The marginal effect of social security expenditure on reducing economic inequality for countries with German legal origins was -0.031, weaker than that of countries with French legal origins, and was even lower in countries with English legal origins (-0.006). However, we did not detect a difference between countries with

Table 11. Comparison of marginal effects

Dependent variable	<i>Gini</i>	
	<i>Education</i>	<i>Social Security</i>
Marginal effect		
<i>English</i>	-0.054	-0.006
<i>French</i>	-0.048	-0.068
<i>German</i>	-0.001	-0.031
<i>Scandinavian</i>	0.000	-0.081

Note: Values are calculated from the estimation results of the interaction term's marginal effect.

German and English legal origins in this regard. These estimates are consistent with those of Esping-Andersen (1990).

Table 11 compares the marginal effects of public education expenditure and social security expenditure on economic inequality by countries' legal origin. In countries with English legal origins, the marginal effect of public education expenditure was strong (-0.054) but the marginal effect of social security expenditure was weak (-0.006). In countries with French legal origins, the marginal effect of public education expenditure was strong (-0.048) and the marginal effect of social security expenditure was also strong (-0.068). In countries with German legal origins, the marginal effect of public education expenditure was weak (-0.001) but the marginal effect of social security expenditure was strong (-0.031). Finally, in countries with Scandinavian legal origins, public education expenditure had little effect on economic inequality but the marginal effect of social security expenditure was strong (-0.081).

In other words, increasing public education expenditure may reduce economic inequality in states with English legal origins, the expansion of both public education and social security expenditure might reduce economic inequality in states with French legal origins, and an increase in social security expenditure might reduce economic inequality in states with

German or Scandinavian legal origins. These estimates indicate that the existence of trade-offs in the marginal effects of public education and social security expenditures varies with the legal origins and is not a common phenomenon.¹¹⁾

5. Conclusion and implications

This paper discussed whether public education and social security expenditure reduce economic inequality, and whether states' legal origins impact this relationship. Because this paper views states' legal origins as the underlying source of welfare regime theory (Esping-Andersen 1990), it is concerned with statistically examining what types of social policies might reduce economic inequality in countries with different legal origins.

This study's estimation results show that the marginal effect of public education expenditure is strong for countries with English and French legal origins and that increasing public education expenditure might reduce economic inequality in these countries. It also found that the marginal effect of public education expenditure tends to be stronger for legal origins that have higher Gini index values. In this case, we can assume that countries with high Gini index values also have a greater ability to increase public education expenditure. The study also found that the marginal effect of social security contributions on economic inequality is strong for countries with Scandinavian and French legal origins. The strong marginal effects here appear to be related to Esping-Andersen's (1990) classification framework.

In short, this paper brings forth the following conclusions. First, increasing public education expenditure might reduce economic inequality in states with English legal origins. Second, increasing both public education and social security expenditure might reduce economic inequality in states

with French legal origins. Third, increasing social security contributions might reduce economic inequality in states with German or Scandinavian legal origins.

This study's findings have several implications. For instance, it is inefficient to blindly adopt successful social policies from one country without considering that country's legal origins and the endogenous institutions in one's own country. Thus, we suggest that policy-makers acknowledge and act on the knowledge that public social investment policies should consider their own state's legal origins.

This paper has a few limitations. For instance, it uses legal origins—the historical evolution of a country's legal system—to analyze the efficacy of policy-making in the present, marking a temporal disconnect between the two. Despite this limitation, we believe it is meaningful to observe significant results even for the current index because of the tendency for path dependence. Future research could expand on this area by performing international comparisons based on the detailed institutional environment of each country.

Notes

- 1) Based on La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998, 2000, 2002), this study classified legal origins into four types: English, French, German, and Scandinavian. La Porta, Lopez-de-Silanes, and Shleifer (2008) defined a fifth type—Socialist—however, we did not use this type as it was not included in the countries covered by this paper. English legal origins mean that the country's laws are mainly based on English Common Law. French and German legal origins are called Civil Law, a legal system which is based mainly on Statute or Continental Law. French legal origins can be traced back to the Napoleonic Code, and German legal origins to Roman law. Scandinavian legal origins have their roots in Northern Europe and are influenced by ancient Germanic Common law.

- 2) According to Berkowitz, Pistor, and Richard (2003a, 2003b), a gap between the legal system and endogenous institutions is associated with a discrepancy in economic development. Berkowitz et al. (2003) show that the gap arises when colonial policy transplants legal origins from one country to another. Because this paper focuses on the economically developed OECD countries, we assume that the gap between legal origins and endogenous systems is at the same level.
- 3) Castles and Mitchell (1992) advocate a “Wage earner welfare state.” Lewis (1992) categorizes welfare states into four types: “Strong male-breadwinner state,” “Modified male-breadwinner state,” “Weak male-breadwinner state,” and “Male-breadwinner model.” Siaroff (1994) classifies countries into four regimes based on family welfare indices constructed from family benefits, childcare, maternity, or parental leave, etc., and the degree of women’s acceptance into the labor market, constructed from wages and labor market participation rates. Ferrera (1996) describes weak interventions in the welfare system in southern European countries and advocates the “Universal breadwinner model,” the “Caregiver parity model,” and the “Universal caregiver model.” Sainsbury (1996) advocates the “Male breadwinner family model” and an “Individual model” from the perspective of entitlement in social policy and taxation.
- 4) In view of Esping-Andersen’s (1990) theory of welfare regimes, “Encompassing” can be considered to correspond to the social democratic regime, “Corporatist” to the conservative regime, and “Basic security” and “Targeted” to the liberal regime.
- 5) Kenworthy (2011) and Marx, Salanauskaite, and Verbist (2013) state that economic inequality can be reduced by providing a tax credit with benefits in both “Basic security” and “Targeted” countries.
- 6) The number of observations is small because the sample is divided into four parts for each legal origin. In other words, it becomes difficult to assume homoscedasticity. We confirmed by the F-test (one-tailed test), and it was significant at less than and equal to the 5% level for most combinations of legal origins. Therefore, the t-test was estimated by Welch’s test, which does not assume homoscedasticity. The estimation method is a non-parametric test,

and the t-test is a two-tailed test. The same test method is used in Tables 6 and 7.

- 7) The Gini coefficient used in this paper is the value after income redistribution.
- 8) The rule of law attaches great importance to the system of precedents set by courts due to the existence of unwritten rules and customs, and the legal state (Rechtsstaat) attaches great importance to the Act of Congress. However, Silkenat et al. (2014) suggest that both are essentially aligned to the protection of human dignity and democracy.
- 9) Inflation and unemployment rates are included in the model because they can have a direct impact on economic inequality. Furthermore, we add labor productivity to the model as a control variable with a view to removing the impact of its variables on economic inequality. In other words, if the productivity is low for general workers, there may be a bias in income distribution. This means that economic inequality between employers with capital and workers without capital can be high. We also add industry structure to the model for the same reason, as it may have an impact on economic inequality.
- 10) The variables indicating the legal origins are dummy variables that do not change during the target period. In other words, it is not possible to estimate them in a fixed effects model that completely removes the effect of time-invariant covariates. Therefore, in this paper, we estimate using a random effects model.
- 11) The correlation coefficient between education and social security was positive, at 0.341. We implemented a t-test for the correlation coefficient and found it to be significant at the 1% level. Namely, no trade-off was observed between the two when compared as a scale rather than a marginal effect.

References

- Alvaredo, F., Chancel, L., Piketty, T., Saez, E., and Zucman, G. (Eds.) (2018). *World Inequality Report 2018*. Belknap Press.
- Amable, B. (2003). *The Diversity of Modern Capitalism*. Oxford University Press.
- Batifoulier, P. (2001). *Théorie Des Conventions (Economie)* [in French]. Economica.

- Berkowitz, D., Pistor, K., and Richard, J. F. (2003a). "Economic development, legality, and the transplant effect," *European Economic Review*, 47(1), 165–195.
- Berkowitz, D., Pistor, K., and Richard, J. F. (2003b). "The transplant effect," *The American Journal of Comparative Law*, 51, 163–203.
- Castles, F. G., and Mitchell, D. (1992). "Identifying welfare state regimes: the links between politics, instruments and outcomes," *Governance*, 5(1), 1–26.
- Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Princeton University Press.
- Esping-Andersen, G. (1999). *Social Foundations of Postindustrial Economies*. Oxford University Press.
- Ferrera, M. (1996). "The 'Southern Model' of welfare in social Europe," *Journal of European Social Policy*, 6(1), 17–37.
- Hall, P. A. and Soskice, D. (2001). *Varieties of Capitalism: Institutional Foundation of Comparative Advantage*. Oxford University Press.
- Heidenheimer, A. J. (1981). "Education and social security entitlements in Europe and America," in Flora, P., and Heidenheimer, A. J. (Eds.) *The Development of Welfare States in Europe and America*, Transaction Books, 269–304.
- Hokenmaier, K. G. (1998). "Social security vs. educational opportunity in advanced industrial societies: is there a trade-off?" *American Journal of Political Science*, 42(2), 709–711.
- ILO. (2020, August). ILO, Statistics on Labour Productivity. Retrieved from/ <https://ilostat.ilo.org/topics/labour-productivity/>
- IMF. (2020, August). IMF, World Economic Outlook Database, October 2019. Retrieved from <https://www.imf.org/en/Publications/WEO/Issues/2019/10/01/world-economic-outlook-october-2019>
- Kenworthy, L. (2011). *Progress for the Poor*. Oxford University Press.
- Korpi, W. and Palme, J. (1998). "The paradox of redistribution and strategies of equality: welfare state institutions, inequality, and poverty in the Western countries," *American Sociological Review*, 63(5), 661–687.
- La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. (2008). "The economic consequences of legal origins," *Journal of Economic Literature*, 46(2), 285–332.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. W. (1998). "Law and finance," *Journal of Political Economy*, 106(6), 1113–1155.

- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. W. (2000). "Investor protection and corporate governance," *Journal of Financial Economics*, 58 (1-2), 3-27.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. W. (2002). "Investor protection and corporate valuation," *The Journal of Finance*, 57 (3), 1147-1170.
- Lewis, J. (1992). "Gender and the development of welfare regimes," *Journal of European Social Policy*, 2 (3), 159-173.
- Marx, I., Salanauskaitė, L., and Verbist, G. (2013). "The paradox of redistribution revisited: and that it may rest in peace?" IZA Discussion Paper No. 7414. Available at <http://ftp.iza.org/dp7414.pdf>
- Means, R. C. (1980). *Underdevelopment and the Development of Law*. University of North Carolina Press.
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.
- North, D. C. (2005). *Understanding the Process of Economic Change*. Princeton University Press.
- OECD. (2020a, August). OECD, Income Inequality Indicator. Retrieved from <https://data.oecd.org/inequality/income-inequality.htm>
- OECD. (2020b, August). OECD, Social Expenditure Statistics. Retrieved from https://www.oecd-ilibrary.org/social-issues-migration-health/data/oecd-social-expenditure-statistics_socx-data-en
- Sainsbury, D. (1996). *Gender, equality and welfare states*. Cambridge University Press.
- Siaroff, A. (1994). "Work, welfare and gender equality: a new typology," in Sainsbury, D. (Ed.) *Gendering Welfare States*, Sage, 82-100.
- Silkenat, J. R., Hickey, J. E., and Barenboim, P. (Eds.) (2014). *The Legal Doctrines of the Rule of Law and the Legal State (Rechtsstaat)* (Vol. 38). Springer.
- Tomita, Y. and Kimura, A. (2021). "Financial resource of public social security expenditure, the rule of law, and economic inequality: international comparison of legal origins," *Economic Research-Ekonomska Istraživanja*, 1-21.
- UNESCO. (2020, August). UIS Statistics-UNESCO, Statistics: Education. Retrieved from <http://data.uis.unesco.org/index.aspx?queryid=189#>

World Bank. (2020, August). World Bank, World Development Indicators Data. Retrieved from <https://data.worldbank.org/indicator>

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