Capítulo 6

Effects of Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs) on the environment

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1. Introduction

In recent decades, the role of business in solving various environmental challenges has emerged as a subject of debate (Gladwin, 1987; Balachandran et al., 2011; Davies, 2009; Hertin and Berkhout, 2003). Traditional environmental and welfare economics theory largely concludes that market failures inherent in the economic system prevent business action from solving environmental problems and, indeed, often motivate environmentally degrading business behaviors (Pigou, 2017; Tietenberg, 2000).

Martinez-Alier et al. (2004) establish that the market economy does not ensure social or ecological reproduction since the market does not manage to produce the energy and materials used in industrial economies but merely achieves their extraction. In contrast, some authors promote the entrepreneurial role as a means to solve the problems of market failures (Coase, 1974; North and Thomas, 1970) and, more specifically, environmental problems (Anderson, 2000; Dean and McMullen, 2007).

Considering that environmental problems generally tend to create uncertainty, the need for sufficient mechanisms to combat such problems is evident for DiMaggio and Powell (1983); Weisbuch (2000); Ostrom (2008); These mechanisms are the institutions, taken as the written and unwritten rules, norms, and restrictions that humans design to reduce the uncertainty that human exchange entails and thereby control their environment (North, 1991).

If institutions are the rules, then organizations are groups formed by individuals united by common goals that build belief systems, which evolve historically from their own learning and induce decision makers to achieve a specific micro and macroeconomic performance to erect an elaborate structure of rules, norms, conventions, and beliefs embodied in constitutions, property rights, and informal restrictions; these in turn shape economic performance (North, 2008).

According to Meyer (2011), institutional theory can be interrelated with corporate responsibility studies theory. One of the most recent ins-

titutionalist theoretical developments is the literature on "varieties of capitalism", spearheaded by Hall and Soskice, who focus their study on how the relations between the state, the market, and civil society are organized differently between capitalist systems and how divergent capitalist models impact business strategy and behavior (Amable 2003; Crouch 2005).

Current economies are the reflection of a world with unusually rapid changes, which requires an institutional adaptation of the same complexity. The success of each economy will depend on the creation of integral institutions that not only promote efficiency in the markets but also provide the actors with tools to combat environmental and other problems. But the environment has not been considered a fundamental element in this theory; therefore, the objective of this research is to introduce the idea of the environment as a new sphere of coordination in the framework proposed by Hall and Soskice (2001). In order to do so, it is necessary to analyze the effects that LMEs and CMEs have on the levels of pollution from GHG emissions.

This is why the objective of this research is to analyze possible conditioning factors of the non-linear relationship that the Environmental Kuznets Curve (EKC) hypothesis assumes in 10 OECD countries during the period 1990–2016, where a GMM panel data model is used to study the variables: GHG emissions per capita, GDP per capita, union density, market capitalization, and expected years of schooling. Additionally, two GMM models were applied to the same data set to analyze the effects that LMEs and CMEs have on the level of greenhouse gas pollution.

According to the results, there is evidence of the possible occurrence of EKC considering variables related to the coordination spheres of Hall and Soskice (2001) in the 10 countries under study. Additionally, it was found that the LMEs have a better positive effect on reducing GHG than the CMEs, which is attributed to the pressure from consumers for environmentally responsible products and services and also to compliance with environmental regulations. Years of schooling result in a positive effect on CMEs to reduce GHG, while the effect of market capitalization is negative for LMEs, and union density is negative for both types of capitalism.

This research consists of five sections: the introductory part, followed by a section that covers the literature review that synthesizes the varieties of capitalism theory and includes a general review of EKC studies and the possible effects of the varieties of capitalism on the environment. A third section covers the methodology and the data used in this research, followed by the results of the method applied, and finally the discussion and the conclusions are presented.

2. Literature Review

2.1 The company and the Varieties of Capitalism

The theory of the varieties of capitalism offers a framework for understanding the institutional similarities and differences found in developed economies. According to this approach, the company is relational and seeks to develop and exploit its dynamic capabilities and basic competencies. Another important factor is the company's relationships, both internally (with employees, administrators, and investors) and externally (with suppliers, customers, trade associations, etc.). Because these relationships are problematic, the success of a company depends on its ability to coordinate effectively with a wide range of actors in different settings (Hall and Soskice, 2001).

According to this approach, the classification of economies in the various varieties of capitalism is based on finding similar patterns of coordination among the different economic entities. In the classification proposed by Hall and Soskice (2001), the authors establish five spheres for solving existing coordination problems.

Table 1. Spheres of business coordination

Coordination Spheres
Industrial Relations: This area studies how the company coordinates its negotiations regarding wages and working conditions with the unions.
Training and education are related to the amount of investment made to train the employees of a company.
Corporate governance Refers to how the company gets access to financing and how investors ensure the return on investment.
Inter-company relations: This sphere analyzes the relationship with other companies, suppliers, clients, inputs, and access to technology.
Coordination with employees: This sphere analyzes how the company ensures the necessary cooperation with employees and how the objectives of the company are achieved.

Source: Own elaboration, based on Hall and Soskice (2001).

Table 1 frames the coordination spheres that Hall and Soskice (2001) propose to solve coordination problems and that allow the classification of developed economies into two large clusters. Coordinated Market Economies (CME) are those economies that are characterized by having companies that, through collective decisions and informal agreements, organize their coordination relationships with the different economic agents. In CMEs, there is a high union density, labor protection for the long term, long-term bank financing, cooperation between companies through reputational networks, highly trained employees, and long-term investment in human capital. Germany, Japan, Switzerland, Belgium, Sweden, Norway, Denmark, Finland, and Austria are classified as CME. The other cluster, the Liberal Market Economies (LME), coordinated their stakeholders through formal agreements in the pursuit of achieving high profit rates through unilateral control based on market fluctuations, little association between employees, deregulated labor markets, employees with easily transferable and general skills, and the ease of exchange of technical knowledge and innovations. Australia, Canada, Ireland, the United Kingdom, the United States, and New Zealand are considered LME.

This classification scheme of economies has opened the door for the development of various classifications and taxonomies under the business coordination approach, not only in developed economies but

also in developing economies (Amable, 2003; Taylor, 2004; Nolke and Vliegenthart, 2009; Molina and Rhodes, 2008; Schneider, 2009).

Since institutions establish the incentives and formal and informal constraints that shape the behavior of the agents involved (North, 1991), it is clear that institutional quality would vary from one economy to another. In the literature on varieties of capitalism, Hall and Soskice (2001) concluded that institutional competitive advantages are a consequence of institutional complementarieties, and this occurs between the five coordination spheres, where the proper functioning of one sphere positively affects the other (Aoki, 2003).

Varieties of capitalism have been used to examine various dimensions, for example: Taylor (2009) analyzes the number of patents and innovations generated by the varieties of capitalism. Epaminonda (2016) studies syndicate union variables using data panels. Mariotti and Marzano (2019) used a simple regression model to analyze the degree of internalization in capitalist systems. Setterfield and Kim (2018), based on a Kaleckian macroeconomic stock flow model (proposed by the same authors in 2016), analyze the increase in income inequality and its long-term stability. Witt and Jackson (2016) performed a qualitative comparative analysis (fsQCA) to test whether different institutional configurations are sufficient for high performance in different sectors, characterized by forms of radical or incremental innovation. Bolaos et al. (2020) analyze the impact of the varieties of capitalism on the relationship between social capital and inequality using a static panel model. Witt and Stahl (2016) carried out a statistical analysis based on the application of surveys on social responsibility. Williams et al. (2015) Analyze the degree of informality (number of non-formal companies) using PROBIT models.

It becomes clear that environmental issues that concern companies haven´t been considered in the varieties of capitalism approach. The diverse types of institutional complementarity will generate diverse levels of pollution. Since the theory has failed to explain these situations, there is a gap in knowledge that this research will fill by analyzing the relationship between greenhouse gas emissions and Liberal Market Economies and Coordinated Market Economies.

2.2 The Environment and the Varieties of Capitalism

According to the Commission of the European Communities (2002), companies that develop environmental protection practices in the medium and long term tend to be more competitive in the international market, to the extent that respect for rules in this area encourages innovation and modernization of processes and products, promoting the use of cleaner technologies. Similarly, internationally competitive companies are in a better position to invest in new, more efficient, and cleaner technologies.

According to Hall and Soskice (2001), companies in any type of economy will develop their corporate strategies through the use of institutions. Following this argument, Mikler (2009) establishes that if companies focus on changing their behaviors with respect to the environment, this will be the product of institutions that allow or limit certain types of pro-environment behavior.

However, as economies and their societies are not the same, the use of mechanisms to hold companies accountable and provide stakeholders with opportunities to influence the accountability process is broad and diverse. Consequently, it can be assumed that the decision of companies to invest in environmentally responsible activities (RAC) is influenced by divergences in political institutions (Meyer, 1999).

For Mikler (2006), no matter the variation in motivations, environmental concerns in both varieties of capitalism present a common objective, which is the generation of profits.

Meyer (2011) establishes that in more coordinated economies, institutions help a large number of actors decide and harmonize environmental protection strategies. Whereas in more liberal market economies, these institutions are less developed and companies have more freedom to design individual RAC strategies, which could generate higher profits.

An interregional study found that European and Japanese companies are more advanced with respect to managing environmental impacts than their counterparts in North America or Asia, excluding Japan (Gordon, 2007).

Cosmas (2008) establishes that the relative adequacy of the different varieties of capitalism to sustainable development lies in the differential

conception of corporate governments, with the CME model being more conducive to the development of sustainable practices than the LME model because the objective of LME companies is to maximize the wealth of their shareholders, while individuals pursue their own interests, obtaining Pareto-efficient allocations.

The CME model recognizes the reality of imperfect conditions and is concerned with ensuring that businesses are run in ways that use resources efficiently. "For example, if there are externalities such as pollution, it is very likely that maximizing the value of the company causes a misallocation of resources" (Allen, 2005: 165). This same author argues that in the case of such externalities, companies that are interested in a broader range of stakeholders are more likely to change their behavior and produce the socially optimal level of contamination, so that although it is not possible to obtain efficiency, it may be possible to achieve a better allocation of resources in the interest of a broad category of stakeholders. This is equally true in the case of economic activities that have the potential to degrade the environment or natural resources (i.e., mining, oil and bioprospecting, commercial agriculture, and fishing). In these cases, capitalism models that emphasize the management of companies in the interests of shareholders are likely to generate more socially inefficient outcomes than those related to the interests of a wider variety of stakeholders (Cosmas, 2008).

For Cervantes (2014), an incremental approach to environmental concerns in German CMEs could be expected, since being based on consensual, regulated cooperation with full attention to the concerns of society and its variety of stakeholders, the objective of these companies will be to balance competitive views and interests, through gradual and incremental measures aimed at ensuring continued consensus and cooperative coordination, while maintaining profits, whereas for UK LMEs, one could expect the concern for the environment to be expressed more in material terms of market forces, profits and competition, if these companies take environmental action, the justification for this is expressed in terms of what consumer demand dictates and what state regulations require, and must be addressed in the short term, to maintain market position, earnings, and shareholder value.

2.3 Factors that allow the EKC hypothesis

The relationship between economic growth and its corresponding environmental effect has been widely discussed since there are different positions in which it is stated that accelerated economic growth is one of the main causes of the decline of natural resources and environmental degradation, while its opposition states that such economic growth can be beneficial for the conservation and improvement of the quality of the environment. According to Grossman and Krueger (1991), there is an empirical relationship between per capita income and certain environmental measures, where environmental quality tends to improve as economic growth reaches a certain high level, at which point a relationship occurs where environmental quality could be represented graphically in the form of an inverted "U", which is known as the environmental Kuznets curve (EKC).

Several studies have carried out investigations that prove the central hypothesis of the EKC, analyzing not only income as a determining factor but also other variables such as energy consumption and commercial openness (Nasir and Rehman, 2011), renewable energy sources (Bölük and Mert, 2015), energy intensity and globalization (Shahbaz et al., 2016), population growth (Alam et al., 2016), etc.

According to the observations made by these researchers and many others, it can be deduced that the problem of environmental quality is due to the intervention of multiple variables, which, by improving them, could also act as actors for mitigating the emission levels.

As mentioned before, the coordination of companies, according to the approach of Hall and Soskice (2001), occurs through five spheres of coordination and differs from country to country according to their political and economic institutions. Therefore, the institutional indicators that refer to these coordination spheres could also be considered variables that affect the incidence of EKC.

3. Methodology

To analyze the relationship between the LMEs, CMES, and the environment, a correlational and longitudinal study was applied to analyze through the analytical method the effects of the varieties of capitalism on the levels of pollution in 10 OCDE countries from 1990 to 2016. Greenhouse gas emissions per capita (GHGp) are used as a marked indicator of the efforts made by economies to reduce their pollution levels.

The empirical data compiled consist of general economic development, education, environment statistics (GHG), social and labor markets for Australia, Canada, Denmark, France, Germany, Japan, the Republic of Korea, New Zealand, the United Kingdom, and the United States.

Greenhouse gas emissions per capita (GHGp) are used as the dependent variable. These data were collected from the data base Our World in Data (2021) and present the trends in anthropogenic emissions of the main greenhouse gases and gas emissions. Data refer to total CO2 emissions (emissions from energy use and industrial processes, for example cement production), CH4 (methane emissions from solid waste, livestock, coal and lignite extraction, rice fields, agriculture, and leaks of gas pipelines), nitrous oxide (N2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF6), and nitrogen trifluoride (NF3). The data exclude indirect CO2.

Since the aim of this paper is to examine the relationship between varieties of capitalism and levels of pollution, it is necessary to add variables referring to the spheres of institutional coordination. Therefore, the following indicators have been used:

- Union density (UD): Used as a labor relations indicator, UD measures the number of workers affiliated with unions, expressed as a percentage of the total number of workers. Data on union density has been collected from the International Labor Organization (2020).
- Years of schooling (YS) This variable is obtained from the data base Our World in Data (2021), and reflects the average of the expected years of schooling of a country.
- Market capitalization, or stock market value, expressed in current US dollars, comes from the World Bank development indicators (WDI, 2021).

- Type of Capitalism (TL or TC): It is a dichotomous variable, obtained according to the literature review. Table 2 specifies the values used.

GDP per capita (GDPp) is used as a control variable and is being collected from the database. Our World in data (2021) is expressed in constant USA dollars using purchasing power parity rates from 2011 (Constant USD, 2011). Table 3 shows a summary of the selected data.

Table 2. TK (Types of Varieties of Capitalism)

Country	Value TL	Value TC	Type of Capitalism
Australia	1	0	LME
Canada	1	0	LME
Denmark	0	1	CME
France	0	1	CME
Germany	0	1	CME
Japan	0	1	CME
Korea	0	1	CME
New Zealand	1	0	LME
United Kingdom	1	0	LME
United States	1	0	LME

Source: Own Elaboration, based on Hall & Soskice (2001); Amable (2003).

In the case of the variables related to the varieties of capitalism, the country scheme proposed by Hall and Soskice (2001) was used, who establish that CMEs carry out wage negotiations with the intervention of employers' associations and unions. Financing is based on commercial networks and banks.

On the other hand, the LMEs base their coordination on labor relations in the market; therefore, union participation and union bargaining are low. Education and vocational training are general. Corporate governance focuses on managers for decision-making.

Table 3. Summary statistics in general and by LMEs and CMEs

	N	Mean	Std. Dev	Min	Max
Overall					
Green House Gases per capita (GHGp)	270	10.65	5.65	-.312	26.12
GDP per capita (GDPp)	270	35523.43	7453.719	11632.6	53399.36
Union Density (UD)	167	23.79	16.96	7.8	73.6
Years of School (YS)	270	15.98	1.27	13.3	20.3
Market Capitalization (MK)	250	2.62e+12	4.75e+12	8.82e+09	2.74e+13
LMEs					
Green House Gases per capita (GHGp)	135	12.97	6.94	-.312	26.12
GDP per capita (GDPp)	135	36644.28	7295.59	22181.32	53399.36
Union Density (UD)	84	21.81	6.57	10.3	30.2
Years of School (YS)	135	16.25	1.29	13.7	20.3
Market Capitalization (MK)	127	3.77e+12	6.35e+12	8.82e+09	2.74e+13
CMEs					
Green House Gases per capita (GHGp)	135	8.34	2.26	3.19	13.95
GDP per capita (GDPp)	135	34402.58	7468.167	11632.6	46373.52
Union Density (UD)	83	25.796	23.03	7.8	73.6
Years of School (YS)	135	15.71	1.19	13.3	19.2
Market Capitalization (MK)	123	1.44e+12	1.31e+12	3.25e+10	4.96e+12

Source: processed and elaborated by the author

3.1 Estimation Strategy

To analyze the relationship between the LMEs, CMEs, and GHG, this study estimates two Models of generalized method of moments (GMM) panel data (Arellano and Bond, 1991) using STATA. Equations 1, 2, and 3 show the modeling used in this study. According to Aspergis et al. (2015), this type of modeling represents the functional form of the

Kuznets curve since it includes quadratic terms that associate the levels of GHG emissions with a series of determining factors. Additionally, this approach allows us to introduce varieties of capitalism variables in an additive way with the income to capture their effect in the EKC. To consider that the environmental Kuznets curve assumption will happen $\alpha_1 > 0$ and $\alpha_2 < 0$.

$$GHGp_{it} = \alpha_1 (GDPp_{it}) + \alpha_2 (GDPp_{it})^2 + \alpha_3 (UD_{it}) + \alpha_4 (YS_{it}) + \alpha_5 (MK_{it}) + \alpha_6 Time + \varepsilon_{it}$$

Equation (1)
Where:

GHG_{it}	Emissions per capita of a country i at a time t
GDP_{it}	Gross Domestic Product per capita of a country i at a time t
UD_{it}	Union Density of a country i at a time t
YS_{it}	Expected Years of Schooling of a country i at a time t
MK_{it}	Market Capitalization of a country i at a time t

The parameter allows the possibility of the fixed effects of the countries, while indicates the estimated residuals.

$$GHGp_{it} = \alpha_1 (TLGDGP_{it}) + \alpha_2 (UD_{it}) + \alpha_3 (YS_{it}) + \alpha_4 (MK_{it}) + \alpha_5 Time + \varepsilon_{it}$$

Equation (2)
Where:

$TLGDGP_{it}$	(TL*GDPp) of a country i at a time t
UD_{it}	Union Density of a country i at a time t
YS_{it}	Expected Years of Schooling of a country i at a time t
MK_{it}	Market Capitalization of a country i at a time t
$TLGDGp_{it}$	(TL*GDPp) of a country i at a time t

$$GHGp_{it} = \alpha_1(TCGDP_{\text{it}}) + \alpha_2(UD_{it}) + \alpha_3(YS_{it}) + \alpha_4(MK_{it}) + \alpha_5 Time + \varepsilon_{\text{it}}$$

Equation (3)
Where:

$TCGDP_{\text{it}}$	(TC*GDPp) of a country i at a time t
UD_{it}	Union Density of a country i at a time t
YS_{it}	Expected Years of Schooling of a country i at a time t
MK_{it}	Market Capitalization of a country i at a time t

In models 2 and 3, the estimated slopes of the varieties of capitalism were added to show the interaction with the GDPp.

It is expected that the sign of the coefficient revealed from the variable GDP per capita (GDP) will be positive because higher levels of per capita income are attributed to more intensive levels of production, which, in turn, contribute to higher levels of emissions. UD is expected to have an association that can be both positive and negative with the concentration levels of emissions, since it may be the case that unions tend to improve environmental quality if the measures taken benefit them somehow, or it could be the case that the environmental measures take away their benefits. In this case, it is expected that unions have a negative impact. It is expected that the variable MK of an economy negatively affects the levels of GHG emissions since the more capital stock there is, the more production processes can generate more emissions. Regarding the variable of years of schooling (YS), the sign shown is expected to be negative since, with a higher level of education, people will be more prompt to reduce their emissions.

It is expected that in models 2 and 3, the variable (TLGDP) will show a positive sign. According to the theory, LME companies mainly seek to maximize the profits of investors. While the TCGDP indicator is expected to show a negative sign since the inclusion of more actors in decision-making could generate a greater application of environmental measures,

Aside from the application of models 1, 2, and 3, an estimation of correlation has been made to analyze the interconnection between the studied variables. The coefficient value should never be 1, otherwise it will be inferred that the variables have the same information.

4. Results

Table 4 shows the correlation results between the dependent variables and the explicative variables. The independent variables are observed to have a low correlation with respect to greenhouse gas emissions. The GDPp variable is the one that shows the highest correlation index with respect to GHGp; this is expected, according to Janicke, 1988; De Bruyn et al., 1998; Hinterberger and Schmidt-Bleek, 1999; Tapio, 2002. The GHG-GDP ratio is relational; as GDP increases, GHG emissions also increase. The results show a negative sign between GHGp and GDPp for the coordinated economies, with which it could be inferred that in these countries the hypothesis of the environmental Kuznet curve could already have been fulfilled; however, the coefficient is very small, and such an assertion cannot be corroborated. The correlation between emissions and union density is small for liberal economies, but the coefficient for coordinated economies is higher and has a positive sign, which differs from the logic presented by Allen (2005) and Cervantes (2014). The interrelation between GHGp and the expected years of schooling in LMEs is high and with a negative sign, with which it could be inferred that the higher the years of schooling, the lower the amount of GHG emissions; however, for coordinated economies, the coefficient resulting is small and with a positive sign. Regarding the correlation between GHGp and MK, both results show the expected signs. Since it is expected that the LME companies are motivated by profits and market forces, a percentage increase in investments would generate greater production and higher levels of pollution. A different case is the expected behavior in CMEs, where the increase in capital stocks could benefit the environment.

Table 4. Correlation Matrix

	Overall Explanatory Variables				
	GHGp	GDPp	UD	YS	MK
Green House Gases per capita (GHGp)	1.0000				
GDP per capita (GDPp)	0.5164	1.0000			
Union Density (UD)	0.1827	0.1137	1.0000		
Years of School (YS)	-0.4198	-0.1480	0.0440	1.0000	
Market Capitalization (MK)	0.311	0.6797	-0.2724	-0.1155	1.0000
	LMEs Explanatory Variables				
	GHGp	GDPp	UD	YS	MK
Green House Gases per capita (GHGp)	1.0000				
GDP per capita (GDPp)	0.5858	1.0000			
Union Density (UD)	0.0707	-0.5862	1.0000		
Years of School (YS)	-0.8139	-0.5033	-0.0872	1.0000	
Market Capitalization (MK)	0.2293	0.8159	-0.7099	-0.1771	1.0000
	CMEs Explanatory Variables				
	GHGp	GDPp	UD	YS	MK
Green House Gases per capita (GHGp)	1.0000				
GDP per capita (GDPp)	-0.0711	1.0000			
Union Density (UD)	0.4210	0.4569	1.0000		
Years of School (YS)	0.1708	0.2589	0.1005	1.0000	
Market Capitalization (MK)	-0.1442	0.2022	-0.2447	-0.6194	1.0000

Source: processed and elaborated by the author

According to the Hausman test, models 1, 2, and 3 have a better specification for fixed effects than the random effects specification. The variables show a slow change over time, so it is reasonable to estimate the models that explain both the serial correlation and heteroscedasticity; however, to validate these assumptions, the Wald heteroscedasticity test and the Wooldrige autocorrelation test were applied to the models.

The results of the application of equation 1 are detailed in Table 5. In the diagnostic section, some of the econometric criteria that the model

satisfies are presented; additionally, the tests of Sargan, AR (1), and AR (2) are included.

Table 5. Results Model 1

Variable	Coefficient	P> [z]
$GHGp_{it} = \alpha_1 (GDPp_{it}) + \alpha_2(GDPp_{it})^2 + \alpha_3(UD_{it}) + \alpha_4(YS_{it}) + \alpha_5(MK_{it}) + \alpha_6 Time + \varepsilon_{it}$		
$GHGp_{it}$	.0004933	0.016
$(GDPp_{it})^2$	-8.16e-09	0.041
UD_{it}	.076272	0.399
YS_{it}	-.1462328	0.417
MK_i	8.98e-14	0.066
_cons	-3.150201	0.287
Diagnostic		
R^2	0.4505	
N	137obs	
Sargan	0.4295	
AR(1)	0.1285	
AR (2)	0.3901	

Source: processed and elaborated by the author

According to the results obtained, there is evidence of the presence of the EKC hypothesis between emissions and per capita income in the 10 OCDE economies under study since the estimated coefficients yielded the expected signs and turned out to be statistically significant. As shown in Table 5, the association between emissions and GDP per capita is positive in the level variable and negative in the squared variable.

In the results regarding the varieties of capitalism variables, MK is statistically significant at 10 % and gives the expected positive sign, with which it could be inferred that a percentage increase in the capital stock would increase the level of GHG emissions; however, the resultant

coefficient is very small. The variables YS and UD were not statistically significant; however, YS yielded the expected negative sign, and the union density index turned out to be a positive factor for the increase in GHG emissions of the countries under study.

Table 6. Results: Models 2 and 3

Variable	**Coefficient**	**P> [z]**
$GHGp_{it} = \alpha_1(TLGDGp_{it}) + \alpha_2(UD_{it}) + \alpha_3(YS_{it}) + \alpha_4(MK_{it}) + \alpha_5 Time + \varepsilon_{it}$		
$TLGDGp_{it}$	-.0002609	0.009
UD_{it}	.061109	0.012
YS_{it}	.0133562	0.903
MK_{it}	6.11e-14	0.008
_cons	6.637703	0.090
Diagnostic		
R^2	0.6473	
N	137obs	
Sargan	0.6495	
AR(1)	0.1266	
AR (2)	0.4223	
Variable	Coefficient	P> [z]
$GHGp_{it} = \alpha_1(TCGDP_{it}) + \alpha_2(UD_{it}) + \alpha_3(YS_{it}) + \alpha_4(MK_{it}) + \alpha_5 Time + \varepsilon_{it}$		
$TCGDP_{it}$	.0001359	0.000
UD_{it}	.2442549	0.000
YS_{it}	-.3455691	0.002
MK_{it}	-6.74e-15	0.793
_cons	1.469334	0.487

Diagnostic	
R^2	0.5838
N	137
Sargan	0.3666
AR(1)	0.1402
AR (2)	0.4289

Source: processed and elaborated by the author

Table 6 shows the results of the application of models 2 and 3 to the group of data collected from the 10 OECD economies under study. The coefficients of the variables TLGDP and TCGDP are small; however, the resulting signs are not as expected. The resulting evidence would indicate that Liberal Economies would have a better effect on the level of GHG emissions than Coordinated Market Economies. YS turned out to be statistically significant in the CMEs panel and with a negative sign, which would indicate that a percentage increase in years of schooling would reduce GHG emissions. The variables on union density turned out to be statistically significant in both models, having a greater negative effect on GHG emissions in the CMEs panel. The MK variable turned out to be positive and statistically significant in the LMEs model; however, the coefficient is very small.

5. Discussion and conclusions

The objective of this study is to analyze the effect of the varieties of capitalism on the level of pollutants, paying special attention to the levels of GHG emissions. To achieve the objectives, a model was used to verify the possible occurrence of the environmental Kuznets curve in 10 OECD countries (Australia, Canada, Denmark, France, Germany, Japan, the Republic of Korea, New Zealand, the United Kingdom, and the United States) using variables on the spheres of coordination of the varieties of capitalism (LMEs and CMEs) for the period from 1990 to 2016 in a data panel using a GMM type of Arellano and Bond (1991).

Additionally, the effects of liberal market economies and coordinated market economies were estimated on the GHG levels of the countries under study using two GMM models (Arellano and Bond, 1991).

The results obtained do not support the initial argument of the research because the LMEs yielded a positive effect for the reduction of GHG emissions. This result contrasts with the logic of Allen (2005), Cervantes (2014), and Meyer (2011), who establish that in more coordinated economies, institutions help a large number of actors decide and harmonize environmental protection strategies. Whereas in more liberal market economies, these institutions are less developed and companies have more freedom to design individual strategies, which could generate higher profits.

However, these results open the doors to discussion and further investigations on the role of consumers in "environmentally friendly" products and compliance with environmental regulations as the main factors in LMEs need to apply greater coordination and environmental protection strategies.

Regardless of the variable YS, the results are interesting since the resulting coefficient in the panel of the CMEs not only yielded a negative sign but also was the highest of the entire set of panel variables. These results are consistent with those established by Meyer (2015), who argues that education causes individuals to be more concerned with social welfare and to accordingly behave in a more environmentally friendly manner.

The variable of union density yielded statistically significant coefficients for the LMEs and the CMEs data panels, and in both cases with positive signs, it was expected that the sign of the CMEs would be negative or smallest than the resulting one in the LMEs, since according to Hyde and Vachon (2019), unions have a greater reducing capacity when they are able to participate in policy formation, and since CMEs have greater union participation in corporate decision-making, a better effect was expected in this panel.

Regarding the MK variable, the results support the theory of Cosmas (2008), where he establishes that the motor of the LME companies is to maximize the wealth of their shareholders, and individuals pursue their own interests, causing the investments to be used to maximize their benefits and not the environment.

Although the results obtained demonstrate the possible occurrence of the EKC in the countries studied, it cannot be said that the set of variables in the spheres of coordination of the varieties of capitalism used have an inference in the occurrence of the EKC. However, the inclusion of other variables for further investigations referring to other spheres of coordination like inter-company relations using indicators of the creation and development of clean technologies or ecoinnovation indexes

This paper presents new evidence to explain the relationship between the environment and the varieties of capitalism. The original contribution of this study not only underlies the results obtained that give evidence that the LMEs that are based on more formal institutions pursue their benefits with what is established by market forces and compliance with regulations, which could be the factors that explained the better results in terms of reducing greenhouse gases. Additionally, this document provides a unique methodological process when applying a panel data model to test the occurrence of the EKC using variables of varieties of capitalism. Another contribution of this research is to consider the environment as another element of coordination within the schemes of the varieties of capitalism and not only as an external element that must be addressed.

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