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# Green Tax

## A Bibliometric Analysis

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### **ABSTRACT**

In this study we provide a bibliometric overview regarding available articles in SCOPUS data base about green tax and double dividend. The results show that the theme has recently become more popular, with most articles affiliated with European countries. Additionally, the most influential authors are Goulder L.H., and Bovenberg A.L. and van der Ploeg F., being Bovenberg considered the most productive author of the sample. Regarding the sources of publication, we identified that the most influential journals are Environmental and resources economics and Energy economics, where most of the articles are published. Finally, through keyword analysis we concluded that green tax focus areas are often related to Double Dividends, Sustainable Development, Environmental Fiscal Reform and Market-Based Instruments, while double dividend focus areas are related to Environmental Tax Reform, Environmental Policy, Economic Growth, Employment, Optimal Taxation and Carbon Tax demonstrating that these are the most influential topics on the subject.

Keywords: Green tax; Double dividend; Bibliometric analysis; VOSviewer

### **INTRODUCTION**

The theme on the environment is not new, in recent years there have been some concerns to protect the environment and nature. This awareness began to evolve with the industrial

revolution and, later, an increased concern arose with the harmful effects of human action on nature and the repercussions caused by world wars.

These negative impacts that modern society entails are vast and require urgent measures so that the destructive tendency is changed and the pressure on resources and the natural system is alleviated. Specific legislation then began to be created and goals were established for the community with a view to preservation. It is at this moment that the concept of environmental tax and its derivatives arises.

Today, climate action has gained another boost thanks, in large part, to the expression of environmental activists and to the goals and commitments of the international community through the Paris Agreement. (OECD, 2018; UNFCCC, 2015) With this impulse also increases the number of investigations and scientific opinions making it difficult to monitor scientific production.

The objective of this study is to develop a significant reference for researchers with an interest in the theme of *Green tax* and *Double dividend*, as we provide an evaluation and perspective of the scientific literature with greater potential, contributing to increase the rigor of research specialties in this theme.

This research also discusses the elements on which environmental taxation is based and the basis for a green tax reform. This results in the importance of deepening the knowledge about what is meant by *Green Tax* and the *Double Dividend*.

Internationally, the studies developed in the context of environmental taxation are mostly concerned with the evaluation of the implementation of the Environmental Tax Reforms (ETR), as well as the "dividends" obtained, these are mostly studies from Europe.

A green tax reform seeks to fulfill two purposes of taxes: raising revenue and changing the behavior of taxpayers, focusing on social and environmental sustainability.

These objectives are achieved by using taxes as instruments of environmental policy, sending signals to the market, placing the tax burden on elements harmful to the environment and alleviating ordinary taxation. In this way the replacement will allow to achieve a multiplicity of fiscal and social objectives, the so-called double dividend.

The possibility of this fiscal policy being able to provide, simultaneously, the balance of public accounts and sustainable growth has caused the volume of scientific research on the subject to gradually increase, contributing to the wealth of data.

With this increase, it becomes important to evaluate the scientific production, not only for the recognition of researchers, but also to allow academics to follow the relevant literature.

The choice of the empirical study is related to the scarcity of bibliometric analysis methodologies, in *Green Tax and Double Dividend*, with the use of *VOSviewer* considered an advanced instrument of these analyses and relationships.

In this sense, and to carry out this study, we proceeded to the collection and processing of reliable and adequate information using the content provider *SCOPUS*. From which we collected published articles delimited by the criterion of keyword, area of study and type of scientific production, considering for this study only scientific articles, without any temporal limitation to be able to analyze all the articles available on these themes, comprising a period of 25 years from 1994 to 2019.

## **LITERATURE REVIEW**

The year 2018 was a year marked by numerous ecological disasters, referred to in chapter four, and species extinction. With these current disasters it is necessary to impose some social changes and for this it is necessary that people and governments change consumer behaviors.

Since the concern about global warming, environmental taxes have been playing an important role in the EU's environmental policies. In the Europe 2020 strategy, environmental tax reform is an important and inevitable element in achieving a smart, competitive, sustainable and inclusive economy. (European Commission, 2010)

This chapter aims to provide the necessary bases for the understanding of this theme and for this it is necessary to use a framework of the types of management and economic instruments to introduce the concept of environmental tax. From this concept we were able to introduce the origin of environmental tax reforms that, in turn, generate the double dividend hypothesis.

### **Management Instruments and Economic Instruments (EI's)**

Conventionally, regulation and control management instruments, such as laws and regulation, have been used to deal with externalities. However, this type of management called *Regulatory or Command and Control (CAC) Approach* was preferentially used until the 70's, when economic instruments began to gain importance due to the fact that the regulation and control

regime is inefficient, because (i) it requires the same compliance with standards by all sources of pollution, Regardless of the marginal costs, (ii) high demands in technical and bureaucratic terms both in their definition, implementation and even in control and analysis, (iii) they are expensive and slow to apply instruments and (iv) promote small technological incentives. (Hawkins, 2000)

In mid 1972 OECD members were recommended to implement the polluter pays and user pays principles which were subsequently published in the Treaty on European Union Article 174(2). These principles aim, regardless of the existence of fault or intent, to make the polluter responsible by reflecting in the cost of goods and services the cost of production, environmental and social costs, making activities harmful to the environment less advantageous from an economic point of view.

To apply them it is necessary to resort to political instruments and, since the instruments of regulation and control alone are not efficient, the use of economic instruments that directly address the disadvantages of the previous ones arises, allowing to promote the reconciliation of environmental and social concerns, to value natural resources and to stimulate behavioral change.

However, to be effective, they must affect the costs and benefits of the choices of economic agents to boost the improvement of the environmental situation. The Economic Instruments must be different and appropriate for different countries, being subdivided into five groups (Hawkins, 2000): Fees and taxes; Subsidies; *Deposit-refund systems*; Creation of markets and financial incentives.

## **Definition of Environmental Tax**

The relevant literature on this subject emerged during 1980, however the main reference work in environmental economics was that of *Arthur Pigou* who in 1920 suggested taxing pollution to internalize the negative externalities of economic activities in the environment. This proved to be an efficient way to correct some market failures and help economic agents to take into account the cost of pollution when making their decisions. <sup>1</sup> (Bovenberg & De Mooij, 1994)

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<sup>1</sup> Negative environmental externalities are seen as reductions in the availability of public goods, such as clean air and water, biological diversity, and global climate. Externalities related to economic and business activities lead

This "new" instrument of taxation was dubbed *Pigouvian Taxes* by Bovenberg & De Mooij (1994) and, in accordance with what was said earlier, contributes to the optimization of social welfare not only by confronting the polluter with a price that reflects the true social marginal cost but also by creating an environmental tax that will generate revenues allowing to reduce or eliminate other distorting taxes, thus changing the weight of the factors considered as growth (capital and labor) to elements of reduction of well-being, as the case of the exhaustion of resources and pollution. (A Lans Bovenberg & de Mooij, 1994; Gouveia & Palma, 2018; Hjøllund & Svendsen, 2001; Sandmo, 2011);

However, and for the tax to be efficient, *Pigou* recommends that it be applied directly and uniformly per unit of pollutant emission. The existence of a uniform tax means that companies would reduce emissions to the point where the marginal cost of reducing an extra unit is equal to the tax rate. If the tax rate were not uniform each company would face a different rate. (Hjøllund & Svendsen, 2001)

The particularity that, in the event of no action, the costs of environmental damage are potentially high suggests that the stance of environmental policy, in relation to global warming, should be quite aggressive. (Klok, Larsen, Hansen, & Dahl, 2006; Pearce, 1991)

As such, this tax is often seen as an instrument that improves the alignment of tax rates because they are also used to confront the user with the social cost of consuming polluting environmental services or with a polluting process, reflecting it in prices, in order to encourage agents to minimize the level of consumption harmful to the environment and a more efficient use of available natural resources, complying with the extrafiscal character of the tax figure. (Jackson, 2010; Klok et al., 2006; Pearce, 1991; Sandmo, 2011)

We can therefore see that, in order to promote sustainable development and adopt the precautionary principle, environmental taxes are subdivided into taxes on energy, transport, pollution and taxes on resources, since these are the goods and services that are likely to degrade the environment through their production, consumption and/or disposal. (Gouveia & Palma, 2018)

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to a reduction in the supply of these goods, while the reduction of externalities leads to the restoration of goods. (Sandmo, 2011)

However, the main difficulty encountered is the quantification of the value of environmental goods so that it is possible to have an idea of the cost-benefit and the estimation of future impacts. (Klok et al., 2006)

It was then that in 1990 some European countries decided to implement environmental tax reforms that we will discuss below. (Klok et al., 2006; Pearce, 1991)

### **Definition of Environmental Tax Reform (ETR)**

Since, as stated earlier, environmental taxes increase public revenue, this can be used to reduce other taxes or fees thereby alleviating the increase in environmental costs for businesses and consumers. In this way, a policy of combining the tax burden was introduced, in which the revenue is neutral (fiscal neutrality), with the name of Environmental Tax Reform.

However, the definition is also the subject of discussion, and this is directly related to the nature of the use of revenues (recycling) from new environmental taxes or increase of existing taxes, the approaches are divided into: (i) Recycling revenues through tax reduction; (ii) Support environmental projects and initiatives using part of the revenues; (iii) Use the proceeds for compensation.

Clinch, Dunne, & Dresner, (2006) present various ways of using recipes as well as their economic, environmental, and political and social acceptance.

One of the ways presented is to resort to the recycling of revenue by dividing a portion for the financing of environmental projects and the other portion for the reduction of the tax on labor. This approach makes it possible to focus on more obvious environmental measures to increase the acceptance of the reform and lower costs if these are efficient projects.

This balance between project financing and tax relief should consider and depend on labor market conditions, the success of projects and the government. Being seen as a socially and politically accepted instrument.

Another form of recycling is to apply the revenue in order to reduce the regressive aspects of energy taxes by preparing a support system to protect those most vulnerable to the results of the reform. Clinch et al., (2006) present suggestions such as: reduce or change indirect taxes; return a global amount equal to each household, corresponding to the average value of the energy tax or make the structure of the tariff, the energy tax, progressive, among others.

For these reasons, these reforms have become an important tool for taxation or *pricing* as they improve the tax systems used while reducing environmental damage and achieving social gains. <sup>2</sup> (Pearce, 1991) Thus providing a justification for a progressive increase in revenues generated through environment-related taxes to reduce taxes derived from other, often distorting, sources, such as income, profits, and employment.

However, Hawkins (2000) states that the main particularity of these is the dependence and interaction of the market. For other authors, the FRG is characterized as a process by which taxation, on the consumption of resources, pollution or energy, is increased while (by recycling) the burden on labor, capital or personal income is decreased to promote fiscal neutrality, conferring social advantages (double dividend) such as the optimization of the level of employment, increased savings and investment. (Ekins & Barker, 2001; Silva & Chaves, 2015)

In this way and to assist in the design of policies, the scientific community has been developing mathematical models. These have been an essential tool to identify the best policy or mix of policies for governments to plan and make decisions taking into account a better balance between environmental and economic objectives and thus avoid substantial costs to the economy and estimate the possible benefits that may result in the scope of environmental taxation. (Gouveia & Palma, 2018; Mota & Palma, 2015)

The most used types of mathematical models are:

- i. *Input-Output*: to analyze the interdependence of industries in the economy;
- ii. *Computable General Equilibrium (CGE)*: group of economic models that are essentially empirical versions of the *Walsarian General Equilibrium System* that apply the assumptions of neoclassical theory, used by (Pereira & Pereira, 2014);
- iii. *Linear Programming Models*;
- iv. *Non-Linear Programming Models*;
- v. *Macroeconomic Models*.

In addition, it is important to take into account that the results should be interpreted as relative and be complemented with empirical studies and over-regulation should be taken into account,

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<sup>2</sup> They are based on taxing the factors of production: Capital and Labor (Pearce, 1991)



that is, overlapping law over law without thinking about the cumulative effect of the measures hindering the execution of taxation. (Hawkins, 2000)

In short, an ETR involves the use of environmental fiscal policy instruments to reflect the costs of environmental damage in the prices faced by polluters and users of polluting products/services and in turn this increase in public revenue is implemented in a way that is useful to society. This implementation is called the Double Dividend. (Clinch et al., 2006)

It is also important to analyse the real costs of implementing this reform because, although it has many advantages, it has some political-economic, legal and social weaknesses that may hinder its implementation. (Borges & Merlin, 2018)

Environmental impacts can be analysed in two ways: using *ex ante* analyses, predicting the possible effects, or *ex post* analyses, analyzing the real facts, as well as achieving the economic, political and social effects of energy taxation. (Clinch et al., 2006)

However, in addition to there being numerous studies on ETR, there is no clear tendency to emphasize the environmental impacts known as the first dividend. This disadvantage coupled with the difficulty in estimating the efficient rate and monetarily quantifying the value of environmental damage or benefit, underlying the fact that it is technically difficult and expensive, makes it difficult to anticipate this same impact. (Clinch et al., 2006)

However, according to Clinch et al. (2006), assuming that environmental taxes are based on scarce resources or substances with polluting emissions, these will have a higher price than other resources or substances, so we can get some answers estimating the elasticity of prices.

Although it should be borne in mind that if, at the same time, the tax rate is set at a relatively low level, and the demand for this resource is relatively insensitive to price changes, and if the revenue is not used to subsidise renewable energy, invest in energy saving or research and development, it will be difficult to achieve the environmental objective determined by jeopardising environmental efficiency. (Baranzini, Goldemberg, & Speck, 2000; Clinch et al., 2006)

There are also factors that must be taken into account that can reduce environmental efficiency, such as inflation and the entry of new pollutants into the market. (Baranzini et al., 2000)

However, the macroeconomic environment, impacts on competitiveness, inequalities between sectors and regressivity entail various political and economic costs. (Clinch et al., 2006)

## Definition of Double Dividend

In theory, the ETR is associated with two principles: revenue neutrality and the achievement of the double dividend through governments' use of environmental tax revenues to lower other taxes. (A Lans Bovenberg & de Mooij, 1994; Mota & Palma, 2015) But the big question discussed by several authors is whether the implementation of an environmental tax reform is capable of giving rise to the double dividend; what will be the type of application of the revenue; and what sign (positive or negative) it assumes, thus contributing to a vast although controversial literature. (Borrego, 2016)

According to Clinch et al., (2006), it is first important to distinguish the effect of "revenue recycling" from "revenue increase". Revenue recycling consists of using the revenue from environmental taxes to reduce existing taxes, mostly distorting rather than setting a *lump-sum*.

Second, it is important to present a definition of the first and second dividend. Apparently, this does not exist in the literature, however the most usual and adopted by researchers is the first dividend, known as the Environmental Double Dividend, cover the negative externality of economic activities in the environment thus assuming a benefit or gain of well-being resulting from the improvement in the environment while the second dividend, known as the Double Economic Dividend, encompass the non-environmental welfare benefits.

Fullerton & Metcalf, (1998) contains, in the article, a literature review of studies and models of the double dividend that conclude with 3 main points:

1. The validity of the double dividend hypothesis cannot be resolved as a general question. Under certain circumstances the exchange of environmental taxes can improve the environment and reduce the burden on the system.
2. The emphasis in the literature on the importance of revenue is misguided. Three types of policies can have equivalent effects on the environment and labour supply. One of the policies increases revenue from the environmental component, another loss of revenue, and the other with no associated revenue.
3. Different regulatory approaches are available and not all regulations create scarcity rents.

With regard to the literature on the application of revenue and the associated economic gains, which will be seen in more detail below, it is interesting to note that they assume an indefinite

amount of forms all these associated with tax benefits, economic growth (L.H. Goulder, 1995; Peng et al., 2019; Shi, Qiao, Shao, & Wang, 2019), economic well-being (Baranzini et al., 2000; Clinch et al., 2006; Koskela, Schöb, & Sinn, 1998) and employability (A Lans Bovenberg & De Mooij, 1994; Chaturvedi, Saluja, Banerjee, & Arora, 2014; Clinch et al., 2006; Pearce, 1991)

Since the European authors argue that the double dividend leads to a decrease in unemployment and consequently an increase in competitiveness (A.L. Bovenberg & van der Ploeg, 1994; A.L. Bovenberg & Van Der Ploeg, 1998), while the American authors assume the double dividend as a gain in reducing the negative impact of the tax system on the economy, making it more efficient and competitive by reducing taxation on capital, income, among others. (Borrego, 2016; Lawrence H. Goulder, 2013; Mota & Palma, 2015)

Regarding the question of which sign (positive or negative) assumes the double dividend in the implementation of a Federal Jar, the studies that defend that this presents a positive sign claim to be associated with the decrease in unemployment, because as the revenues from environmental taxation increase, so does the taxation on labor and social security contributions, thus providing an incentive for employability. (Clinch et al., 2006; Ekins & Barker, 2001; L.H. Goulder, 1995)

In turn, the negative sign is associated with the distortion of the purchasing power of households through taxation on the most polluting products and the insufficient compensation of the decrease in taxation on income, and there is also the possibility that, in the presence of distorting taxes, environmental taxation does not fully internalize environmental damage. (A Lans Bovenberg & De Mooij, 1994)

As a rule, the double dividend hypothesis assumes that the two dividends are independent. The introduction of interdependence can generate different policy implications, leading to instruments that do not generate revenue being more efficient than instruments that do. (Lai, 2018)

Given that many studies are focused on evaluating the implementation of an ETR and the associated double dividend, and this is seen to keep up with economic challenges, it is important to detail the economic gains presented earlier and highlight the behavior of the economy when introducing a reform.

The consolidation and balance of public accounts as well as sustainable growth are very important in a Federal Republic of Germany, as such *Goulder* (1995) in his study defined three

types of dividend based on efficient costs being these dividends weak, intermediate and strong, however this definition does not have many supporters. (A Lans Bovenberg & De Mooij, 1994) assume that the conditions imposed by *Goulder* are too strict and prove that one cannot achieve the strong form of the double dividend.

Additionally, they discover the effect of tax interaction while searching for the validity of the double dividend. They concluded that in the presence of distorting taxes the optimum point of the environmental tax should be below the social damage of pollution.

The study conducted by Shi et al., (2019) concludes that if taxes on pollution increase the elasticity of capital production and decrease that of labor and increase the efficiency of resource use that, by convergence, promotes economic growth.

In dissent, Peng et al., (2019), says that energy taxes lead to resource efficiency but if this is excessive it leads to economic decline.

While, according to Freire-González & Ho, (2018) efficiency is achieved whether the revenue from the implementation of a carbon tax is used to reduce taxes on capital, on labor or on value added.

As for competitiveness, it can be defined at the business level as the company's ability to maintain or increase national and/or international market share and profit. (Baranzini et al., 2000) This is influenced by micro-factors such as the cost structure, quality, and stock market, and by macro-factors such as taxes, fees, subsidies, and regime accordingly.

Thus, through an open economy model, we can conclude that the implementation of a moderate environmental tax rate will induce the replacement of energy use by labor, leading to a reduction in costs that, consequently, can lead to a reduction in price thus making the economy more competitive. (Koskela et al., 1998; Metcalf, 2014)

Accordingly, Clinch et al., (2006), conclude that there are only impacts on competitiveness if environmental policy imposes different levels of costs or if countries have different policies and regulations between companies.

Clinch et al. (2006) explores three approaches to ETR and concludes that the most common is the reduction of taxes at work to promote employability, however it will depend greatly on macroeconomic conditions and the labor market (reasonable or perfect competitiveness) in the country in question.

Additionally, the study by Maxim, Zander, & Patuelli, (2019) compares the performance of an ETR that generates double employment dividends in European and non-European countries. The results show that revenue recycling policies and taxes play an important role in employability, however the optimal policy is not identical in European and non-European countries. That is why there is a need for each country to design its policy in such a way as to create an optimal effect on employment, considering its needs.

In short, if the recycling option is to use revenues from environmental taxes to reduce taxes on wages and others that hinder employment, the problem of unemployment can be solved. (Bosello & Carraro, 2001; Chiroleu-Assouline & Fodha, 2009; Kuralbayeva, 2019; Pearce, 1991)

### **Definition of Triple Dividend**

In practice, ETR's can lead to multiple dividends, satisfying other macroeconomic objectives, such as improving the distribution of wealth and reducing public debt, taking a form of fiscal sustainability. (Pereira & Pereira, 2014)

In the study by Pereira and Pereira (2014) the first dividend is always achieved, and the second dividend can be in two ways: increase in GDP or in employability. The increase in GDP occurs if the reform adopts public or private investment policies while the increase in employability occurs if the policies fall on the reduction of social security contributions, by companies, and the personal income tax.

Liu, (2013) suggests that tax evasion may play a potential role in calculating the costs of reform, with certain environmental taxes having unique properties that make them difficult to circumvent. When we consider a green tax change, by changing the tax base from easy to circumvent tax ones to difficult ones we can decrease the total amount of tax evasion.

By using revenues from environmental taxes to reduce pre-existing taxes rather than directing revenues through non-productive transfers. By reducing marginal rates on easy-to-avoid taxes, policymakers can realize the substantial additional benefit of lowering tax evasion overall.

## METHODOLOGY

Our research began, firstly, with the collection of scientific articles published in the various scientific journals about *Green Tax* until September 30, 2019. To this end, and in order to collect only reliable and adequate information to provide an objective answer, we used the *SCOPUS* database as a content provider, as it is considered the largest, and most common, bibliometric database. (Mongeon & Paul-Hus, 2016; Zupic & Čater, 2015)

In the elaboration of the criteria, we tried to include all the existing articles on the referred theme, so the first restriction to be made was that of all the articles presenting, in a comprehensive way, the keyword *Green tax* in order to include articles that have placed only the keyword *Green Tax* or *Green Tax Reform*.

Then, and to make the investigation more complete, the keyword *Double Dividend*, which as previously presented, is one of the principles of environmental tax reforms, was included in the research, like the previous criteria. Totaling, with the two keywords, a sample of 162 articles. Among these 162 articles there were 14 areas of study, from which we chose **Erro! A origem da referência não foi encontrada.** *Economic, Econometrics and Finance* and *Business, Management and Accounting*, having reduced the sample to 107 articles presented in Table 1.

*Table 1 - Articles considered in the study, divided into author(s), title, and year of publication*

Author(s)	Article title	Year of Publication
Shi H., Qiao Y., Shao X., Wang P.,	The effect of pollutant charges on economic and environmental performances: Evidence from Shandong Province in China	2019
Mardones C., Cabello M.,	Effectiveness of local air pollution and GHG taxes: The case of Chilean industrial sources	2019
Andreoni V.,	Environmental taxes: Drivers behind the revenue collected	2019
Weiss J.F., Anisimova T.,	The innovation and performance effects of well-designed environmental regulation: evidence from Sweden	2019
Jacobs B., van der Ploeg F.,	Redistribution and pollution taxes with non-linear Engel curves	2019
Freire-Gonzalez J., Ho M.S.,	Carbon taxes and the double dividend hypothesis in a recursive-dynamic CGE model for Spain	2019
Kuralbayeva K.,	Environmental Taxation, Employment and Public Spending in Developing Countries	2019
Meeks R., Sims K.R.E., Thompson H.,	Waste Not: Can Household Biogas Deliver Sustainable Development?	2019

Author(s)	Article title	Year of Publication
Peng J.-T., Wang Y., Zhang X., He Y., Taketani M., Shi R., Zhu X.-D.,	Economic and welfare influences of an energy excise tax in Jiangsu province of China: A computable general equilibrium approach	2019
Maxim M.R., Zander K.K., Patuelli R.,	Green tax reform and employment double dividend in European and non-European countries: A meta-regression assessment	2019
Maxim M.R., Zander K.,	Can a green tax reform entail employment double dividend in European and non-European countries? A survey of the empirical evidence	2019
Tikoudis I.,	Second-Best Road Taxes in Polycentric Networks with Distorted Labor Markets	2019
Skolrud T.D., Galinato G.I.,	Revenue-neutral pollution taxes in the presence of a renewable fuel standard	2019
Klenert D., Schwerhoff G., Edenhofer O., Mattauch L.,	Environmental Taxation, Inequality and Engel's Law: The Double Dividend of Redistribution	2018
Ma Z., Zhao J., Ni J.,	GREEN TAX LEGISLATION for SUSTAINABLE DEVELOPMENT in CHINA	2018
Perrier Q., Quirion P.,	How shifting investment towards low-carbon sectors impacts employment: Three determinants under scrutiny	2018
Yan S., Eskeland G.S.,	Greening the vehicle fleet: Norway's CO <sub>2</sub> -Differentiated registration tax	2018
Liu A.A., Yamagami H.,	Environmental Policy in the Presence of Induced Technological Change	2018
Silva S., Smith I., Pine C.,	Renewable energy subsidies versus carbon capture and sequestration support	2018
Singh S., Haldar N., Bhattacharya A.,	Offshore manufacturing contract design based on transfer price considering green tax: a bilevel programming approach	2018
S. Rausch, Yonezawa H.,	THE INTERGENERATIONAL INCIDENCE of GREEN TAX REFORM	2018
Caron J., Cole J., Goettle R., Wave C., McFarland J., Woollacott J.,	DISTRIBUTIONAL IMPLICATIONS OF A NATIONAL CO <sub>2</sub> TAX IN THE U.S. ACROSS INCOME CLASSES AND REGIONS: A MULTI-MODEL OVERVIEW	2018
Caron J., Cohen S.M., Brown M., Reilly J.M.,	EXPLORING THE IMPACTS OF A NATIONAL U.S. CO <sub>2</sub> TAX AND REVENUE RECYCLING OPTIONS WITH A COUPLED ELECTRICITY-ECONOMY MODEL	2018
Lai Y.-B.,	The Feasibility of the Double-Dividend Hypothesis in a Democratic Economy	2018
Freire-Gonzalez J.,	Environmental taxation and the double dividend hypothesis in CGE modelling literature: A critical review	2018
Hong C.-Y., Huang C.-H., Li J.-F., Tsai Y.-C.,	Environmental Tax Reform, R&D Subsidies and CO <sub>2</sub> Emissions: View Double Dividend Hypothesis	2018
Chloupkova J., Svendsen G.T., Zdechovsky T.,	A global meat tax: from big data to a double dividend	2018
Mathieu-Bolh N.,	Can tax reforms help achieve sustainable development?	2017

Author(s)	Article title	Year of Publication
Pui K.L., Othman J.,	Economics and environmental implications of fuel efficiency improvement in Malaysia: A computable general equilibrium approach	2017
Islam A.K.M.N., Mitu J.A.,	Green fiscal reform in the context of Bangladesh: A scoping exercise	2017
Alexeev A., Good D.H., Krutilla K.,	Environmental taxation and the double dividend in decentralized jurisdictions	2016
Lai C.-F.,	Examining the double dividend effect of energy tax with the overlapping generations model	2016
Bostan I., Onofrei M., Dascălu E.-D., Firțescu B., Toderășcu C.,	Impact of sustainable environmental expenditures policy on air pollution reduction, during European integration framework	2016
Zárate-Marco A., Vallés-Giménez J.,	Environmental tax and productivity in a decentralized context: new findings on the Porter hypothesis	2015
Tikoudis I., Verhoef E.T., van Ommeren J.N.,	On revenue recycling and the welfare effects of second-best congestion pricing in a monocentric city	2015
Jacobs B., of Mooij R.A.,	Pigou meets Mirrlees: On the irrelevance of tax distortions for the second-best Pigouvian tax	2015
Tuladhar S.D., Montgomery W.D., Kaufman N.,	Environmental policy for fiscal reform: Can a carbon tax play a role?	2015
Nerudova D., Dobranschi M.,	Double dividend hypothesis: Can it be validated by carbon taxation swap with payroll taxes?	2015
Gonand F., Jouvét P.-A.,	The "second dividend" and the demographic structure	2015
Metcalf G.E.,	Using the tax system to address competition issues with a carbon tax	2014
Figge F., Young W., Barkemeyer R.,	Sufficiency or efficiency to achieve lower resource consumption and emissions? The role of the rebound effect	2014
Allan G., Lecca P., McGregor P., Swales K.,	The economic and environmental impact of a carbon tax for Scotland: A computable general equilibrium analysis	2014
Orlov A., Grethe H.,	Introducing carbon taxes in Russia: The relevance of tax-interaction effects	2014
Chaturvedi A., Saluja M.S., Banerjee A., Arora R.,	Environmental fiscal reforms	2014
Andersson D., Nässén J., Larsson J., Holmberg J.,	Greenhouse gas emissions and subjective well-being: An analysis of Swedish households	2014
Markandya A., Gonzalez-Eguino M., Escapa M.,	From shadow to green: Linking environmental fiscal reforms and the informal economy	2013
Goulder L.H.,	Climate change policy's interactions with the tax system	2013
Liu A.A.,	Tax evasion and optimal environmental taxes	2013
Bjertnæs G.H., Tsygankova M., Martinsen T.,	Norwegian climate policy reforms in the presence of an international quota market	2013
Orlov A., Grethe H., McDonald S.,	Carbon taxation in Russia: Prospects for a double dividend and improved energy efficiency	2013



Author(s)	Article title	Year of Publication
Böhringer C., Keller A., van der Werf E.,	Are green hopes too rosy? Employment and welfare impacts of renewable energy promotion	2013
Sun A.,	The establishment of the green tax policy in China - To accelerate the construction of circular economy experimental zone in Qaidam basin of Qinghai province as an example	2013
Fraser I., Waschik R.,	The Double Dividend hypothesis in a CGE model: Specific factors and the carbon base	2013
Rivers N., Groves S.,	The Welfare Impact of Self-supplied Water Pricing in Canada: A Computable General Equilibrium Assessment	2013
By Miguel C., Manzano B.,	Gradual green tax reforms	2011
Pang A., Shaw D.,	Optimal emission tax with pre-existing distortions	2011
By Miguel C., Manzano B.,	Green tax reforms and habits	2011
Jaeger W.K.,	The Welfare Effects of Environmental Taxation	2011
Nakabayashi M.,	Optimal tax rules and public sector efficiency with an externality in an overlapping generations model	2010
Aidt T.S.,	Green taxes: Refunding rules and lobbying	2010
Fernandez E., Perez R., Ruiz J.,	Double dividend, dynamic Laffer effects and public abatement	2010
Kronenberg T.,	Energy conservation, unemployment and the direction of technical change	2010
Chiroleu-Assouline M., Fodha M.,	Double dividend and distribution of welfare: Advanced results and empirical considerations	2009
Andersson J.O.,	Basic income from an ecological perspective	2009
Chen J.-h., Shieh J.-y., Chang J.-j., Lai C.-c.,	Growth, welfare and transitional dynamics in an endogenously growing economy with abatement labor	2009
Beladi H., Chao C.-C., Hazari B.R., Laffargue J.-P.,	Tourism and the environment	2009
Gomez C.M., Lozano J., Rey-Maqueira J.,	Environmental policy and long-term welfare in a tourism economy	2008
Glomm G., Kawaguchi D., Sepulveda F.,	Green taxes and double dividends in a dynamic economy	2008
Takeda S.,	The double dividend from carbon regulations in Japan	2007
Benedict A.M., Jacobsen M.,	Ricardian rents, environmental policy and the 'double-dividend' hypothesis	2007
Røpke I., Godskesen M.,	Leisure activities, time and environment	2007
Albrecht J.,	The use of consumption taxes to re-launch green tax reforms	2006
Heijdra B.J., Kooiman J.P., Ligthart J.E.,	Environmental quality, the macroeconomy, and intergenerational distribution	2006
Patuelli R., Nijkamp P., Pels E.,	Environmental tax reform and the double dividend: A meta-analytical performance assessment	2005
Bayindir-Upmann T., Raith M.G.,	Unemployment and pollution: Is one policy suited for two problems?	2005

Author(s)	Article title	Year of Publication
Sugeta H., Matsumoto S.,	Green tax reform in an oligopolistic industry	2005
Bovenberg A.L., by Mooij R.A.,	Does money illusion rescue the double dividend?	2005
Bayındır-Upmann T.,	On the double dividend under imperfect competition	2004
Welsch H., Ehrenheim V.,	Environmental fiscal reform in Germany: a computable general equilibrium analysis	2004
Ng Y.-K.,	Optimal environmental charges/taxes: Easy to estimate and surplus yielding	2004
Kumbaroğlu G.S.,	Environmental taxation and economic effects: A computable general equilibrium analysis for Turkey	2003
Babiker M.H., Metcalf G.E., Reilly J.,	Tax distortions and global climate policy	2003
Böhringer C., Wiegard W., Starkweather C., Ruocco A.,	Green Tax Reforms and Computational Economics A Do-it-yourself Approach	2003
Goodstein E.,	The death of the Pigovian tax? Policy implications from the double-dividend debate	2003
Szomolányiová J.,	Environmental Taxation Benefits - Theoretical Analysis [Teoretická analýza přínosů environmentálních daní]	2002
Håkonsen L.,	A Note on Green Taxes and Double Dividends	2001
Ekins P., Barker T.,	Carbon taxes and carbon emissions trading	2001
Bosello F., Carraro C.,	Recycling energy taxes: Impacts on a disaggregated labour market	2001
Aronsson T.,	Green taxes and uncertain timing of technological change	2001
Mayeres I., Proost S.,	Marginal tax reform, externalities and income distribution	2001
Chia N.-C., Phang S.-Y.,	Motor vehicle taxes as an environmental management instrument: the case of Singapore	2001
Jansen H., Klaassen G.,	Economic impacts of the 1997 EU energy tax: Simulations with three EU-wide models	2000
Bosquet B.,	Environmental tax reform: Does it work? A survey of the empirical evidence	2000
Ligthart J.E., Van Der Ploeg F.,	Environmental policy, tax incidence, and the cost of public funds	1999
Bruvoll A., Ibenholt K.,	Green throughput taxation: Environmental and economic consequences	1998
Alden D.M., Proops J.L.R., Gay P.W.,	Industrial hemp's double dividend: A study for the USA	1998
Pezzey J.C.V., Park A.,	Reflections on the Double Dividend Debate: The Importance of Interest Groups and Information Costs	1998
Koskela E., Schöb R., Sinn H.-W.,	Pollution, Factor Taxation and Unemployment	1998
By Mooij R.A., Bovenberg A.L.,	Environmental Taxes, International Capital Mobility and Inefficient Tax Systems: Tax Burden vs. Tax Shifting	1998

Author(s)	Article title	Year of Publication
Bovenberg A.L., Van Der Ploeg F.,	Consequences of environmental tax reform for unemployment and welfare	1998
Schöb R.,	Environmental Taxes and Pre-Existing Distortions: The Normalization Trap	1997
Håkonsen L., Mathiesen L.,	CO2-stabilization may be a 'no-regrets' policy: A general equilibrium analysis of the norwegian economy	1997
Majocchi A.,	Green fiscal reform and employment: A survey	1996
Kuper G.H.,	The effects of energy taxes on productivity and employment: The case of the Netherlands	1996
Proost S., Van Regemorter D.,	The double dividend and the role of inequality aversion and macroeconomic regimes	1995
Lans Bovenberg A., by Mooij R.A.,	Environmental taxes and labor-market distortions	1994
Bovenberg A.L., van der Ploeg F.,	Environmental policy, public finance and the labour market in a second-best world	1994

After data collection, it was necessary to evaluate the scientific production, through the application of several bibliometric indicators to introduce quantitative rigor to the evaluation of the literature. These indicators are divided into performance indicators, such as quality, importance and scientific impact indicators, and *science mapping* indicators, such as thematic associations and structure. (Costa, Fernández-Llimós, & Lopes, 2012; Zupic & Čater, 2015)

In the indicators of scientific activity we used, to measure the patterns of publication and authorship, the historical evolution, number of published works, geographical affiliation, and productivity of the authors.

Regarding scientific impact indicators to measure the standards of publication and use of scientific articles we have divided these into two types: the impact of the works on the community and the impact of the sources of publication.

Finally, to measure the indicator of thematic associations, we used the analysis of the *keywords* of the articles, references, and the collaborations in the authorship of the articles.

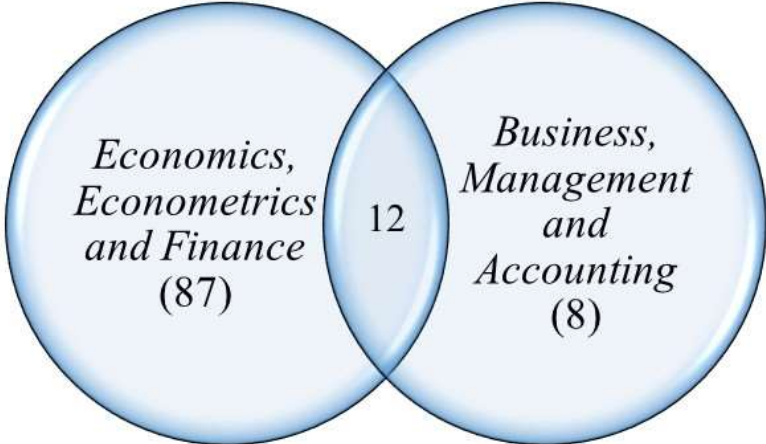
## FINDINGS

The objective of this study is to analyze and evaluate the scientific production considered by articles published in scientific journals, on the theme *Green Tax and Double dividend*, being

made an application of the various bibliometric indicators of scientific activity, importance, and impact.

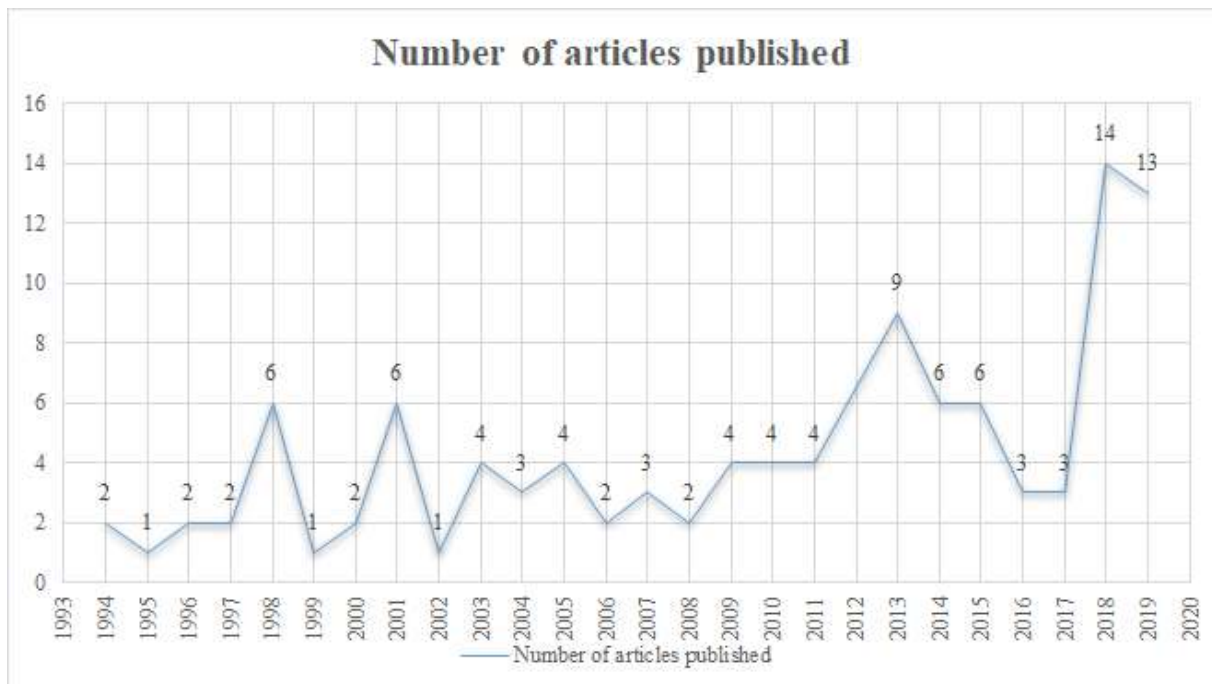
The 107 scientific articles selected were distributed by three areas of study: *Economics, Econometrics and Finance* and *Business Management and Accounting*, as evidenced in the figure below.

Figure 1 - Distribution of articles analyzed by area of study



To evaluate the historical evolution of the publications, we rely on the analysis of Figure 2, where it is possible to verify that this theme has been presenting a positive general growth trend. The year in which the highest number of publications was registered was 2018, with 14 articles, and the years 1995 and 1999 were the years in which there were fewer publications (1 article).

Figure 2- Historical evolution of the publication of scientific articles



In addition, we can observe that in the last 8 years more than half of the articles have been published, and the intervals with the most publications, since the beginning of the study, those of 1998-2001, 2009-2015 and 2018-2019. Interestingly, this interval intersects with important environmental and economic events, namely:

- The first Conference of the members of the United Nations Framework Convention on Climate Change (better known by its acronym UNFCCC) in 1995 with the aim of stabilizing or reducing greenhouse gas emissions;
- The adoption of the Kyoto Protocol in 1997 with more emphasis on the first conference;
- In 2001 the *Marrakech* Agreement defined the national system of emission inventories in order to emphasize sustainable development and climate change;
- In 2008 a UNFCCC conference agreed to fund a fund to help poorer countries with the effects of climate change;
- Approval in 2012 of the understanding of the validity of the Kyoto Protocol until 2020;
- In 2015 the Paris Agreement was approved where it was established that global warming should be contained below 2°C;
- The year 2018 was a year marked by multiple natural disasters around the world with the forest fire in California, Spain and Portugal, Hurricane *Florence* and *Michael*, earthquakes in the state of Alaska, Peru, Taiwan, Iran and Japan, the eruption of the Fire Volcano in Guatemala, Kilauea Volcano in Hawaii and Soputan Volcano in

Indonesia, the *tsunami* in Indonesia, area storms in India, heavy rains in Thailand that caused the blockage of a cave with 12 children and an adult, and heat waves in Canada and Japan.

- Finally, 2018 was also a year of great expression for environmental activists and *Greta Thunberg* was nominated for the Children's Climate Award.

After analyzing the periodicity of the publication of the articles, we proceed to the analysis of the productivity of the authors, verifying which of these was the one that contributed the most to the scientific community with their knowledge. Thus, through Table 2 we can see that, in a total of 211 authors, the author who contributed most to the research on the subject of

*Table Green Tax* was Bovenberg A. L., with a total of 5 articles, and second, with a total of 4 articles, Mooji R.A and van der Ploeg F.. We can also see that about 80% of the authors only contributed to the scientific community with one scientific article, and the remaining 18 authors contributed with 2 articles.

*Table 2- Number of articles published by author*

Authors	Number of articles per author	%
Bovenberg A.L.	5	2.092%
by Mooij R.A.	4	1.674%
van der Ploeg F.	4	1.674%
Bayindir-Upmann T.	2	0.837%
Böhringer C.	2	0.837%
Caron J.	2	0.837%
By Michael C.	2	0.837%
Freire-Gonzalez, J.	2	0.837%
Grethe H.	2	0.837%
Håkonsen L.	2	0.837%
Jacobs B.	2	0.837%
Ligthart J.E.	2	0.837%
Liu A.A.	2	0.837%
Manzano B.	2	0.837%
Maxim M.R.	2	0.837%
Metcalf G.E.	2	0.837%
Orlov A.	2	0.837%
Patuelli, R.	2	0.837%
Proost S.	2	0.837%
Schöb R.	2	0.837%
Tikoudis I.	2	0.837%
Other authors	1	79.498%

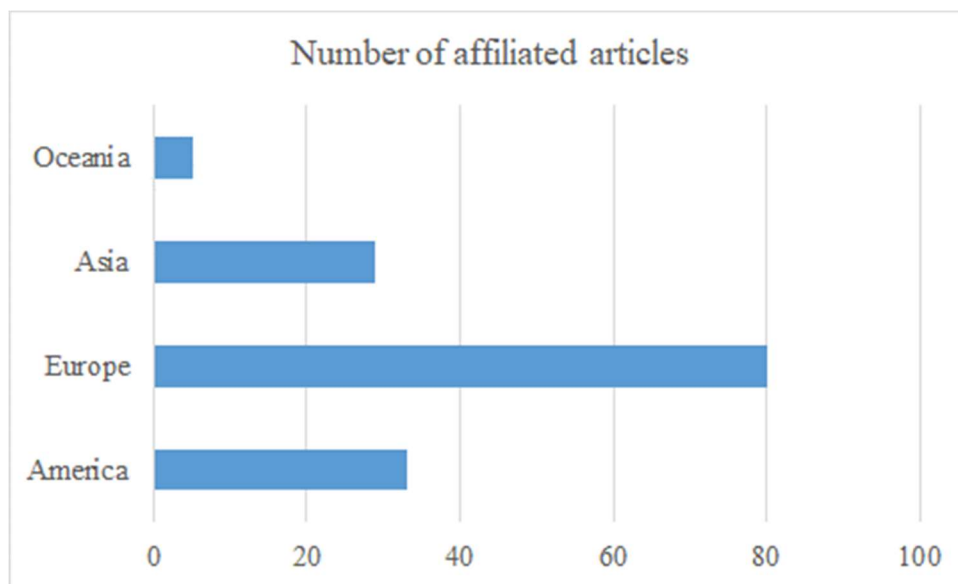
Authors	Number of articles per author	%
Total	239	100%

Through the geographical link we can check which country the article was affiliated with at the time of publication.

The best method to visualize the behavior of this indicator is through Figure 3, where we can see that it is divided into four continents, namely: Oceania, Europe, Asia and America. We can also observe that the vast majority of scientific articles on the subject are affiliated with Europe, in more detail, looking at Table 3, the Netherlands, the United Kingdom and Germany. **Erro! A origem da referência não foi encontrada.**

*Table 3 - Distribution of affiliated authors by country/territory*

*Figure 3 - Distribution of affiliated authors by continent*



Nevertheless, we can state that the country with the most affiliations is the United States of America with about 27 affiliated articles.

*Table 3 - Distribution of affiliated authors by country/territory*

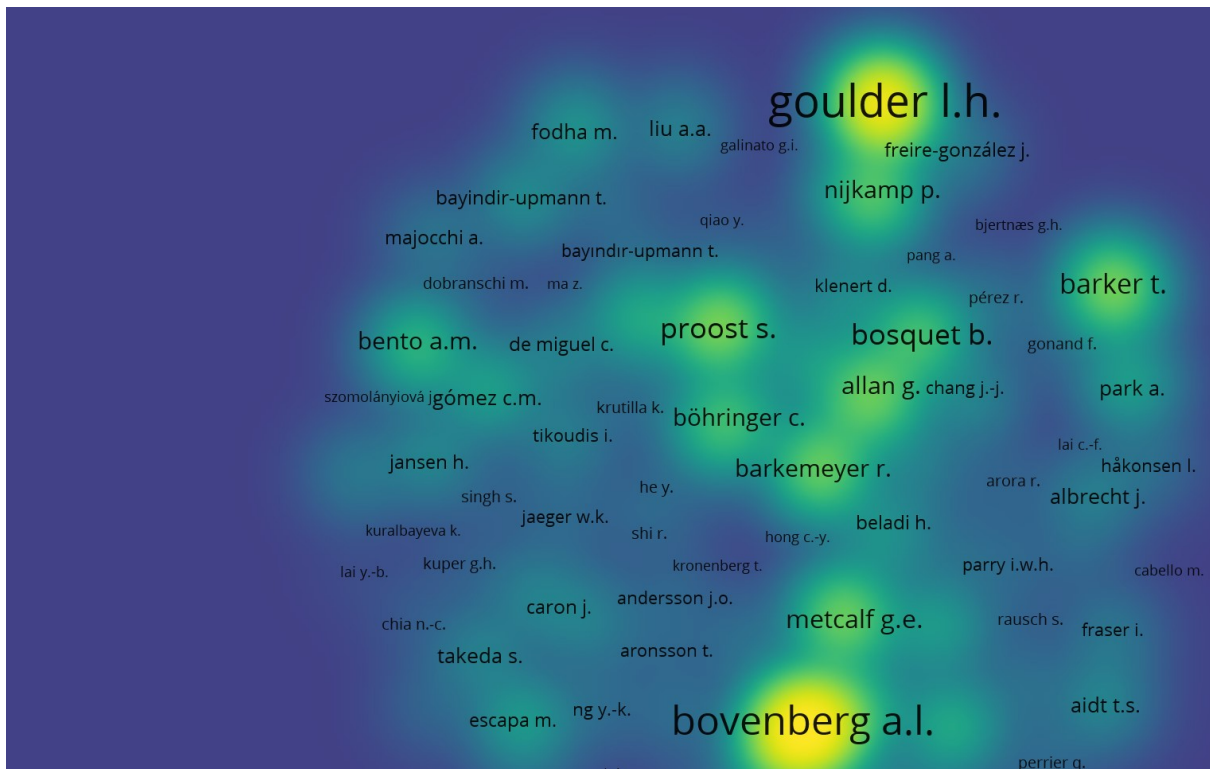
Continent/Country/Territory	Number of affiliated authors
America	33
United States of America	27

Canada	4
Chile	2
<b>Europe</b>	<b>80</b>
Holland	14
United Kingdom	13
Germany	12
Spain	8
France	6
Italy	5
Norway	5
Belgium	4
Sweden	3
Finland	2
Czech Republic	2
Denmark	1
Portugal	1
Switzerland	1
Austria	1
Romania	1
Turkey	1
<b>Asia</b>	<b>29</b>
Japan	7
China	5
Taiwan	5
Thailand	5
India	2
Malaysia	1
Hong Kong	1
Kuwait	1
Singapore	1
Bangladesh	1
<b>Oceania</b>	<b>5</b>
Australia	5
<b>Total</b>	<b>147</b>

Through the density map Figure 4 we can see that the authors with the most citations are: *Figure 4- Map of densities cited by scientific article Goulder L.H. , with the article "The effects of energy taxes on productivity and employment: The case of the Netherlands", totaling 506 citations from a sample of 2303, Bovenberg A.L. and van der Ploeg F. and the article "Environmental policy, public finance and the labour market in a second-best world" with 152 citations, Bosquet B. with 128 citations in his article "Marginal tax reform, externalities and income distribution" and, finally, Barket T. and Ekins P. with 103 citations in "Environmental Taxation Benefits - Theoretical Analysis [Teoretická analýza přínosů environmentálních daní]"*.



Figure 4- Map of densities cited by scientific article



This analysis can also be done using the *H-Index* metric, created by the American physicist *JE Hirsch*, to measure the productivity and impact of researchers based on their most cited articles. (Costa et al., 2012)

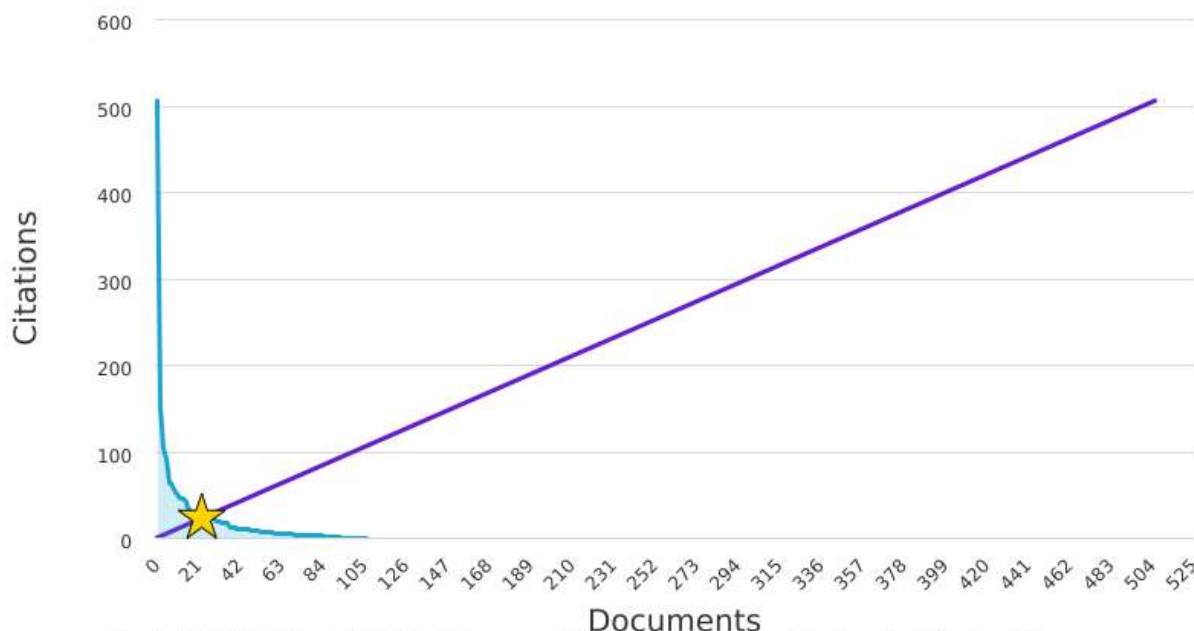
Given that this metric can be applied to an individual publication or to a research group, institution, or country, we will use it to analyze the group of publications in this study. Through the information provided by *SCOPUS* and represented in Figure Figure 5- *H-Index of the articles under study* we can affirm that this study has an H index of 24, that is, that of all the articles published (107 articles), 24 of these articles have at least 24 citations each.

Figure 5- H-Index of the articles under study

These documents h-index24

Scopus

Of the documents considered for the h-index, have been cited at least times



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The analysis of Table 4 shows that of the 46 scientific journals analyzed, the one with the most publications is **Erro! Autorreferência de marcador inválida.** *Environmental and Resource Economics* with a total of 16 articles out of 107, corresponding to 15% of the analysis. We can also observe that about 55% of the journals have less than 6 articles published, of which 30% only have 1 article.

Table 4- Distribution of articles published by scientific journal

Magazine	Number of published articles	%
<i>Environmental and Resource Economics</i>	16	14.95%
<i>Energy Economics</i>	10	9.35%
<i>Journal of Environmental Economics and Management</i>	8	7.48%
<i>Ecological Economics</i>	6	5.61%
<i>Resource and Energy Economics</i>	6	5.61%
<i>International Tax and Public Finance</i>	5	4.67%
<i>Journal of Cleaner Production</i>	5	4.67%
<i>Climate Change Economics</i>	3	2.80%
<i>Environmental Economics and Policy Studies</i>	3	2.80%

<i>International Journal of Energy Economics and Policy</i>	3	2.80%
<i>Journal of Policy Modeling</i>	3	2.80%
<i>Journal of Public Economics</i>	3	2.80%
<i>National Tax Journal</i>	2	1.87%
<i>Scandinavian Journal of Economics</i>	2	1.87%
<i>Agricultural Economics (Czech Republic)</i>	1	0.93%
<i>Amfiteatru Economic</i>	1	0.93%
<i>Asian Social Science</i>	1	0.93%
<i>B.E. Journal of Economic Analysis and Policy</i>	1	0.93%
<i>Basic Income Studies</i>	1	0.93%
<i>Computational Economics</i>	1	0.93%
<i>Economic Modelling</i>	1	0.93%
<i>Economic Record</i>	1	0.93%
<i>Economic Systems Research</i>	1	0.93%
<i>Economie Internationale</i>	1	0.93%
<i>Engineering Economics</i>	1	0.93%
<i>Environment, Development and Sustainability</i>	1	0.93%
<i>European Journal of Law and Economics</i>	1	0.93%
<i>European Journal of Political Economy</i>	1	0.93%
<i>Finance a Uver - Czech Journal of Economics and Finance</i>	1	0.93%
<i>German Economic Review</i>	1	0.93%
<i>IIMB Management Review</i>	1	0.93%
<i>Industry and Innovation</i>	1	0.93%
<i>International Journal of Energy Economics and Policy,</i>	1	0.93%
<i>International Journal of Green Economics</i>	1	0.93%
<i>International Journal of Innovation and Sustainable Development</i>	1	0.93%
<i>International Journal of Production Research</i>	1	0.93%
<i>International Review of Law and Economics</i>	1	0.93%
<i>Journal of Agricultural and Resource Economics</i>	1	0.93%
<i>Journal of Economic Surveys</i>	1	0.93%
<i>Journal of Macroeconomics</i>	1	0.93%
<i>Journal of the Japanese and International Economies</i>	1	0.93%
<i>Journal of Urban Economics</i>	1	0.93%
<i>Land Economics</i>	1	0.93%
<i>Portuguese Economic Journal</i>	1	0.93%
<i>Singapore Economic Review</i>	1	0.93%
<i>Spanish Economic Review</i>	1	0.93%
<b>Total</b>	<b>107</b>	<b>100.00%</b>

Finally, it is interesting to analyze the thematic associations of the articles under study, for this we can make use of the citations, *keywords* used and the relations between countries.

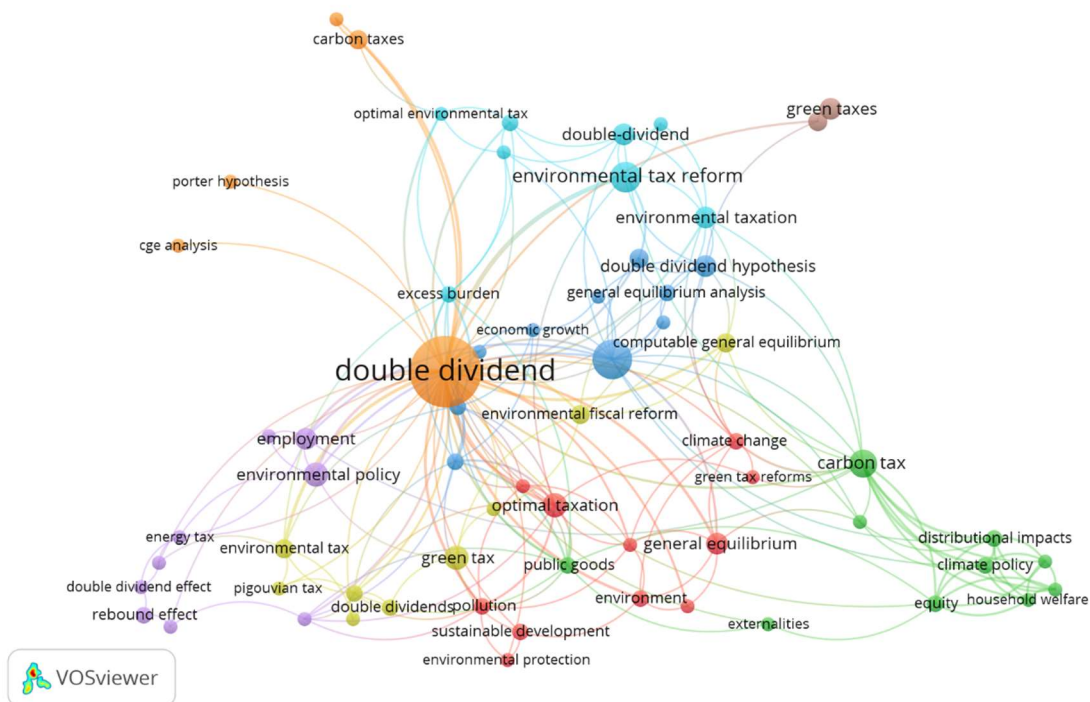
In this way, helping us in the bibliographic map created in *VOSviewer* we can represent each theme by a circle that in turn may or may not present a relationship with another theme. The

frequency and importance of each *keyword* is related to the size of each circle and the distance between them allows to evaluate the level of association.

*Figure 6 shows that the*

Figure 6- Keywords used by the authors in scientific articles keywords used in the articles are related to different themes, represented by the different colors. The keyword *Double Dividend*, used as a filter in this study, is closely related to *Environmental Tax Reform*, *Environmental Policy*, *Economic Growth*, *Employment*, *Optimal Taxation* and *Carbon Tax*. The other keyword of this study, *Green Tax*, is closely related to *Double Dividends*, *Sustainable Development*, *Environmental Fiscal Reform* and *Market-Based Instruments*.

*Figure 6- Keywords used by the authors in scientific articles*



This analysis technique uses the words inserted in the documents to establish and build relationships of conceptual structure and as such can be applied to titles, keywords, abstracts and even to the body of the text.

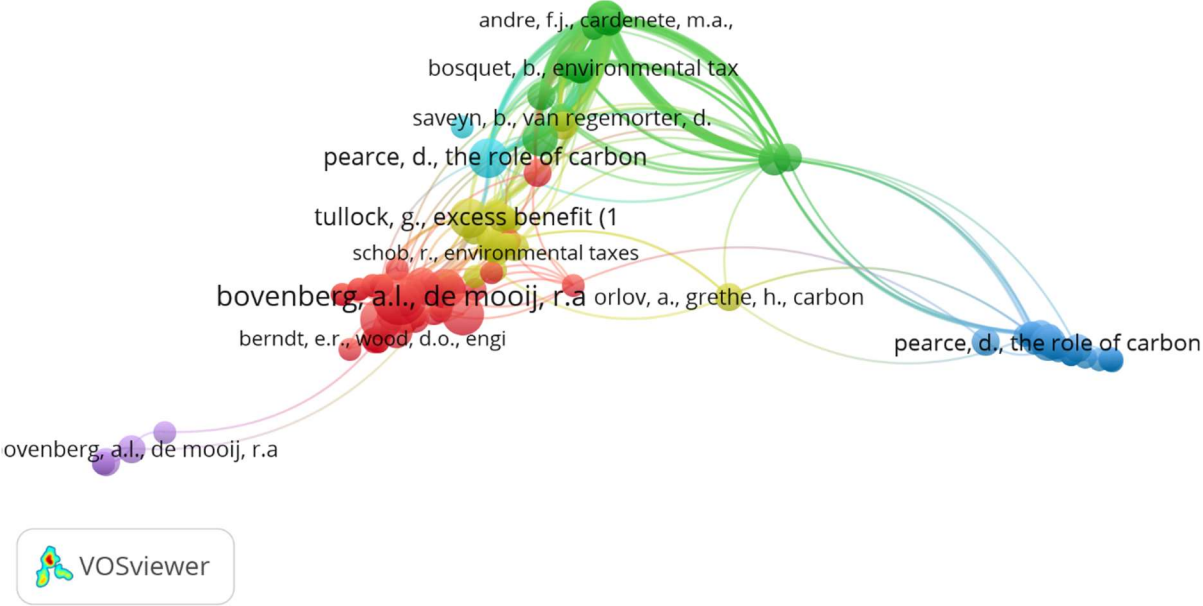
Finally, in the present work we made the analysis of the references co-cited in the studies that constituted a way of analyzing the connection between two documents based on the frequency

with which they are cited together, an additional advantage of data collection in the SCOPUS database. (Zupic & Čater, 2015)

As explained earlier, each circle represents an article, the size of this circle indicates the "activity" of the publication of the article. The distance between these indicates the degree of reference co-citations, and the groups of articles are represented by colors.

With this it was found that in the total of 3770 citations of references (Figure Figure 7 - Reference co-citations of the articles under study) the most co-cited articles in the bibliographic references are that of *Bovenberg and Mooij* together with *Pearce, Terkla, Parry* and *Tullock*.

Figure 7 - Reference co-citations of the articles under study



## CONCLUSIONS

Our study analyzes and reports the evolution of scientific development on the subject of *Green tax* and *double dividend* between 1994 and 2019 in terms of publications available in the *SCOPUS* database. After defining some criteria, except temporal, we obtained 107 articles that allow us to have a comprehensive view of the current state of the literature.

This analysis offers an evolution of the theme providing information on which publications and key authors, as well as the most influential journals, topics, and areas of study most relevant, among others. Thus, serving as a guide for future researchers interested in this theme.

The approach chosen by us to carry out the study also allows us to contribute to the methodologies of bibliometric analysis demonstrating the use of *VOSviewer* as an advanced instrument of these relationship analyses. The specialty of this is the graphical representation of large bibliometric maps so as to provide an easier way to visualize and interpret. (van Eck & Waltman, 2010)

Our results demonstrate that the publication pattern has evolved during the period of analysis (1994-2019), and the theme has recently become more popular and more important. Proof of this is the increase in the number of publications and citations in recent years.

These publications, of articles, are mostly articles affiliated with European countries. However, when we do this analysis by country, we conclude that the country/territory with the most affiliations is the United States of America, which has co-authorship with 14 other countries.

In turn, the most influential authors are *Goulder L.H* and *Bovenberg A.L.* and *van der Ploeg F.com* 506 and 152 citations respectively. *Bovenberg A.L.* He is also the most productive author, having 5 articles published in the sample. Still regarding the type of authorship, we conclude that the tendency is to resort to collaborations in the creation of articles.

Regarding the sources of publication, we identified that the most influential scientific journals are *Environmental and resources economics* and *Energy economics*, where most of the articles are published. However, the *Journal of Cleaner Production* is the one with the highest *CiteScore*, the average number of citations in the last 3 years, being the most influential.

Through the analysis of the *keywords* we could conclude that the focus areas of *green tax* is often related to *Double Dividends*, *Sustainable Development*, *Environmental Fiscal Reform* and *Market-Based Instruments*, while the focus areas of *double dividend* are related to *Environmental Tax Reform*, *Environmental Policy*, *Economic Growth*, *Employment*, *Optimal*

*Taxation* and *Carbon Tax* demonstrating that these are the most influential topics of the subject.

However, because it is a bibliometric, this study presents some limitations derived from its nature, because the projects of a bibliographic nature hardly reach perfection because there is a possibility that relevant authors were not included in the theme. The fact that only the *SCOPUS* database was used, and limits were imposed on the area of study ended up creating a selection of authors by this profile.

It would be useful for the scientific community to add, in future studies, publications from other databases, such as the *Web of Science* or *Google Scholar*, as well as to add to the study the keyword *Environmental Tax Reform* to have a larger sample, and therefore, more representative of the reality of the *Green Tax* and *Double Dividend* theme.

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## KEY TERMS AND DEFINITIONS

**Double Dividend** – It refers to the notion that environmental taxes can both reduce pollution (the first dividend) and reduce the overall economic costs associated with the tax system by using the revenue generated to displace other more distortionary taxes that slow economic growth at the same time (the second dividend) (European Environment Agency).

**Environmental Tax** – Environmentally related taxes are an important instrument for governments to shape relative prices of goods and services. The characteristics of such taxes included in the database (e.g. revenue, tax base, tax rates, exemptions, etc.) are used to construct the environmentally related tax revenues with a breakdown by environmental domain: energy products (including vehicle fuels); motor vehicles and transport services; measured or estimated emissions to air and water, ozone depleting substances, certain non-point sources of water pollution, waste management and noise, as well as management of water, land, soil, forests, biodiversity, wildlife and fish stocks (OECD).

**Environmental Tax Reform** – Environmental tax reform (ETR) is a reform of the national tax system where there is a shift of the burden of taxation from conventional taxes, for example on labor, to environmentally damaging activities, such as resource use or pollution. The burden of taxes should fall more on 'bads' (such as pollution or natural resource use) than 'goods' (like employment) so that appropriate signals are given to consumers and producers and the tax burdens across the economy are better distributed from a sustainable development perspective (European Environment Agency).

**Green Tax** – A green tax is defined as a tax whose taxable base is a physical unit (or a substitute for it) that has a specific proven negative impact on the environment. To do this, it is necessary that the tax base of the environmental tax is related to the problem under consideration (the environmental damage of certain emissions or the use of products intricately linked to said damage) and that the structure of tax rates contributes to the environmental damage or to the achievement of pre-set environmental objectives (CIAT – Inter-American Center of Tax Administrations).

**Triple Dividend** – The triple dividend of resilience (TDR) is an approach that considers avoided losses (first dividend), induced economic or development benefits (second dividend), and additional social and environmental benefits (third dividend) of adaptation actions. The second and third dividends are especially important since they accrue regardless of whether the actual climate risk materializes (World Resources Institute).