# THE CARBON MARKET AND ECONOMIC FACTORS THAT CAN AFFECT EMISSIONS REDUCTION SUCCESS

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Abstract

Greater awareness about the consequences of increasing greenhouse gases (GHG) has triggered some policies in order to reduce emissions, including the creation of carbon markets. There are different types of mechanisms, such as the European Emission Trade Scheme (EU ETS), which follows the cap-and-trade principle, and carbon credits based on projects deployed with a focus on emissions reductions (such as the Clean Development Mechanism, CDM, a Kyoto Protocol instrument). Based on the New Institutional Economics, the main objective of this paper is to discuss whether the performance measure Emissions Reduction Success (RS) in the EU ETS and in CDM projects are influenced by institutional characteristics of the hosting countries (such as transaction costs, property rights, and corruption) and by microeconomic features of projects (such as sector, scale, and GHG emission reduction volume). For this purpose, Emissions Reduction Success (RS) is defined as the ratio between estimated and actual emissions reduction. By using econometric models, we conclude that institutional and microeconomic variables influence Emission Reduction Success in both EU ETS and CDM projects. The most important variable affecting project performance is the project sector.

**Key words: Carbon Market, Institutional Economics, transaction costs, Kyoto Protocol, clean development mechanism, EU ETS.**

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## 1. Introduction

Scientific research into climate trends offers increasing evidence that human activities are largely responsible for the higher concentration of greenhouse gases (GHGs) in the atmosphere, which causes global warming, the main cause of climate change (IPCC, 2008).

Awareness about GHG increase has triggered some policies in order to reduce emissions, including the implementation of carbon markets. One such mechanism is the European Emission Trade Scheme (EU ETS), following the cap-and-trade principle, which works on the basis of negotiating emission permits; another involves carbon credits based on project deployment, created with a focus on emission reduction goals, such as the Clean Development Mechanism (CDM), a Kyoto Protocol instrument.

The EU ETS is based on allowances, working on the cap-and-trade principle, which means that the emission limits are placed on the total amount of certain greenhouse gases that can be emitted by factories, power plants, and other installations in participating countries. Within the cap, companies receive or can buy emission allowances which they can trade with one another as needed. Each year a company must surrender enough allowances to cover all its emissions. Nevertheless, after the monitoring process, there may be variances in verified emissions compared to the number of Emission Permits.

With the Clean Development Mechanism (CDM), a project must from its initiation include an estimate of annual average GHG emission reductions. This is followed up with annual monitoring and comparison of this estimate with actual reductions.

In this paper, the ratio between estimated and actual GHG emissions of CDM projects is termed Emission Reduction Success (performance measure). Likewise, the difference between emission permits and actual emissions of the EU ETS is also defined as Emission Reduction Success (performance measure).

The main objective of this paper is to analyse the role that institutional characteristics of the hosting countries (such as transaction costs, property rights, and corruption) and microeconomic project features (such as sector, scale, and GHG emission reduction volume) play in Emission Reduction Success related to the two carbon markets, EU ETS and CDM.

To achieve this, the paper will initially describe both EU ETS and CDM, clarifying how they work and how they were developed; next, it will offer theories that support the hypotheses; and finally, it will present econometric model descriptions and analyses of Emission Reduction Success by verifying institutional and microeconomic influence.

## 2. Carbon Market Characteristics

### *2.1. Kyoto Protocol and Clean Development Mechanism*

One of the most important carbon markets today stems from the establishment of the Kyoto Protocol, which introduced economic tools to help Parties fulfill goals established under the United Nations Framework Convention on Climate Change (UNFCCC). The Kyoto Protocol determined that Annex-I countries[2] should reduce their combined GHG by an average of 5.2% of 1990 levels over the period between 2008 and 2012, the so-called first commitment period. The Kyoto Protocol was adopted in Kyoto, Japan, on December 1997, and entered into force on February16, 2005, after Russia's ratification.

In order to facilitate reduction target compliance, Kyoto Protocol established flexibility mechanisms, by which an Annex-I country can exceed its emission limit without increasing global net emissions, as long as there is an equivalent reduction in another country.

There are three flexible mechanisms: Joint Implementation (JI), Emissions Trading (ET), and the Clean Development Mechanism (CDM). Joint Implementation allows industrialized countries to offset their emissions and sinks by participating in projects in other Annex-I countries. Emissions Trading policy delineates transactions relating to GHG emissions among Annex-I countries by addressing the adoption of policies based on markets for tradable allowances. This mechanism allows developed countries to negotiate the emissions quotas agreed in Kyoto among themselves, whereby countries with emissions exceeding their quotas can buy permits to cover these excesses. Finally, and directly affecting developing countries, the Clean Development Mechanism (CDM) permits industrialized countries to meet their reduction commitments by investing in projects which avoid greenhouse gas emissions in developing countries (UNFCCC, 1997). As a result of the deployment of projects, a carbon trade emerges.

After first Kyoto commitment period (2008 until 2012), during the COP 17 (2011), a political compromise was agreed, with the following assumptions: i) establishment of a formal provision for a second Kyoto Protocol commitment period (post 2012); ii) launch of a Green Climate Fund to expand long-term financing for developing countries; and iii) establishment of a formal clause for

[2] Annex-I parties are defined as developed countries and economies in transition (UNFCCC, 1997).

an action plan resulting in a global agreement on climate change (called the Durban Platform for Enhanced Action), to be defined in 2015 and enter into force in 2020.

The most recent meeting took place in 2012 in Doha, where parties established: i) a second commitment period from January 2013 to December 2020; ii) a revised list of GHG to be included; and iii) amendments and updates to relevant articles of the Kyoto Protocol, focused on the first commitment period.

During the second commitment period, countries agreed to reduce GHG emissions by at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020. Despite some decisions which assumed guarantees of Kyoto Protocol continuity, Japan, the Russian Federation, Canada, and New Zealand stated that they would not participate in the next commitment period of the Kyoto Protocol (UNFCCC, 2013).

### *2.2. European Union Emissions Trading Scheme - EU ETS*

The first large emissions trading market, the UK Emissions Trading Scheme (UK ETS) was developed in 2002, through an auction of 4.028 $MtCO_2e$. In 2007 this program ceased its activities, but it led to the creation of the EU Emissions Trading Scheme (EU ETS), which began operating in January 2005. The first phase of compliance with reductions lasted from 2005 to 2007; the second from 2008 to 2012, coinciding with the first commitment period of the Kyoto Protocol; and the third will span from 2013 to 2020 (DECC, 2005; DEFRA, 2005; UK, 2005).

The European market initially emerged in order to help countries meet the targets set by the Kyoto Protocol. The EU ETS Commission created a Linking Directive, which functions as a regulatory regime that determines the relationship between the Kyoto Protocol and EU ETS. The Linking Directive allows institutions included in the EU ETS to use Clean Development Mechanisms (CDM) carbon credits to meet their commitments (IETA, 2005; Point Carbon, 2013; World Bank, 2013).

Each European member has to develop a National Allocation Plan (NAP), a document that establishes the amount of GHG emission allowances (emission permits) to be distributed to their industries and power plants. Each company must adjust its polluting profile to remain within the established quota; if it exceeds the emission limit, it is allowed to buy permits, and if it is below, it can sell them. Covering about 12,000 facilities in the first phase, the scheme included the energy, metal and steel, pulp and paper, cement, and ceramics and glass sectors. At this stage, only carbon dioxide ($CO_2$) emissions were regulated.

In 2012 the aviation sector was included, and many others changes are expected for Phase 3 of the EU ETS from 2013, such as the possible inclusion of other sectors, and other countries such as Norway, Iceland, and Liechtenstein. Emissions limits for countries will fall by 1.74% per annum through 2020, and there will be a substantial increase in the number of allowances auctioned (from below 4% thus far to over 50%). Other gases and sources will also become part of the EU ETS, such as $CO_2$ from petrochemicals, ammonia, and aluminum; $N_2O$ from adipic, nitric, and glycolic acids; perfluorocarbons from the aluminum sector; and $CO_2$ capture, transport, and geological storage (DEFRA, 2005; World Bank, 2013).

## 3. Theoretical background

The dependent variable in this paper is Emission Reduction Success (ISSUSUC); this calculation was considered based on GHG reductions, but carried out differently between the two programs, assuming the following formulations:

*A- Reduction Success in Clean Development Mechanism cases*

Relationship between the projected reductions in existing previous document, and real emission reduction observed by a monitoring process (Risoe, 2013; UNFCCC, 2013).

*B - Reduction Success in EU ETS cases*

Following the same reasoning defined by RISOE related to CDM, we can consider Reduction Success to measure the relationship between emissions verified by a monitoring process compared to the number of emission permits, over a specific period (EU ETS, 2013).

In order to understand the factors that can affect Emission Reduction Success, this study analyses institutional and microeconomic variables.

### *3.1 Institutional variables*

North (1990) classifies "institutional environment" through a macroeconomic approach, defining institutions as "rules of the game", and organization as "players". Institutional frameworks, by defining property rights and institutions (formal or informal), affect economic performance. The "institutional environment" is crucial to investors' decisions about investing in a given region. "Institutional arrangements" feature a microeconomic approach, and are related to "commitments" between two or more parties, as long as they take into account regulations in the prevailing institutional environment in which they operate. Shifts in economic resources result in institutional changes, and better-defined property rights increase the value of resources. In other words, the more certain the legal protection of property, the greater the potential investor interest.

Well-defined property rights imply low costs in: making contracts; searching out information and partners; negotiating; and concluding bargains. By the same reasoning, certainty and incentives for productive behavior may arise on the basis of many institutional characteristics, including those related to protection of private property rights, such as generality, transparency, and accountability in public decision making; and the expectation that the institutions will be properly implemented. Consequently, in this scenario agents are more willing to engage in economic transactions. Moreover, the risk of undertaking entrepreneurial activities is assumed to be reduced, which may also stimulate the rate of entrepreneurship (Baumol, 1993; Foss, 2008).

North (1990) posits that "the major role of institutions in a society is to reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction." Moreover, well-established institutions can result in a decrease in transaction costs by means of reducing uncertanty; consequently, the lower transaction costs, the more such activity will take place (Agarwal *et al*., 2010). By the same reasoning, property rights protection is related to corruption: the lower the level of corruption, the greater the investor certainty about the "rules of the game" and confidence in investing (Barzel, 1997; North, 1990; Williamson, 1985). According to Baumol, 1990 (*apud* Foss, 2013), by giving political and economic actors incentives to behave honestly and predictably, high quality institutions help to stimulate productive behavior, contributing to economic growth.

In keeping with these ideas, it is possible to associate Emission Reduction Success in emission reduction projects with productivity, considering that the better an institutional environment for economic development, the better the predicted emission reduction in carbon projects.

In addition to institutional variables associated with economic freedom, we also considered the degree of investment, business, and fiscal freedom that mark the fields of economic exchanges, which help in understanding how the institutional environment affects investment decisions, and in turn affect Emission Reduction Success. Another economic freedom variable that this study considers is the degree of openness to international trade, considering that greater trade between countries may imply more access to international opportunities (Wacziarg, 2001; Madsen, 2008 *apud* Foss, 2013), and also more emission reduction projects. Moreover, freedom to invest could increase the rate of technology adoption, and therefore better emission reduction estimation. Finally, we argue that public regulation is an important component in any measure of economic freedom, and consequently in emission reduction project implementation.

Considering the role of institutional frameworks in Emission Reduction Project development, in this study we assume that institutional country variables correlate with Emission Reduction Success, suggesting the hypothesis:

H1: Institutional characteristics of the host countries (such as transaction costs, property rights, and corruption) influence the Emission Reduction Success of Clean Development Mechanism projects as well as EU ETS.

### *3.2 Microeconomic variables*

From the microeconomic point of view, economies of scale apply to a variety of organizational and business situations and at various levels, such as business or manufacturing unit, plant, or an entire enterprise, where an initial increase in size or speed of operation leads to greater efficiency. It can be inferred that learning-by-doing is correlated to economies of scale, which helps to explain why companies grow more in some industries. This study hypothetically considers scale to be negatively related to Emission Reduction Success, as larger projects present greater difficulty in estimating emissions reduction. Another variable analyzed is the volume of GHG emission reduction, and hypothetically volume is negatively related to Emission Reduction Success, again because larger projects present greater difficulty in accurately estimating GHG emissions reduction.

Ying (1967) pointed out that the “learning” process is used in dynamic programming, and also found in strategic planning and chess. “Doing” refers to the capability of workers to improve their productivity by regularly repeating the same type of action, thereafter developing greater productivity through practice and self-perfection. Learning-by-doing plays a role in economic evolution, through specialization in production, and provides an engine for long-term growth (Arrow, 1962).

In this research we connect learning-by-doing with “time”, the period over which an emissions reduction project is developed. The more recent a project, the more accurate the Emission Reduction Success, because it is assumed that developers of CDM or EU ETS have learned more about how to build them, and how to better estimate GHG emission reduction. This study hypothetically considers more recent dates to be positively related to Emission Reduction Success, since the newer a project, the more precise the estimates of GHG emission reduction.

The classical breakdown of economic sectors can be separated into: primary, involving retrieval and production of raw materials; secondary, conversion of raw or intermediate materials into goods; and tertiary, including services to consumers and businesses. Sector activity can affect market framework, being a determinant of production performance (Bezanko, 2006). Along these lines, it is possible to consider sector relevance in emission reduction projects, and hypothetically we can affirm that Emission Reduction Success is influenced by sector.

Considering the role of microeconomic characteristics in carbon projects, in this study we hypothetically assume that microeconomic variables correlate with Emission Reduction Success, suggesting the hypothesis:

H2: Microeconomic features of projects (such as sector, scale, GHG volume reduction) influence the Emission Reduction Success in the Clean Development Mechanism and EU ETS.

**4. Data, measures, and econometric model**

In order to test the hypotheses, this study develops an econometric model of linear regression, estimated by ordinary least squares (LSO), as shown in Table 1, which presents the estimation of parameters of the tested model, outlined as:

$$ISSUSUC_{i,t} = \alpha + \beta X_{i,t} + \gamma W_{i,t} + \delta Z_{i,t} + \varepsilon_{i,t}$$

Where *ISSUSUCi,t* stands for Emission Reduction Success in sector and country i observed in year t; X is a set of variables expressing microeconomic features of projects; W includes variables related to structural institutional characteristics of the hosting countries; and Z embraces control variables aiming to capture short-term macroeconomic effects, measured by GDP. Regarding multicollinearity of variables, according to the econometric model adopted this is controlled by the criteria of tolerance and VIF, confirming the need to exclude variables CORRUPTION and NINST due to multicollinearity problems. Outliers were also excluded (ISSUSUC > 500%). Heteroscedasticity, was measured with the Goldfeld-Quandt test. The hypothesis of homoscedasticity was not rejected.

The information source for microeconomic variables related to CDM projects is official data described in the Convention of the United Nations Framework on Climate Change and the UNEP Risoe Centre on Energy, Climate, and Sustainable Development (Risoe, 2013; UNFCCC, 2013).

For EU ETS, the data source used is the EU ETS official site (EU ETS, 2013). For Clean Development Mechanism projects, the sample refers to total CDM projects already implemented, registered and that had carbon credit issued by March 2013. For EU ETS, data refers to allocated allowance up to January 2013.

Macroeconomic variables include institutional variables as explanatory *proxies* for Transaction Costs. The data source for institutional variables is the Heritage Foundation (Heritage, 2013), related to the available index, referring to June 30, 2012.

#### *4.1.1. Institutional variables*

Institutional variables can be divided into:

a) *Legal Framework*: property rights and freedom from corruption.

b) *Direct-acting government*: fiscal freedom and government spending.

c) *Regulatory Efficiency*: business freedom, labor freedom, and monetary freedom.

d) *Open markets*: trade freedom, investment freedom, and financial freedom (Heritage, 2013b).

- Property Rights (PROPER) is an assessment of the ability of individuals to accumulate private property, secured by clear laws and enforced by the state.

- Freedom from Corruption (CORRUPTION) refers to economic insecurities and uncertainties.

- Fiscal freedom (FISCAL) is a measure of the tax burden imposed by the government, which includes direct taxes as a percentage of Gross Domestic Product (GDP).

- The labor freedom component (LABOR) is a quantitative measure that considers various aspects of the legal and regulatory framework in the labor market of the countries, including regulatory measures relating to minimum wages, laws that inhibit layoffs, demands for reparations, and measurable regulatory restrictions on hiring and hours worked.

- Monetary freedom (MONET) combines a measure of price stability with an assessment of price controls. The score for the monetary freedom component is based on two factors, the weighted average rate of inflation over the last three years, and price controls.

- Trade Freedom (TRADE) is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services.

- Business freedom (BUSINS) is a global indicator of the efficiency of government regulation of business, according to the Freedom of Investment Index (Investment Freedom, INVEST).

- Financial Freedom (FINANCIAL) is a measure of bank efficiency, independence from government control, and absence of interference in the financial sector.

- Official measures of interbank interest rates, and GDP (Gross Domestic Product and TaxRate).

### *4.1.2. Microeconomic variables*

Independent microeconomic variables related to project specificities, and directly related to emission reduction projects are selected in this paper as:

- The scale of a project (SCALE) is the average of the Verified Emissions and Emission Permit. It aims to capture the influence of the amount of emission reductions on Emission Reduction Success in EU ETS.

- The number of facilities/projects (NINST) is the number of plants in EU ETS that emit greenhouse projects based on Emission Permits acquired.

- Sector activities in EU ETS are: energy, metallurgical, construction, paper and pulp (STENERGIA, STMETAL, STCONSTR, STPAPEL) and are variable dummies for the sectors.

- Sector activities in CDM projects refer to categories of projects defined by the UNFCCC (2009). This paper analyzes: biomass projects (BIOMASS); mine methane/coal (coalbed); energy efficiency (EE); energy efficiency (EOWNGEN); hydroelectric projects (HYDRO); and wind energy projects (WIND).

- Volume of carbon certificates issued (KCERT) is the total volume of greenhouse gases reductions in CDM projects, which is equal to the total volume of emission reductions actually observed in the projects.

- Project deadline is the same as the duration of the project in years stipulated at the beginning of the CDM approval process (Durat).

- Year is the time that the project was registered with the CDM Executive Board (REGIS). In EU ETS, years of checking the emission permit records (D2006 to D2011) are variable dummies for each year.

| | EU_ETS | | CDM | |
|---|---|---|---|---|
| **Dependent Variable** | **ISSUSUC** | | **ISSUSUC** | |
| | | | | |
| **(Constant)** | 109.915 | | -41.968 | |
| | (103.696)) | | (15.623) | |
| **ESCALA** | -0.124 | *** | | |
| | (0.047) | | | |
| **KCERT** | | | 0 | *** |
| | | | 0 | |
| **DURAT** | | | 0.038 | *** |
| | | | (0.008) | |
| **STENERGY** | -8.328 | ** | | |
| | (4.268) | | | |
| **STMETAL** | 12.337 | ** | | |
| | (5.049) | | | |
| **STCONSTR** | 19.874 | *** | | |
| | (4.329) | | | |
| **STPAPER** | 22.42 | *** | | |
| | (5.166) | | | |
| **HYDRO** | | | 0.282 | *** |
| | | | (0.03) | |
| **WIND** | | | 0.317 | *** |
| | | | (0.032) | |
| **BIOMASS** | | | 0.226 | *** |
| | | | (0.037) | |
| **EOWNGEN** | | | 0.129 | *** |
| | | | (0.045) | |
| **COALBED** | | | -0.022 | |
| | | | (0.077) | |
| **PROPER** | -0.341 | * | -0.002 | |
| | (0.280) | | (0.003) | |
| **CORRUP** | | | 0.009 | * |
| | | | (0.005) | |
| **FISCAL** | 0.53 | *** | 0.002 | |
| | (0.151) | | (0.006) | |
| **BUSINS** | 0.796 | *** | -0.007 | *** |
| | (0.254) | | (0.002) | |
| **LABOR** | 0.353 | *** | -0.006 | *** |
| | (0.121) | | (0.002) | |
| **MONET** | -0.718 | | -0.003 | |

| | | | | |
|---|---|---|---|---|
| | (0.61) | | (0.005) | |
| **TRADE** | 0.073 | | -0.005 | |
| | (1.144) | | (0.006) | |
| **INVEST** | -0.311 | | 0.004 | |
| | (0.26) | | (0.002) | |
| **FINANC** | -0.244 | | 0.004 | |
| | (0.23) | | (0.003) | |
| **TAXRATE** | 1.697 | *** | -0.011 | |
| | (0.417) | | (0.007) | |
| **GDP** | -0.003 | * | 0 | |
| | -0.002 | | 0 | |
| **D2006** | 1.515 | | | |
| | (5.295) | | | |
| **D2007** | 0.806 | | | |
| | (5.242) | | | |
| **D2008** | -4.415 | | | |
| | (5.201) | | | |
| **D2009** | 28.991 | *** | | |
| | (5.201) | | | |
| **D2010** | 31.563 | *** | | |
| | -5.177 | | | |
| **D2011** | 23.662 | *** | | |
| | -5.276 | | | |
| **REGIS** | | | 0.021 | *** |
| | | | 0.008 | |
| **N** | 1442 | | 1575 | |
| **R Square** | 0.173 | | 0.139 | |
| | | | | |
| **Adjusted R Square** | 0.161 | | 0.127 | |
| **F** | 14.144 | *** | 11.377 | *** |

**Table1. Econometric Model, explainable variables**

## 4.2 Analysis of the results

In the EU ETS market, variables related to the size of the project (SCALE) were significant at 1%, meaning that the higher the projected volume of reductions, the lower the rate of Emission Reduction Success (ISSUSUC). Greater difficulty in meeting the target can probably be related to difficulties in forecasting and monitoring emissions in large and complex projects. As project size is intrinsically related to the sectors in which projects were developed, it can be inferred that success is ultimately affected by sector.

Almost all sectors are significantly related to ISSUSUC (Emission Reduction Success), so project activities are directly linked to the success of emission reduction in EU ETS, as well as CDM projects. Regarding the Clean Development Mechanism, the industry in which the CDM project is developed influences the success of emissions reduction, significant at 1% with the exception of Coalbed sector.

Regarding the time factor, the year of project registration confirms the principle of learning-by-doing, since the most recent projects are more successful in reducing emissions than older ones. The estimated coefficient was significant at 1%. There is also a positive relationship between Emission Reduction Success and project timeframe, significant at 5%. There is a strong relation between ISSUSUC and the economic crisis at the end of the last decade: the more recent a project, the more significant years related to Emission Reduction Success (ISSUSUC).

Some macroeconomic institutional variables, fewer in the CDM then in EU ETS, were significant, such as freedom of business and work. Legal and Open Market variables (property law, monetary freedom, trade, investment, and finance) showed no significant bearing on Emission Reduction Success (ISSUSUC). However, some variables of regulatory efficiency, such as fiscal freedom, freedom of labor, and interest rates showed a positive relationship with the ISSUSUC. It can be assumed that, the greater the control over certain aspects of business activity, the greater the incentive to emit below the emission volume permitted, corroborating the idea that regulation has a positive influence on Reduction Success. For CDM projects, a low level of corruption tends to increase the success rate of projects, bearing in mind that the more corrupt governments are closer to zero on the corruption index.

In conclusion, these analyses confirm the hypotheses that there are relations between microeconomic variables and Emission Reduction Success in both programs. Nevertheless, microeconomic variables have more influence on CDM projects than on EU ETS. Institutional variables also affect Emission Reduction Success, but are generally more significant to EU ETS than to CDM projects.

In the short-term scenario, macroeconomic factors significantly affect reductions in carbon emissions. The coefficients of the dummy variables associated with the financial crisis of the late 2000s show that the reduction in the level of economic activity has contributed positively to the reduction of emissions.

## 5. Conclusion

Emissions reduction projects, whether cap-and-trade through EU ETS or Clean Development Mechanism projects, are governed by rules and international legal definitions outlining emission property rights, which determine the level of GHG reductions and emission limits. These two programs each have a complex institutional framework supporting two markets, with many similarities and some important differences, including transaction costs.

Explanatory variables intrinsic to individual projects play an important role in the success of reduction projects, as do institutional variables, albeit more so for the CDM than the EU ETS. A relevant factor in Emission Reduction Success is the sector of each project. For EU ETS, pulp and paper industries, construction, and metallurgy have a positive relationship with respect to Emission Reduction Success. In the case of CDM, all sectors are relevant, with the exception of the coalbed sector.

The other significant microeconomic variable is scale: the greater the number of facilities, the lower the rate of Emission Reduction Success, suggesting that the larger the project, the more difficult it is to accurately estimate emissions.

With regard to macroeconomic variables, those related to legal frameworks and open markets showed no significant bearing on Emission Reduction Success in both market types. In this sense, the variables of property law, monetary freedom, and trade, investment, and financial freedom show no strong explanatory relationship with Emission Reduction Success projects in EU ETS. On the other hand, some variables of regulatory efficiency, such as fiscal freedom, freedom of labor, and interest rates showed a positive relationship with Emission Reduction Success. One hypothesis that justifies this could be that the more control exercised over certain aspects of business activity, the greater the incentive to remain within the permitted emission volume, corroborating the idea that regulation has a positive influence on Emission Reduction Success.

This study makes clear the importance of institutional variables and microeconomic characteristics in Emission Reduction Success projects in CDM and the EU ETS. However, institutional variables have more significance to EU ETS than in CDM. Institutional factors showed a strong influence on emissions, particularly during periods of economic crisis. This suggests that emission reduction markets can be improved by redefining goals in tune with short-run macroeconomic performance.

Both microeconomic and macroeconomic factors influence Emission Reduction Success of CDM projects and EU ETS. However, institutional variables are generally less significant to CDM projects than to the EU ETS.  Unfortunately, carbon markets have been affected by the global economic crisis, the lack of a clearly-defined international climate change deal, and unfavorable policy shifts in some countries. There is nevertheless a willingness to link different schemes, which could facilitate the transition from the current fragmented emissions trade towards a global carbon market.

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