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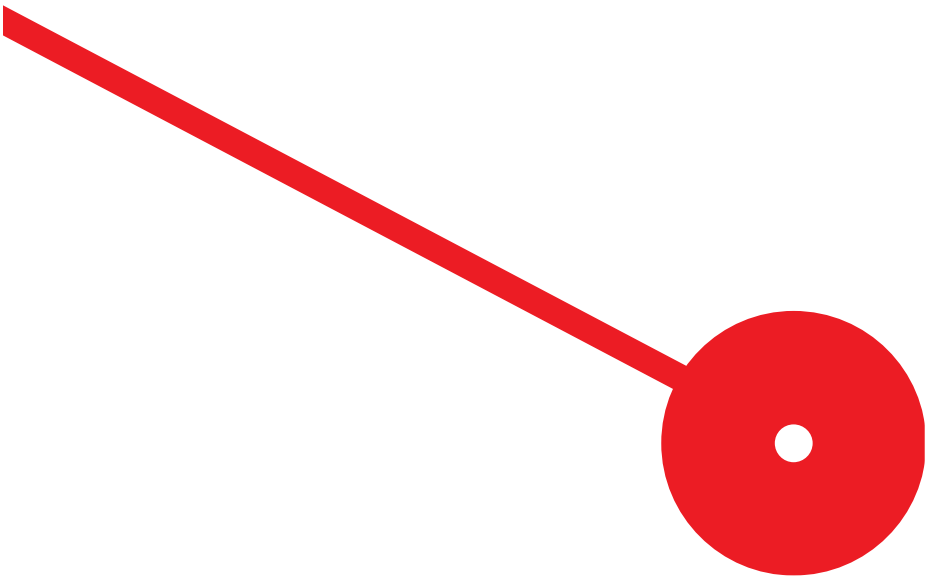
Tax harmonization in the EU: a bibliometric analysis

Jorge Aníbal Coelho Mendes Saldanha

10/2024



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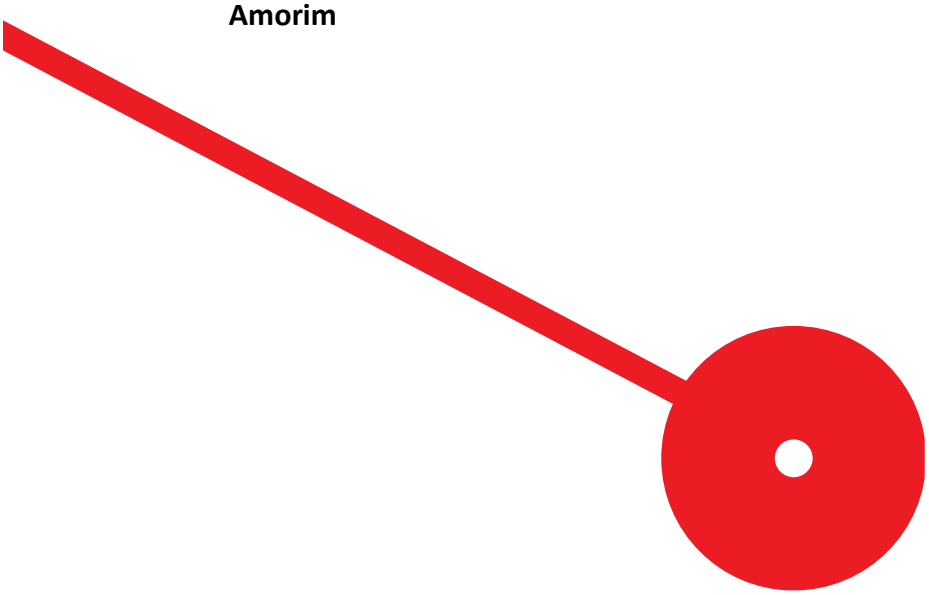
Dissertação de Mestrado
apresentado ao Instituto Superior de Contabilidade e Administração do Porto para a obtenção do grau de Mestre em Contabilidade e Finanças, sob orientação de Professor Doutor José de Campos Amorim



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10/2024

Dedication

To my wife, Maria

To my son, Daniel

Acknowledgements

To Professor Doutor José de Campos Amorim for teaching, helping and empathising,

To Professor Doutor Luís Gomes for his dedication to teaching

To my wife and son, for their love, support and faith in me,

To Filipe and Élia for friendship and sharing,

To Maia, for long years of friendship,

To Catarina e Cristina for always being there for me,

Thank you

Resumo:

A Matéria Coletável Comum Consolidada do Imposto sobre as Sociedades (MCCCIS) e o Quadro de Tributação dos Rendimentos Empresariais na Europa (QTREE) são ambos propostas da União Europeia (UE) para uma harmonização das taxas de imposto sobre os rendimentos empresariais nos estados-membros. O principal objectivo destas propostas consiste no reforço do Mercado Único, tornando mais fácil e barato para as empresas o desenvolvimento de actividades transfronteiriças na EU, através da introdução de um conjunto único de regras para as empresas calcularem as suas receitas tributáveis na UE, substituindo a actual mistura de diferentes sistemas fiscais nacionais.

Realizámos uma análise bibliométrica para examinar tópicos, autores, fontes, afiliações, países da UE (bem como Reino Unido, Suíça e Noruega) e como se interligam, sobre o tema da harmonização fiscal, com um período temporal de 2011 a 2024. Os dados foram retirados da Web of Science, com um total de 495 artigos. Verificámos que o tema mais relevante é a concorrência fiscal, e que os autores mais prolíficos são de filiações e países do centro e norte da Europa.

Esta dissertação fornece uma visão geral dos padrões de publicação e de citação da harmonização fiscal. Além disso, pode dar um vislumbre das tendências e direcções futuras para pesquisa e publicação.

Palavras chave: Análise Bibliométrica, Harmonização Fiscal, União Europeia, Competição Fiscal

Abstract:

The Common Consolidated Corporate Tax Base (CCCTB) and the Business in Europe: Framework for Income Taxation (BEFIT) are both proposals by the European Union (EU) to harmonize corporate taxation across member states. The primary objective of these proposals is to strengthen the Single Market by making it easier and cheaper for companies to operate cross-border in the EU, by introducing a single set of rules for companies to calculate their taxable revenues in the EU, replacing the current medley of different national tax systems.

We conducted a bibliometric analysis to examine topics, authors, sources, affiliations, EU countries (as well as UK, Switzerland and Norway) and how they interconnect, on the theme of tax harmonisation, with a time span from 2011 to 2024. Data was retrieved from Web of Science, with a total of 495 articles. We found the most relevant topic to be tax competition, and the most prolific authors from affiliations and countries of central and northern Europe.

This dissertation provides an overview of tax harmonisation publication and citation patterns. Moreover, it can give a glimpse of trends and future directions for research and publication.

Key words: Bibliometric analysis, Tax harmonisation, European Union, Tax Competition

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Acronyms

ATAD – Anti Tax Avoidance Directive

BEFIT – Business in Europe: Framework for Income Taxation

BEPS – Base Erosion and Profit Shifting

CCCTB – Common Consolidated Corporate Tax Base

CCTB – Common Corporate Tax Base

EU – European Union

FIFO – First In, First Out

LIFO – Last In, First Out

MNC – Multinational Companies

OECD – Organization for Economic Co-operation and Development

R&D – Research and Development

WoS – Web of Science

CHAPTER I - INTRODUCTION

1 Introduction

Tax harmonization has been on the agenda of the European Union (EU) for some time. Since the 1990s, the development of e-commerce and of international acquisitions and mergers, and the increase in factors mobility changed the economic landscape. Even more important, MNCs considered the internal market as its domestic one when the monetary and economic union was established (Nerudová, 2008). The primary motivation for tax harmonization was to waive off the tax-related barriers to trade as high compliance costs and obstacles for cross-border businesses created by diverse corporate tax systems (Fuest, 2008). But disparate tax rates or systems have some serious implications in an integrated market since they adversely affect the allocation of resources. Moreover, reduced tax rates usually encourage MNCs to shift their income across borders to lower-tax jurisdictions to escape the tax burdens. Consequently, reducing tax rates may result in a reduction of the overall tax base that would be available to the other country's tax authority. From the standpoint of equality and fairness, a cohesive tax policy within the EU is important, which led to the CCCTB proposal (European Commission, 2016). Disparate tax rates may also result in distortions in investment choices and thereby imperil the economic equilibrium conditions. But the proposal needed unanimous support to go through and some member states, profiting from the status quo, opposed, leading to the failure of the proposal.

Nowadays, the economic and organizational environment is somehow different. The OECD is making several changes to taxation worldwide. Its Inclusive Framework on BEPS develops an agreement on a two-pillar stand: Pillar One addresses profit allocation and Pillar Two aims to ensure global minimum taxation (OECD, 2020). Since the EU is a member of the OECD, this context becomes more favourable to engage in a new attempt to deal with the tax systems issue. The EU member states must also respect the ATAD, which requires a minimum tax rate in the host jurisdiction of a MNC's foreign subsidiary (Council Directive (EU) 2016/ 1164 - of 12 July 2016 -Laying down Rules against Tax Avoidance Practices That Directly Affect the Functioning of the Internal Market, 2016).

So, the European Commission believes that now is the time for a new initiative, Proposal for a Council Directive on BEFIT.

BEFIT is presented with the purpose of, while reducing current tax compliance costs by up to 65% and tackling tax uncertainty, creating a level playing field for businesses with cross-border operations.

In this context, it is important to examine how did scientific literature analyse the field of tax harmonization along CCCTB process and as BEFIT implementation begins. To pursue this objective, we will take a bibliometric approach, that will allow a quantitative perspective on a social science field.

The scientific production on tax harmonization is becoming increasingly relevant because nowadays most countries are conscious of the need to tackle tax avoidance and profit shifting. The large amount of data published so far on the subject can give not only qualitative, but also meaningful quantitative answers to questions researchers formulate.

In this study, we try to answer the following research questions in relation to publications on tax harmonization, from 2011 to 2024:

RQ1- Which are the most prolific and the most cited authors?

RQ2- Which journals are the most relevant in this field?

RQ3- Which words are used the most?

RQ4- Which countries publish and correspond in this field?

RQ5- How does the scientific production in the field evolve over time?

The present dissertation has the following structure: after this introduction, chapter II consists of a literature review on tax harmonization initiatives led by the EU and on bibliometric analysis, the methodology used to treat, visualize and interpret the data; chapter III will present the data and the methodology used; chapter IV will discuss visualization and interpretation of the results; chapter V will conclude by summarizing the findings and pointing future research directions.

2 Literature review

Corporate income tax policies across the EU constitute an entangled web of practices and regulations that significantly impact the decision making, operations and competitiveness of businesses among member states. Within the 27 EU Member States, there are gaps and imbalances in determining the corporate income tax, which promotes tax competition within the EU (Andrejovská & Hudáková, 2016). There is a statistically significant relation when analysing the corporate income tax revenues and the facts of tax competitiveness (Banociova & Tahlova, 2019).

2.1 Trying to solve the problem

Some authors divide EU members states in groups according to the level of their effective corporate tax rates and analyse the changes among them through a period (Delgado *et al.*, 2019). As we can see in Table 1, there has been substantial differences among EU countries and over time, from 2012 to 2022.

Table 1. EU Corporate Income Tax Rate

TOP STATUTORY TAX RATE					EFFECTIVE TAX RATE AVERAGE (large non-financial corporations)				
	2012	**2022**	**Difference**	**Ranking 2022**		**2012**	**2022**	**Difference**	**Ranking 2022**
Belgium	34,0	25,0	-9,0	21	Belgium	26,3	23,1	-3,2	20
Bulgaria	10,0	10,0	0,0	1	Bulgaria	9,0	9,0	0,0	1
Czechia	19,0	19,0	0,0	8	Czechia	16,7	17,0	0,3	11
Denmark	25,0	22,0	-3,0	17	Denmark	22,0	19,8	-2,2	16
Germany	29,6	29,8	0,2	27	Germany	28,2	28,8	0,6	26
Estonia	21,0	20,0	-1,0	11	Estonia	16,5	10,2	-6,3	2
Ireland	12,5	12,5	0,0	3	Ireland	14,4	14,1	-0,3	6
Greece	20,0	22,0	2,0	17	Greece	17,5	21,1	3,6	17
Spain	30,0	25,0	-5,0	21	Spain	32,4	29,0	-3,4	27
France	36,1	25,8	-10,3	24	France	34,2	26,0	-8,2	25
Croatia	20,0	18,0	-2,0	7	Croatia	16,5	14,8	-1,7	8
Italy	31,3	27,8	-3,5	26	Italy	25,1	23,9	-1,2	24
Cyprus	10,0	12,5	2,5	3	Cyprus	11,9	13,3	1,4	5
Latvia	15,0	20,0	5,0	11	Latvia	12,4	16,7	4,3	10
Lithuania	15,0	15,0	0,0	5	Lithuania	12,7	12,7	0,0	4
Luxembourg	28,8	24,9	-3,9	20	Luxembourg	24,9	21,8	-3,1	19
Hungary	20,6	10,8	-9,8	2	Hungary	19,3	11,1	-8,2	3

Malta	35,0	35,0	0,0	29	Malta	32,2	23,3	-8,9	23
Netherlands	25,0	25,8	0,8	24	Netherlands	22,6	23,2	0,6	22
Austria	25,0	25,0	0,0	21	Austria	23,0	23,1	0,1	20
Poland	19,0	19,0	0,0	8	Poland	17,5	15,9	-1,6	9
Portugal	31,5	31,5	0,0	28	Portugal	28,4	21,4	-7,0	18
Romania	16,0	16,0	0,0	6	Romania	14,8	14,7	-0,1	7
Slovenia	18,0	19,0	1,0	8	Slovenia	16,4	17,3	0,9	12
Slovakia	19,0	21,0	2,0	16	Slovakia	16,8	18,7	1,9	13
Finland	24,5	20,0	-4,5	11	Finland	23,3	19,6	-3,7	15
Sweden	26,3	20,6	-5,7	15	Sweden	23,2	18,7	-4,5	13
EU-27	22,9	21,2	-1,6		EU-27	20,7	18,8	-1,8	
EA-19	24,3	23,0	-1,2		EA-19	22,1	20,4	-1,7	

Source: Adapted from Taxation and Customs Union-European Comission

Given the diverse economic structures and regulatory frameworks within the EU, these income tax policies present a large set of disparities, namely tax rates and incentives, loopholes and tax instability. Corporate tax rates have an undeniable effect on macroeconomic indicators (Andrejovská & Glova, 2022). Unravelling the factors that cooperate to formulate and apply these policies is essential in understanding their impact on investment decisions, businesses and the economic growth of member states. For instance, multinational corporations face additional transaction costs, compared to local businesses, when operating in a foreign country (Bevan & Estrin, 2004). Distance, language and different government practices can be challenging, but multinational corporations (MNC) must also deal with multiple national tax systems, the possibility of withholding taxes on intra-EU payments, cross-border dividends taxation, as well as the delicate problem of transfer pricing calculations (Hellerstein & McLure Jr., 2004), just to give a few examples. But also, small and medium enterprises (SME) that do cross-border business strive with these problems (Solilova *et al.*, 2019). The EU is aware of the need to support its single market, by creating a harmonized corporate tax framework. The complexity of cross-border operations and tax compliance costs places EU businesses at competitive disadvantage when facing companies operating in markets of a similar size (European Commission, 2023b). Thus, for many years, the EU has been building knowledge on previous proposals and consulting with member states, with financial stakeholders and on OECD experience, since this organization gathers most of the EU countries (European Commission, 2023b). The first CCCTB proposal (European Commission, 2011) aimed at stimulating growth by overcoming the problems of double

taxation, heavy administrative burden and compliance costs for businesses. However, it faced significant resistance from member states who feared losing tax sovereignty. In 2016 the European Comission reintroduced the proposal, incorporating new elements to address BEPS, in a two-step approach: first establishing a common tax base (CCTB); then later implementing the consolidation aspect (CCCTB). The "Proposal for a Council Directive on Common Consolidated Corporate Tax Base" (European Commission, 2016) and the "Pillar Two Directive"(OECD, 2020) paved the way for the European Commission to publish, on 12 September 2023, two directive proposals: "Business in Europe: Framework for Income Taxation" (BEFIT)(European Commission, 2023b) and "Directive on Transfer Pricing" (TP) (European Commission, 2023a). Since BEFIT followed CCCTB, this literature review will analyse several perspectives on the main elements of the CCCTB proposal and whether these are present on BEFIT. Both proposals rely on consolidation with formula apportionment, to overcome the profit shifting opportunities that MNC use, being considered separate entities in different countries. Its EU-wide consolidated profits will be allocated to member states taking in account employment, payroll, sales and/or assets; then, the allocated profit will be subject to the country's tax rate. Bettendorf (2010) considers that CCCTB would likely produce a modest aggregate welfare gain for Europe, with some countries being better off, and the opposite for the others. This author found that countries in Central and Eastern Europe benefit the most but that they run the risk of adverse selection, in case Western losing countries choose to leave the agreement. Nevertheless, he points a limitation on his study: the reduction in compliance costs, ignored in the analysis, may be of upmost importance to the debate. On the other hand, CCCTB apportionment formula "performs remarkably badly" (Hundsdoerfer & Wagner, 2020). The authors state that the deviation due to formula apportionment is systematic and related to the within-group heterogeneity in profitability and size.

2.2 Tax harmonization

A suggestion would be that tax harmonization could start within countries that are geographically and politically close together. Harmonization could be set to countries with a similar tax burden (Lukacova *et al.*, 2020). Other authors defend that, through tax avoidance strategies, formula apportionment factor can be manipulated and MNCs may

change the allocation of real production factors (Eichfelder *et al*., 2018). But for others, the formulary apportionment with factors which generate the taxable income of the group (assets, payroll, turnover) may be the best option (Nerudová, 2008). However, as for Bettendorf (2010), these articles overlooked the importance of the reduction of the compliance costs, being its estimation pivotal to the full understanding of BEFIT advantages. Either CCCTB or BEFIT target MNCs with over 750 000 000 € in yearly revenues. But while CCCTB would create a common corporate tax base, allowing only minor adjustments at a country level, BEFIT will demand an aggregated group tax base, allocated to group members based on their income over the last three fiscal years. This may allow a better control of transfer pricing compliance risks (European Commission, 2023a) and reduce the cost of disputes. CCCTB allowed the use of LIFO, with some advantage in deducting inventory costs and was conceiving an Allowance for Corporate Equity which would benefit smaller firms. Neither is present in BEFIT, that permits only FIFO and average cost as methods for inventory deduction costs. Both proposals choose the straight-line method for depreciation, but the CCCTB had an important deduction incentive for R&D investments with a particular focus on small businesses, no longer present in the BEFIT proposal. As a matter of fact, including intangible assets in the formula apportionment seems not to influence with statistical significance the results in terms of profitability (Mlčúchová, 2023a), which seems a bit counterintuitive, but in line with BEFIT position. The formulary apportionment methodology discussion will be of the upmost importance for BEFIT (Mlčúchová, 2023b). In a digitalized market, where innovation sets the compass for businesses, it would seem logical for intangible assets to assume a positive correlation with profitability.

In the EU, reforms taken during 2010-2014, the deepest period of the crisis, intended to narrow the tax base to increase the private investment and enhance competitiveness mainly by extending or introducing new tax incentives, on R&D. This allowed the R&D investment to stay strong during the crisis (Garnier *et al*., 2015).

For the near future, the 27 member states will discuss the proposals and eventually some changes will be made. The European Commission plans to apply the TP Directive by 2026 and the BEFIT Directive by 2028. If and when the EU adopts these directives, it will set a milestone in the harmonization of corporate tax regulations across the EU, even though a period of adaptation will be required. It would be wise for businesses to monitor

the proposals discussion progress to prepare for the benefits of an enhanced single market and for the anticipation of perceived risks and unknown costs.

2.3 Bibliometric analysis

Bibliometrics, a statistical analysis of bibliographic data (Broadus, 1987), was developed by Pritchard (1969). It can be used to determine the intellectual structure of any science field (Hota *et al.,* 2020), namely taxation, when huge amounts of data prove difficult or inefficient to be treated manually (Barbu *et al*., 2022). Bibliometric analysis builds on the assumption that citations are a reliable proxy for determining the influence of authors or publications on a field of research (Culnan *et al*., 1990).

Bibliometrics have become increasingly popular in scientific research for various reasons (Moral-Munoz *et al*., 2020). The availability of open access software tools like R, RStudio, Bibliometrix, Biblioshiny and VOSviewer, as well as scientific databases like Web of Science, Scopus, Google Scholar or Pubmed granted access to operational research to anyone, whether a renowned researcher or an undergraduate student.

Despite several limitations, various indicators and metrics exist to measure trends within scholarly publications and to uncover the influence of a given article, author, or journal. Citation counts are the most visible and perhaps the most important metric used to gauge research impact (Waltman & Schreiber, 2012). A simple gauge of the number of times that a publication has been cited by the scientific community, citation counts serve as a proxy for the influence that research may have. Similarly, the h-index is a single-number metric that measures both the scientific output of researchers and the number of times their publications have been cited (Egghe, 2008). Furthermore, the impact factor reflects the annual average number of citations that articles published in a journal receive (Garfield, 2006). It provides a quantitative approach for researchers to identify the leading journals in their field and presents new journals of substantial importance (Royle et al., 2013). In studies such as tax harmonization, where a great variety of topics tend to be discussed, the tax scientific journal indicators from the list are useful to rank select top journals already within the frame. Overall, these metrics serve to quantify and rank contributions within a particular discipline and in various ways, taking other considerations into account (Tscharntke *et al.,* 2007). For instance, different works are

used for author-level evaluations, such as signifying relationships among co-authors, articles, or fields of research. Trends can be identified using these metrics, pinpointing changes in citations, h-index, and the related number of publications (García-Villar & García-Santos, 2021). Given these considerations, some of the limitations of various indexes can mitigate against their exclusive use and indicate the necessity for analytical techniques. The choice of appropriate publication indicators is extremely fragile, and one should compare the extent to which the calculation of publication parameters is met. Fine-tuned combinations of publication indicators are therefore expected to create the best bibliometric overview (García-Villar & García-Santos, 2021).

3 Data and Methodology

This chapter presents the methodological framework and data collection procedures in this bibliometric analysis.

Bibliometric analysis implies systematic research on scientific literature to unveil patterns and trends within a certain field (Passas, 2024). It is necessary to search and collect data from relevant databases, refine and submit it to bibliometric procedures to extract useful information. Bibliometric analysis allows to apply quantitative methods to huge amounts of bibliographic data and has become increasingly popular using tools like R, its Bibliometrix package and the user-friendly Biblioshiny (Aria & Cuccurullo, 2017). Using this software on the results provided by scientific databases like Web of Science, Scopus or ScienceDirect, for instance, allows a quantitative and qualitative analysis in the scientific literature of the studied field. So, the existence of these databases allowed bibliometric analysis to establish in scientific research and become increasingly popular (Ramos-Rodrígue & Ruíz-Navarro, 2004)

According to Passas (2024), there are seven steps in the process of conducting a bibliometric analysis:

3.1 Defining the research objectives

Defining a research objective implies being curious. It implies formulating the right questions to get information we didn't know, or to confirm something we suspected. So, it is the time for reflection, to define the clear objectives and the scope of the study. In this dissertation, the primary aim was to map and analyse the intellectual structure and evolution of research in tax harmonization from 2011 to 2024. The specific research questions were:

RQ1- Which are the most prolific and the most cited authors?

RQ2- Which journals are the most relevant in this field?

RQ3- Which words are used the most?

RQ4- Which countries publish and correspond in this field?

RQ5- How does the scientific production in the field evolve over time?

3.2 Downloading the dataset

At this point, the author carried out a literature search and chose the database (e.g. Web of Science, Scopus, ScienceDirect) from where to download the dataset.

The bibliographic data was retrieved from the Web of Science (WoS) Core Collection database, which was selected for its comprehensive coverage of peer-reviewed publications and standardized citation data. WoS also allows to refine searches from multiple perspectives, including document types, citation topics, affiliations, languages, countries/regions, among others, and works particularly well with Bibliometrix, Bibliometrix, with its Biblioshiny platform, was the chosen software tool as it implements the most complete set of techniques and presents an easy interface for researchers.

We used the Boolean operators "AND" to search for publications that had both terms, narrowing search results and "OR" to find results with either term, broadening search results. The asterisk (*) was used for the acceptance of either "harmonization" or "harmonisation ". The search used the following criteria:

Search terms: "tax harmoni*ation" OR "tax competition" OR "CCCTB" or "BEFIT" OR "fiscal harmoni*ation" AND "corporate income tax" with a publication date from 2011-01-01 to 2024-06-30

This initial search obtained 1197 publications.

3.3 Cleaning and refining

Then, the search was refined to include only the EU member states, as well as UK, Switzerland and Norway. The UK was a member of the European Communities (EC) from 1973 to 2020 and possesses an outstanding scientific and research community; Switzerland and Norway are linked to the EU by several agreements, namely the Horizon Europe Programme, and have a respected scientific production. This restriction reduced the number of publications to 737.

Then we chose English as the only language. English accounted for 96,47% of publications and there were 711 publications available.

WoS allows the possibility of refining the search through a large set of research areas. We excluded all, except:

- Business Economics
- Government Law
- International Relations
- Operation Research Management Sciences
- Public Administration

This exclusion brought to 509 the publications total.

Finally, as Document Types, we selected Articles, Early Access Articles as well as Proceedings Papers to obtain the final count of 495 publications.

The results were exported as Plain Text File and the Record Content chosen was Full Record and Cited References.

3.4 Selection of bibliometric technique

In this phase, the appropriate bibliometric technique was chosen, based on the research objectives (e.g., co-word analysis, co-citation analysis), using standalone software, or a R-package. CitNetExplorer (van Eck & Waltman, 2014) and VosViewer (Eck & Waltman, 2009) are standalone Java software frequently used to analyse and visualize citation networks in scientific databases. Examples of R-packages are CITAN (Gagolewski, 2011) and Bibliometrix (Aria & Cuccurullo, 2017): CITAN can only use Scopus database and lacks some important functions (e.g. co-citation, bibliographic coupling, scientific collaboration). So, in this dissertation, we chose Bibliometrix since it presents a more comprehensive set of analysing and visualizing functions. Namely, it allows the analysis of impact indexes (e.g. h-, g- and m-), among other advantages over VosViewer, although it requires programming knowledge with R (Arruda *et al*., 2022)

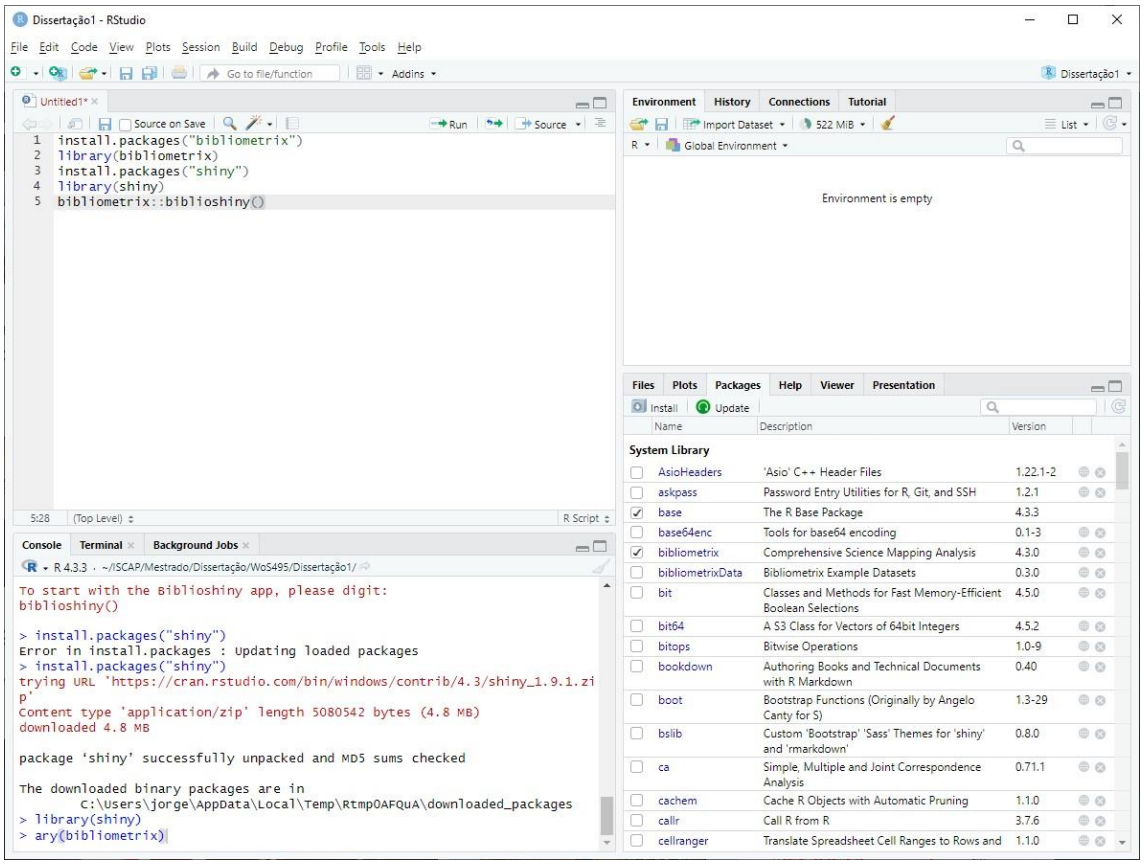

Figure 1 – Running Bibliometrix and Biblioshiny on RStudio

Source: Own elaboration on RStudio

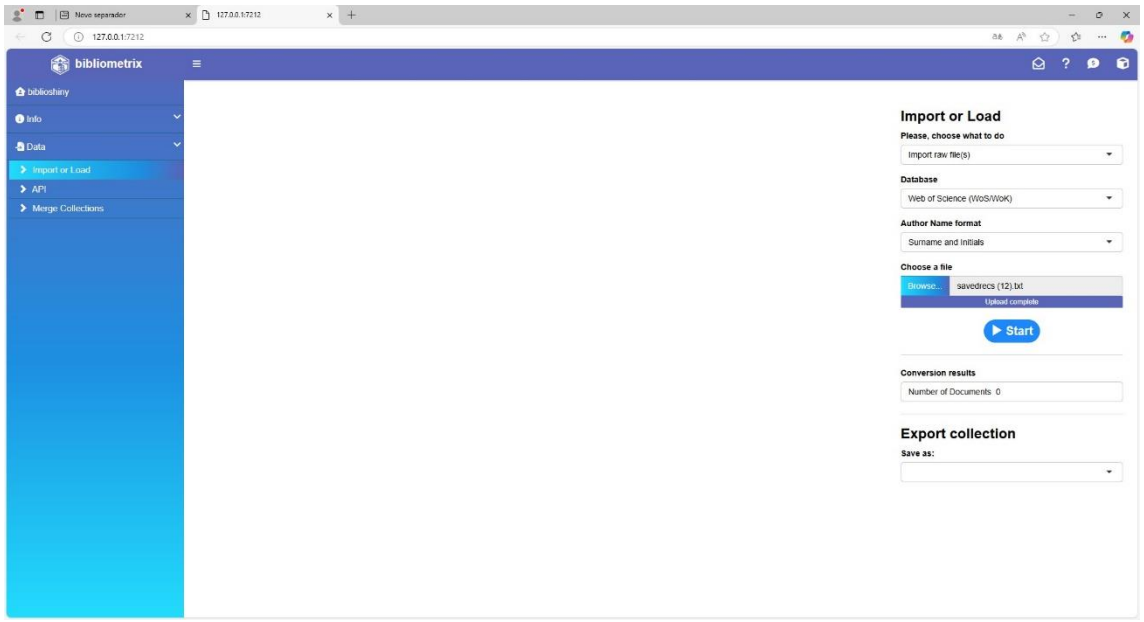

Figure 2 – Loading WoS data in Biblioshiny

Source: Own elaboration on Biblioshiny

3.5 Running the data

Then, with the functions of the Bibliometrix package (Derviş, 2020), RStudio loaded and converted data to a data frame on a more user-friendly platform, Biblioshiny. Biblioshiny is an intuitive interface which presents a menu including analytics and graphs for three kind of metrics (source, author and document) and the results can be exported, saved or printed (Moral-Munoz *et al*., 2020).

3.6 Visualizing the results

According to Chen (2017), science mapping is a process of domain analysis and visualization, studying several components to explore and interpret visualized intellectual structures and dynamic patterns.

The choice of the visualization technique to use is paramount to the full understanding and the correct interpretation of the output (Cobo *et al*., 2011).

Clustering is a technique used in science mapping, that allows creating clusters that display a thematic intellectual structure at a given moment, but also their transformation over time in the research field, when we consider, for instance, co-citation analysis.

3.7 Interpreting the results

In bibliometric research, the final stage consists of interpreting the findings and results of the research (Zupic & Čater, 2015). However, to only report the findings will not suffice (Block *et al.*, 2020); the objective is to expose the present state of the analysed literature, structure the existing knowledge, apprehend the gaps and the trends of the literature and define the path for future research (Block *et al*., 2020). Many researchers that use bibliometric analysis tend to just describe the findings, instead of interpreting them (Lim & Kumar, 2024), but the theoretical value of bibliometric analysis comes from science mapping innovation in identifying knowledge clusters (Molina-García *et al*., 2023)

CHAPTER IV - RESULTS

4 Results

4.1 Performance analysis

Performance analysis investigates the importance of research elements to a study field, namely the contribution of authors, institutions, journals, and countries (Cobo *et al*., 2011). This analysis, descriptive by nature, is central in bibliometric studies (Donthu *et al*., 2021) and can use the number of citations or publications as metrics, or even combine them.

Table 2. Citation and publication related metrics

Description	**Results**
MAIN INFORMATION ABOUT DATA	
Timespan	2011:2024
Sources	201
Documents	495
Annual Growth Rate %	-4.96
Document Average Age	6.82
Average citations per doc	8.069
References	13230
DOCUMENT CONTENTS	
Keywords Plus (ID)	655
Author's Keywords (DE)	1102
AUTHORS	
Authors	699
Authors of single-authored docs	127
AUTHORS COLLABORATION	
Single-authored docs	153
Co-Authors per Doc	2.04
International co-authorships %	31.92
DOCUMENT TYPES	
article	402
article; early access	3
article; proceedings paper	3
proceedings paper	87

Source: Own elaboration from Bibliometrix

The examination of the topic in economic and fiscal literature was carried out from a sample of 495 documents retrieved from Web of Science, ranging from 1st January 2011 to 30th June 2024. The type of documents consisted of articles from a total of 201 sources, showing an average annual decrease of -4,96%, an average age of 6,82 years, an average citation per document of 8,069 and a total of 13230 references.

There were 699 authors, from which 127 produced single-authored documents in a total of 153. There were 2,04 co-authors per document and international co-authorship was present in 31,92% of the documents. Clearly, most researchers share publications' authorship and those who are highly productive show the preference for collaboration (Barbu *et al*., 2024)

4.1.1 Analysis of annual distribution of publications

The distribution of publications over the years can reveal information on tax harmonization and the changes in scholars' attention (Barbu *et al*., 2022).

Scientific production on the field gained some significance since 2011, when CCCTB proposal was introduced, and then again in 2016 at the time of CCCTB reintroduction (Khan Niazi, 2017), until 2017. Then, there was a decline in scientific production. This reduction in scientific production may relate with the COVID-19 pandemic: other areas of research saw a drastic reduction in published papers (Farji-Brener & Amador-Vargas, 2023). In 2023 the field regained the interest of researchers with the presentation of the BEFIT proposal.

4.1.2 Analysis of authors

Figure 4 presents the most prolific authors, even if they are not the most cited. But sometimes, being recent publications, there is the possibility of getting more citations in the near future. Nevertheless, Haufler, Dobrovic, Becker, Nerudová, and Runkel share the two rankings.

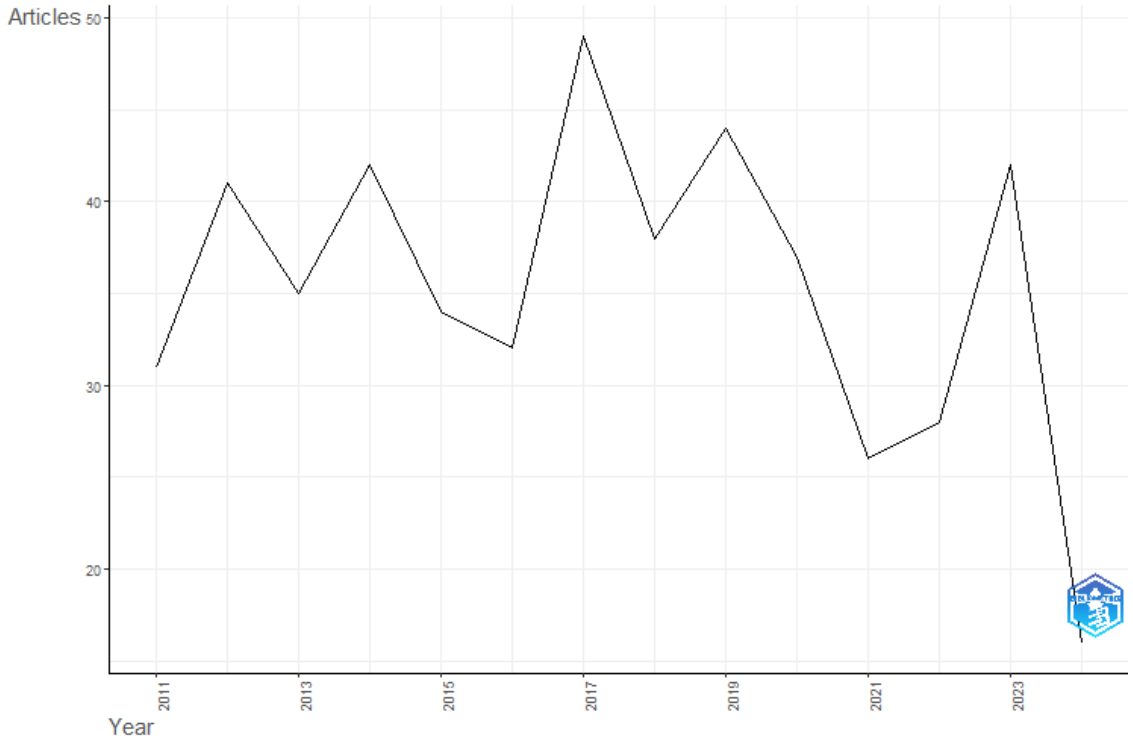

Figure3 – Annual scientific production

Source: Own elaboration from Bibliomatrix

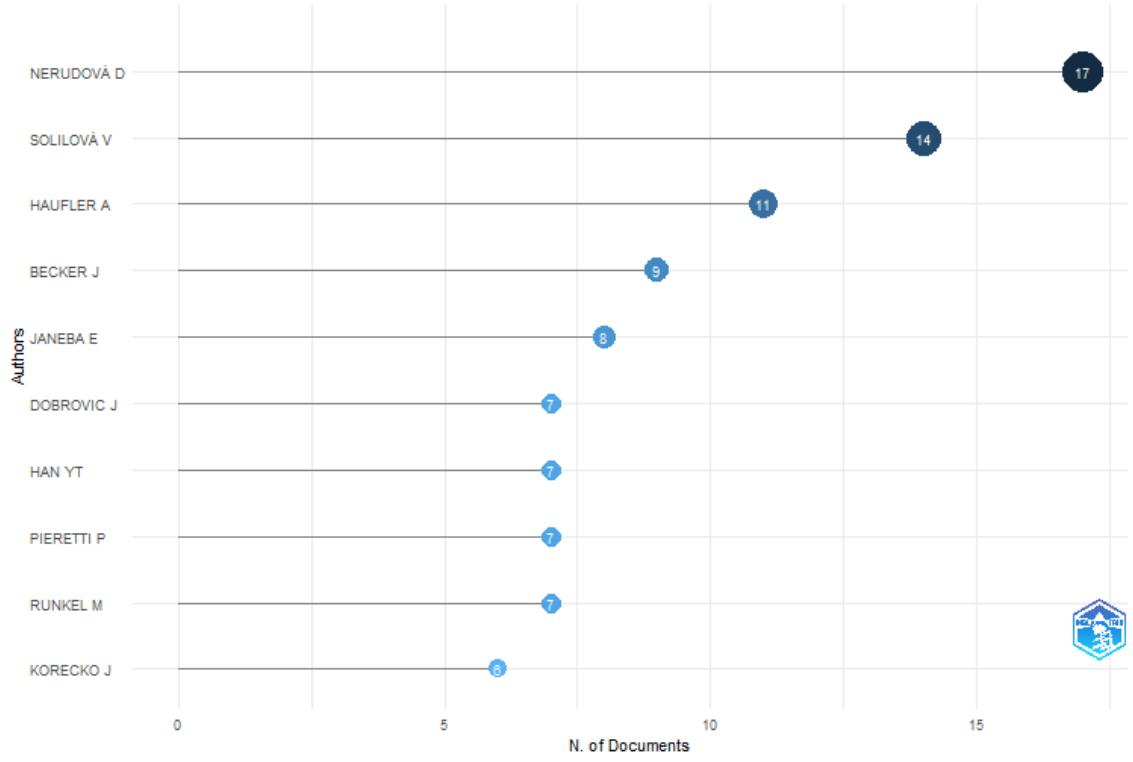

Figure 4 – Most relevant authors

Source: Own elaboration from Bibliometrix

Table 3. Authors' local impact

Author	h_index	g_index	m_index	TC	NP	PY_start
HAUFLER A	6	11	0,4285714	143	11	2011
DOBROVIC J	5	7	0,5555556	71	7	2016
RIXEN T	5	5	0,3571429	196	5	2011
RUNKEL M	5	7	0,3571429	98	7	2011
BECKER J	4	6	0,2857143	48	9	2011
BUETTNER T	4	5	0,2857143	152	5	2011
DEVEREUX MP	4	4	0,3333333	91	4	2013
EICHNER T	4	5	0,2857143	64	5	2011
MARDAN M	4	5	0,3636364	40	5	2014
NERUDOVÁ D	4	6	0,3076923	45	17	2012

Source: Own elaboration from Bibliometrix

Previously presented for sources as local impact metrics, indexes are also used to rate author's impact in terms of publication citations. Costas (2008) considers indexes to be complementary to this analysis. In Table nº 3, the higher ranked 10 authors, according to h-index, were not only prolific but also highly cited. So, beyond the number of publications, one must consider also the number of citations each published author obtains. From this point of view, Haufler becomes the most relevant if we consider h-index and g-index (Egghe, 2008). The former implies that there are 6 publications on the subject with at least 6 citations each; the latter states that the sum of the citations of the 11 most cited publications surpasses this number raised to the square (11^2=121); finally, m-index considers h-index divided by the years since first publication on the subject. These indexes must be analysed as a whole to better understand authors' impact: Haufler is highly cited for all his published papers, but Buettner, with lower h- and g- indexes and less than half of the publications, has a higher citation total; on the other hand, Dobrovic, in a shorter period is prolific and highly cited.

As we can see in Table 4, author productivity seems to roughly follow Lotka's Law (Lotka, 1926), which states that the proportion of contributors making a single contribution is around 60 per cent, while those making *n* contributions are about $1/n^2$ of those making one. So, most of the authors only publish once in this research field.

Table 4. Lotka's law

N.Articles	N.Authors	Freq
1	550	0,786838
2	85	0,121602
3	26	0,037196
4	20	0,028612
5	7	0,010014
6	2	0,002861
7	4	0,005722
8	1	0,001431
9	1	0,001431
11	1	0,001431
14	1	0,001431
17	1	0,001431

Source: Own elaboration from Bibliometrix

In Figure 5, the most local cited authors in the considered publications set are displayed and allow a deeper study in the field of tax competition and harmonization. Many of them are not present in the top indexes analysis nor in the most relevant authors but were cited frequently by the authors of this publications set. But still, Haufler, Nerudová, Runkel, Devereux and Rixen are present, stating the impact of these authors in this research area.

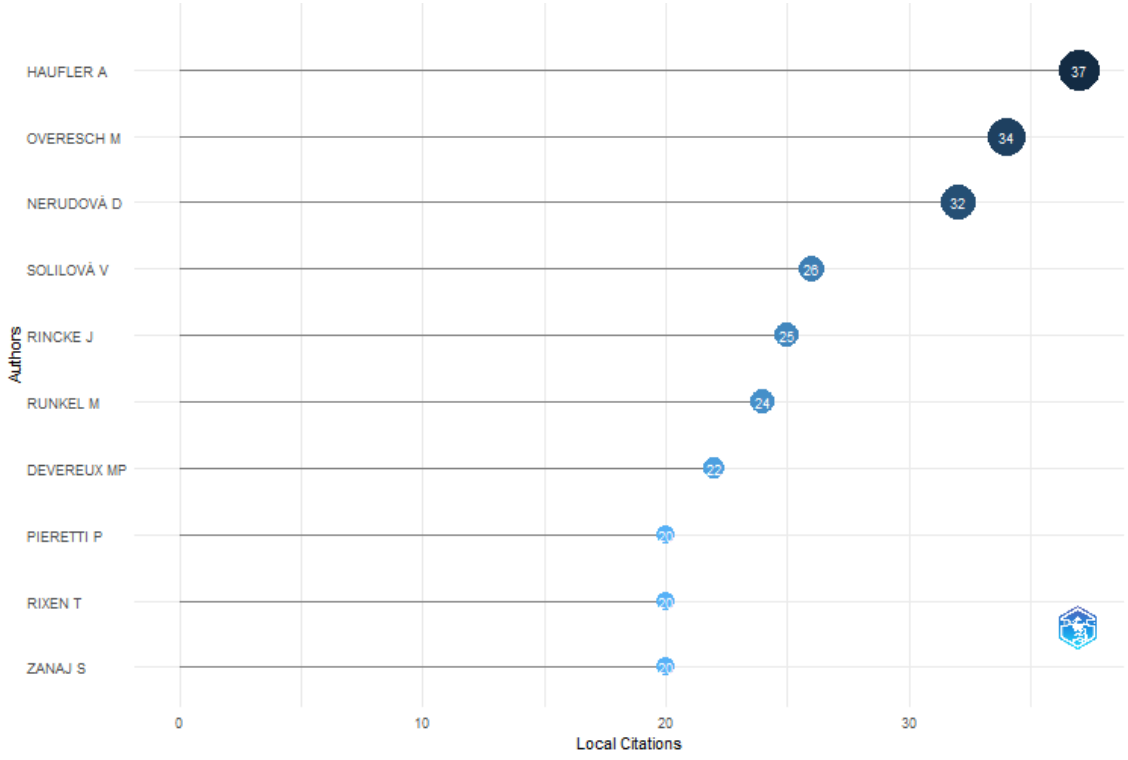

Figure 5 – Most local cited authors

Source: Own elaboration from Bibliometrix

Another analysis to consider is the timing of scientific publication. Which are the authors that published more recently on the studied research field? Figure 6 shows the number of published articles each year, as well as total citations. So, Janeba E., for instance, published an article in 2024, with no citations yet, but he has 3 publications in 2023, with a total of 4 citations. Therefore, he is an author to watch out for. Also, Haufler, Han and Pieretti published in 2023, making them current researchers in this field. For the time considered, Dobrovic, in a short period, published seven papers, which were highly cited, as we can see from the size and colour of the circumferences; however, he stopped publishing in this field in recent years.

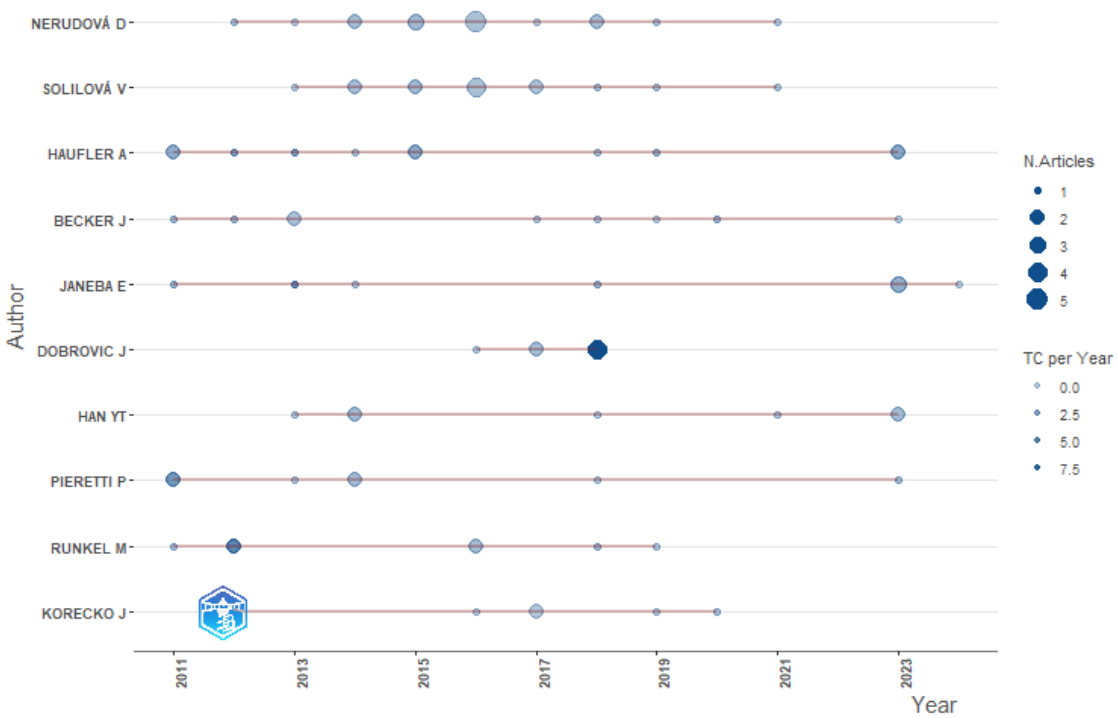

Figure 6 – Authors' production over time

Source: Own elaboration from Bibliometrix

4.1.3 Analysis of sources

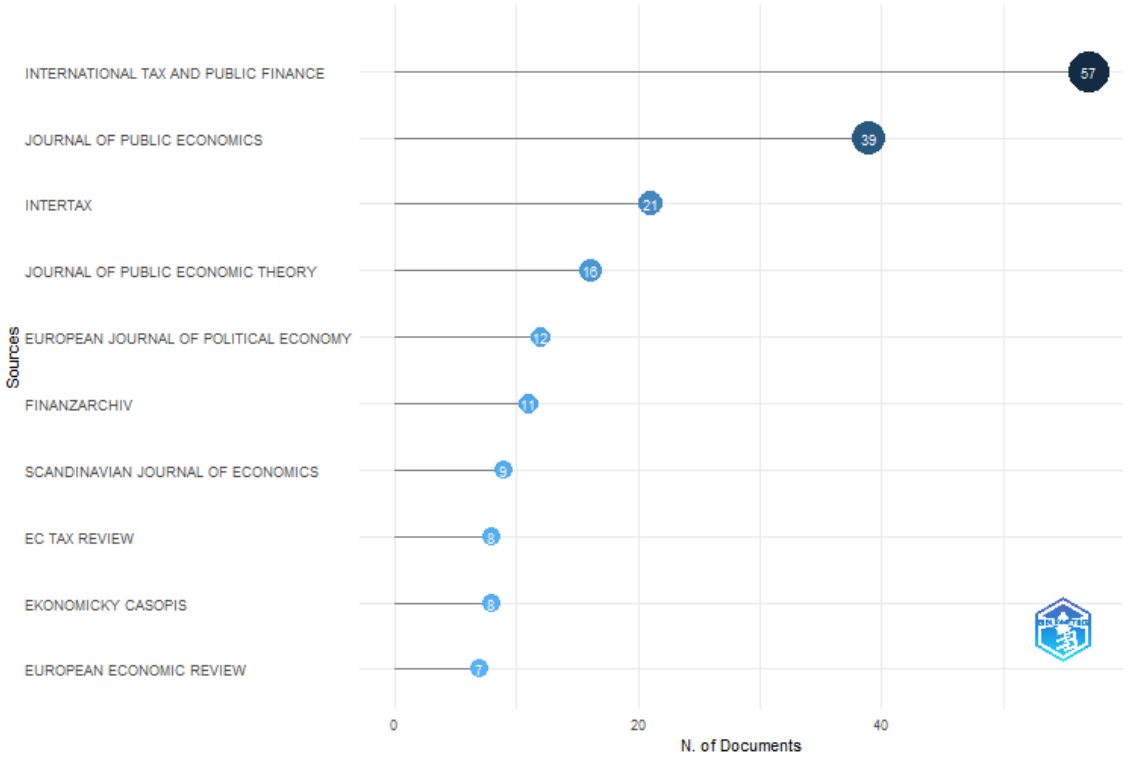

Figure 7 – Most relevant sources

Source: Own elaboration from Bibliometrix

However, beyond the number of publications, one must consider also the number of citations each published document originates. From this point of view, the *Journal of Public Economics* becomes the most relevant if we consider h-index and g-index (Egghe, 2008). The former implies that there are 14 publications on the subject with at least 14 citations each; the latter states that the sum of the citations of the 25 most cited publications surpasses this number raised to the square (25^2=625); finally, m-index considers h-index divided by the years since first publication on the subject.

Table 5. Source local impact

Source	h_index	g_index	m_index	TC	NP	PY_start
JOURNAL OF PUBLIC ECONOMICS	14	25	1	719	39	2011
INTERNATIONAL TAX AND PUBLIC FINANCE	11	20	0,7857143	542	57	2011
EUROPEAN JOURNAL OF POLITICAL ECONOMY	8	12	0,5714286	195	12	2011
NATIONAL TAX JOURNAL	5	5	0,3571429	78	5	2011
EC TAX REVIEW	4	4	0,6666667	24	8	2019
EKONOMICKY CASOPIS	4	5	0,3333333	30	8	2013
EUROPEAN ECONOMIC REVIEW	4	7	0,3076923	66	7	2012
INTERNATIONAL ECONOMIC REVIEW	4	5	0,3076923	64	5	2012
INTERTAX	4	5	0,6666667	49	21	2019
JOURNAL OF COMPETITIVENESS	4	5	0,5	65	5	2017

Source: Own elaboration from Bibliometrix

Taking in consideration the number of publications on the subject, the most relevant source would be the *International Tax and Public Finance*, but according to the total of citations and all three indexes, the *Journal of Public Economics* assumes to be the most influential in this research field. The *Journal of Public Economics* focuses on public policy and on the application of quantitative analysis to economic theory and has usually 12 issues per year. *EC Tax Review,* for instance, a journal exclusively dedicated to tax developments and tax harmonization in the EU, has only 6 per year, creating different conditions for citation statistics.

Figure 8 shows the sources' publication performance over time. It is interesting to note that, within the considered period, *International Tax and Public Finance* took the lead in 2017 over the *Journal of Public Economics*, and both are significantly more productive in the field than *Intertax*, the *Journal of Public Economic Theory* or the *European Journal of Political Economy*. However, one must point out that these are cumulative results and *Intertax* only started publishing in the field in 2019, meaning that nowadays it must be considered an important source.

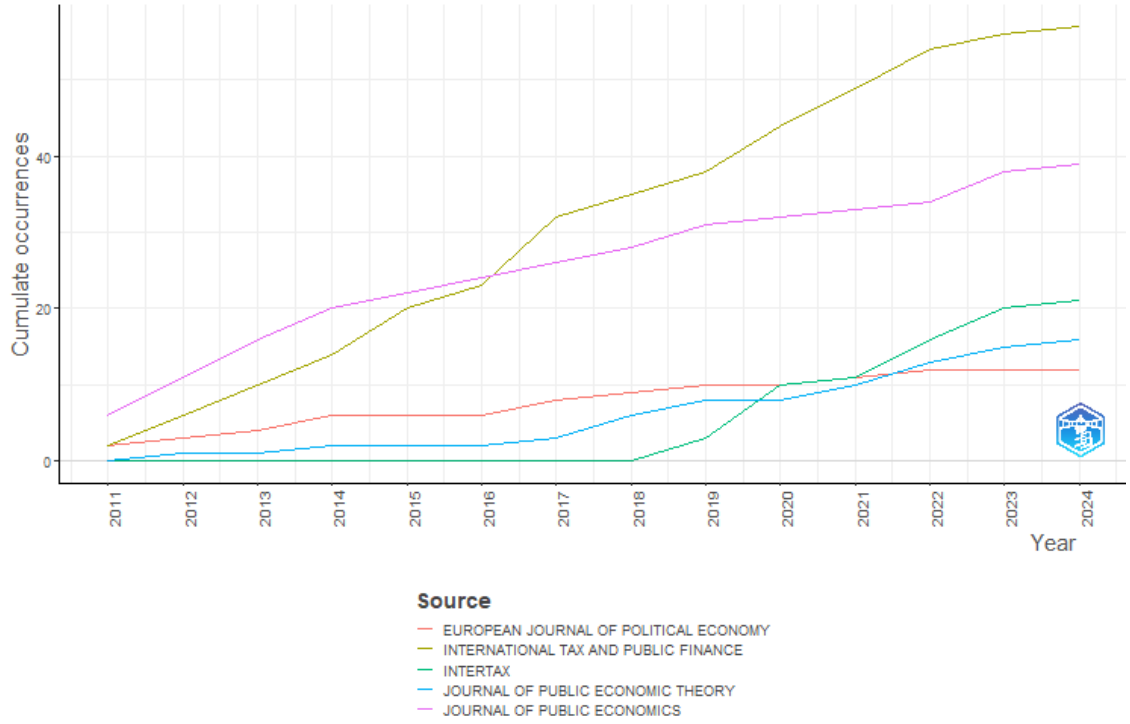

Figure 8 – Sources' production over time

Source: Own elaboration from Bibliomatrix

4.2 Co-authorship analysis

Co-authorship analysis studies the interconnections among researchers in each field. In the middle of the XXth century, co-authorship was relatively rare. For instance, in 1950, 92 per cent of published articles in the *Journal of Political Economy* had just one author. In 1993, co-authorship in the same journal reached 39,6 per cent (Hudson, 1996). Either in the same affiliation or in another, or even in different countries, co-authorship became easier and helped tackling the complexities of current research.

Co-authorship analysis reveals patterns of research collaboration, points key research networks and identifies emerging research trends.

Considering collaboration networking, subauthorship often represents an important contribution to scientific production, frequently overlooked. Acknowledged scientists that gather and process data, that provide insights or technical support establish an important intellectual partnership (Andrikopoulos & Economou, 2016). Most of them constitute a giant component (Perez & Germon, 2016) with nodes close together. That is

why social network and common affiliation analysis may provide a more detailed understanding of the collaboration network dynamics.

4.2.1 Analysis of authors

.Using author collaboration network makes easier the perception of authors who made significant contributions to the studied field and shows the interconnections among these authors (Barbu *et al.*, 2024).

Higher influential authors and more published ones are interconnected with numerous direct links (Acedo et al., 2006). Showing some examples in the network analysis in Figure 9, Solilová and Nerudová both do research at Mendel University in Brno; Overesch and Buettner work in Germany, respectively at the University of Cologne and at the University of Erlangen Nuremberg; as an example of international co-authorship, Haufler does his research in Germany, at the University of Munich and Nishimura in Japan, at Osaka University. Haufler is one of the most cited in this set of authors, reinforcing the idea that publications with international co-authorship get more citations (Moya-Anegon *et al.*, 2018).

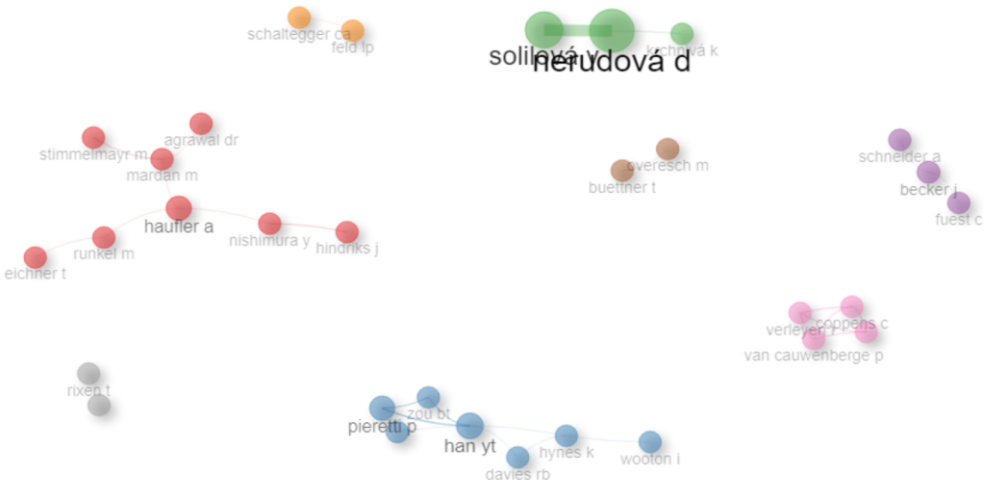

Figure 9 - Collaboration network

Source: Own elaboration from Bibliomatrix

4.2.2 Analysis of affiliations

Together, German institutions dominate the affiliations' production. In the cumulative total of publications, IFO is in the clear lead. IFO Institut has close ties with Ludwig-Maximilians- Universität in Munich and their economic research supports policymakers' decisions (Sauer & Wohlrabe, 2018). Being a federal state, Germany experiences on a smaller scale the same tax competition problem the EU does, with municipalities with low or no corporate tax. This situation originated a federal law setting a minimum tax rate on taxable profits (Buettner & Poehnlein, 2024).

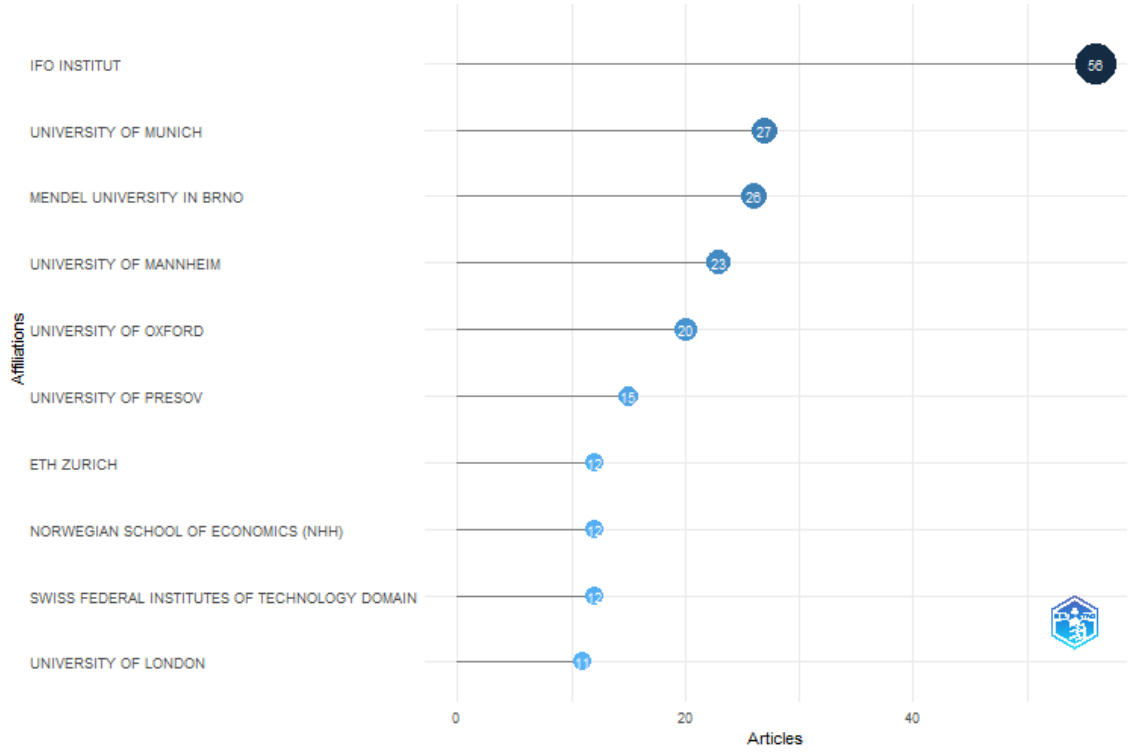

Figure 10 – Most relevant affiliations

Source: Own elaboration from Bibliometrix

The other institutions, despite occasional exchanges evolved similarly in terms of production.

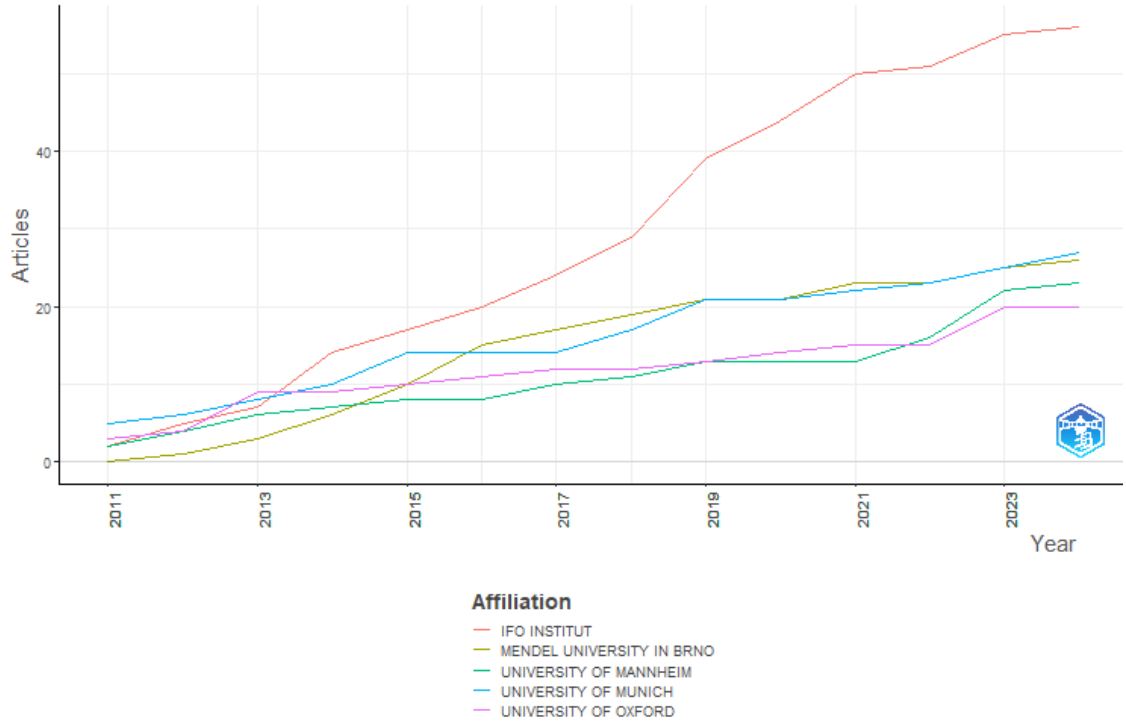

Figure 11 – Affiliations' production over time

Source: Own elaboration from Bibliometrix

4.2.3 Analysis of countries

Figure 12 visualizes the data concerning the nationality of authors and co-authors in the total publications.

One of the main benefits of international co-authorship is the possibility of achieving greater diversity in researching a given topic. International researchers working together can often produce higher quality research since their multi-angle view can be more comprehensive. They can also have access to different data resources and exchange skills and knowledge. More importantly, internationally co-authored publications tend to have an increased impact, getting higher citation rates (Khor & Yu, 2016).

Germany is the most prolific country, with 108 articles, from which 33 are multiple country publications (MCP). The Czech Republic had only 2 MCP out of 47 articles. The United Kingdom authors or co-authors were present in 13MCPs out of a total of 31 and French corresponding authors participated in 8 MCPs out of 28. Swiss researchers had 9 multiple country publications from a total of 25. Poland and Romania only had single country publications in this research field over this period.

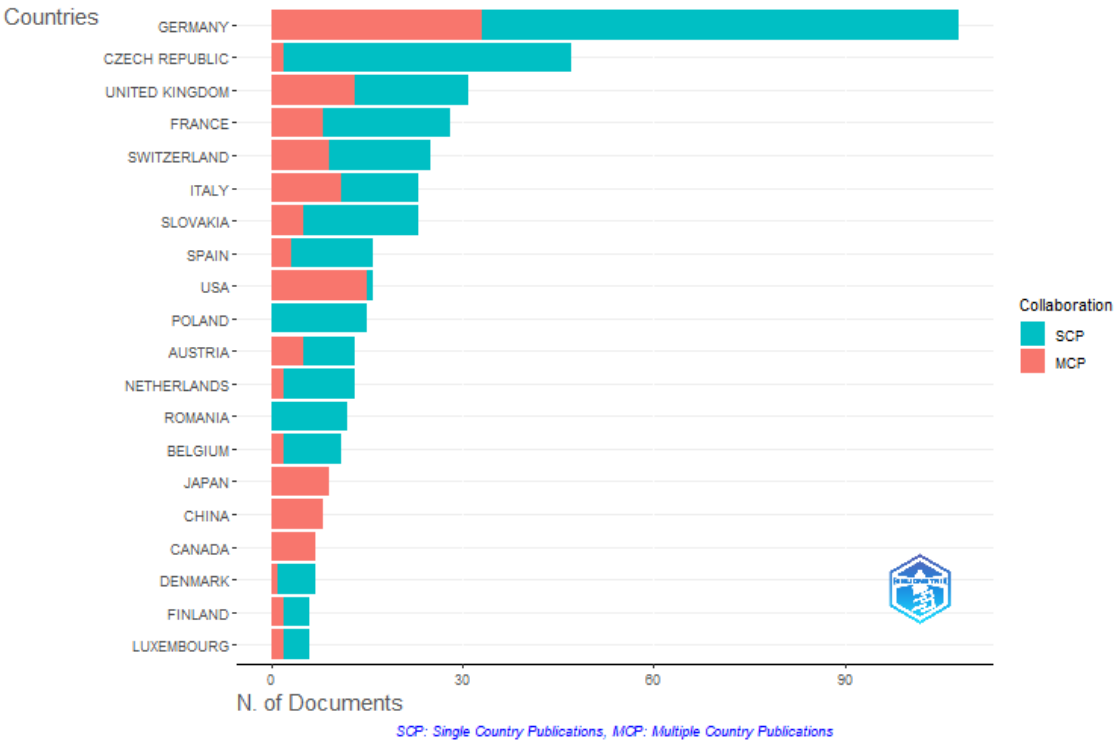

Figure 12 – Corresponding authors' countries

Source: Own elaboration from Bibliometrix

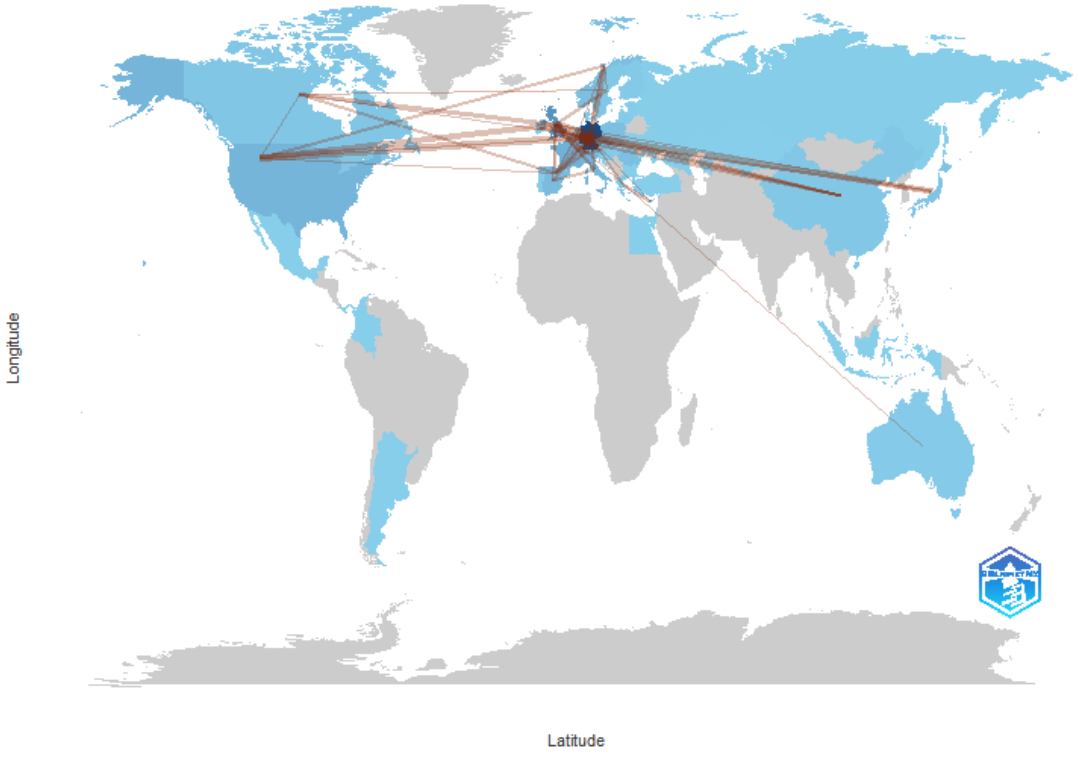

Figure 13 – Collaboration world map

Source: Own elaboration from Bibliometrix

Figure 13 shows the collaboration world map. Most of the international collaboration occurs within the EU, but the United States, Canada, Japan, China and Australia also collaborate in this research field.

4.3 Co-citation analysis

Co-citation analysis is a technique that considers that publications cited together have usually a related theme (Hjørland, 2013)**.** The intellectual structure of a research field and its underlying themes can be revealed by this analysis (Liu *et al.,* 2015). Two publications are linked when they surge in the references list of a third publication. In figure 14, through a network analysis of co-citation, the ten colours reveal ten clusters, and the links established between publications cited together. Table 3 presents all the details,of the ten clusters of cited publications.

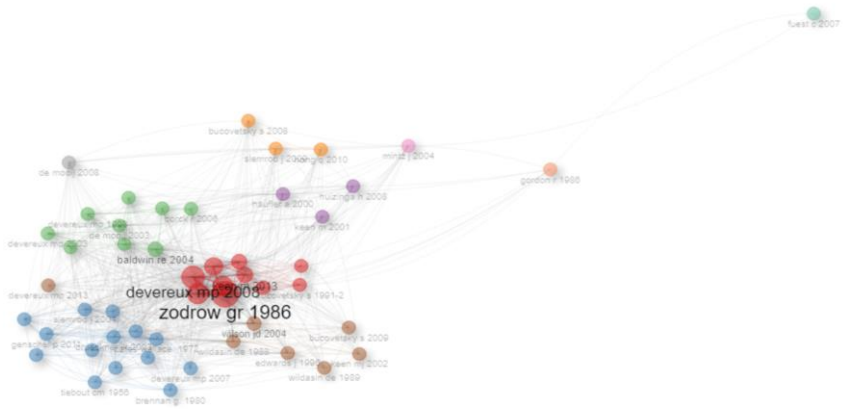

Figure 14 – Co-citation network

Source: Own elaboration from Bibliometrix

Table 6. Co-citation network

Node	Cluster	Betweenness	Closeness	PageRank
zodrow gr 1986	1	122,9938	0,016949	0,069635
devereux mp 2008	1	91,79585	0,016949	0,053019
wilson jd 1999	1	72,0087	0,016667	0,046181
wilson jd 1986	1	52,59509	0,016393	0,049965
bucovetsky s 1991-1	1	44,09492	0,016667	0,044433
keen m 2013	1	25,33901	0,015873	0,035784
kanbur r 1993	1	11,05342	0,014286	0,030663

wilson jd 1991	1	24,87094	0,016393	0,035576
bucovetsky s 1991-2	1	3,929846	0,013158	0,019748
hindriks j 2008	1	2,423583	0,012658	0,018646
brueckner jk 2003	2	4,432269	0,0125	0,026644
oates wallace. 1972	2	5,357879	0,013514	0,023418
tiebout cm 1956	2	0,8276	0,011765	0,016061
genschel p 2011	2	1,236405	0,011905	0,014435
slemrod j 2004	2	4,418445	0,013158	0,021283
overesch m 2011	2	6,650128	0,013514	0,019078
besley t 1995	2	1,216932	0,012195	0,021917
brennan g. 1980	2	1,694457	0,012346	0,012453
paty s. 2008	2	4,340192	0,012987	0,016552
basinger sj 2004	2	0,820841	0,011765	0,015582
case ac 1993	2	1,541633	0,0125	0,0187
devereux mp 2007	2	1,741953	0,012658	0,011935
swank d 2002	2	0,831343	0,012048	0,014275
brueckner jk 2001	2	2,438515	0,012658	0,018917
baldwin re 2004	3	20,01749	0,015152	0,030478
haufler a 1999	3	7,787323	0,014493	0,018018
devereux mp 2003	3	1,863865	0,012821	0,014096
de mooij 2003	3	5,631861	0,014286	0,02047
devereux mp 1998	3	5,431634	0,014085	0,014746
borck r 2006	3	1,161884	0,012346	0,015906
ottaviano gip 2005	3	0,928553	0,012195	0,01622
bénassy-quéré a 2005	3	1,164479	0,012821	0,015201
fuest clemens 2005	3	1,543514	0,0125	0,011886
haufler a 2000	4	18,68099	0,014706	0,014745
keen m 2001	4	8,361439	0,013699	0,010419
huizinga h 2008	4	6,691981	0,013333	0,010613
hong q 2010	5	2,739972	0,0125	0,014671
slemrod j 2009	5	2,010395	0,0125	0,013052
bucovetsky s 2008	5	2,487946	0,0125	0,011172
wilson jd 2004	6	21,82465	0,015385	0,020357
wildasin de 1988	6	10,68205	0,014493	0,014522
edwards j 1996	6	5,231503	0,013514	0,013625
wildasin de 1989	6	2,525398	0,011765	0,011097
devereux mp 2013	6	0,917296	0,012048	0,006954
keen mj 2002	6	2,260485	0,012195	0,010269
bucovetsky s 2009	6	3,280602	0,012195	0,010632
mintz j 2004	7	38,34787	0,012821	0,009757
de mooij 2008	8	3,595015	0,013158	0,006393
fuest c 2007	9	0	0,008	0,003858
gordon r 1986	10	14,17803	0,011236	0,005945

Source: Own elaboration from Bibliometrix

4.3.1 Analysis of cited references

Bibliographic coupling assumes that if two publications share references, their content will be related (Kessler, 1963). Based on shared references, this analysis will group publications in clusters by themes. Differently from co-citation analysis, bibliographic coupling is focused on the citing publications, highlighting more recent publications and showing the direction of current research. The network analysis in Figure 15 shows two different clusters: orange and blue. In theory, they should present two different themes. In practice, in this case, the two clusters share tax competition as a broad theme. However, the references shared by each cluster provide a different approach to the tax competition theme. In orange, heterogenous firms join agglomeration as subthemes; in blue, corporate taxation stands out.

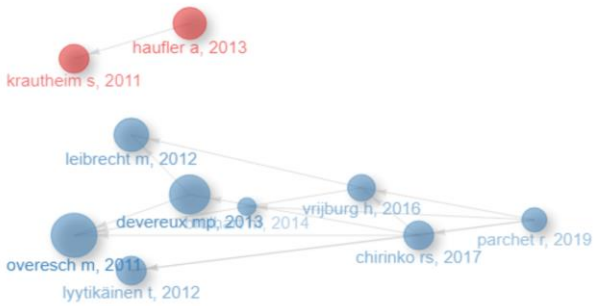

Figure 15 – Historiagraph

Source: Own elaboration from Bibliometrix

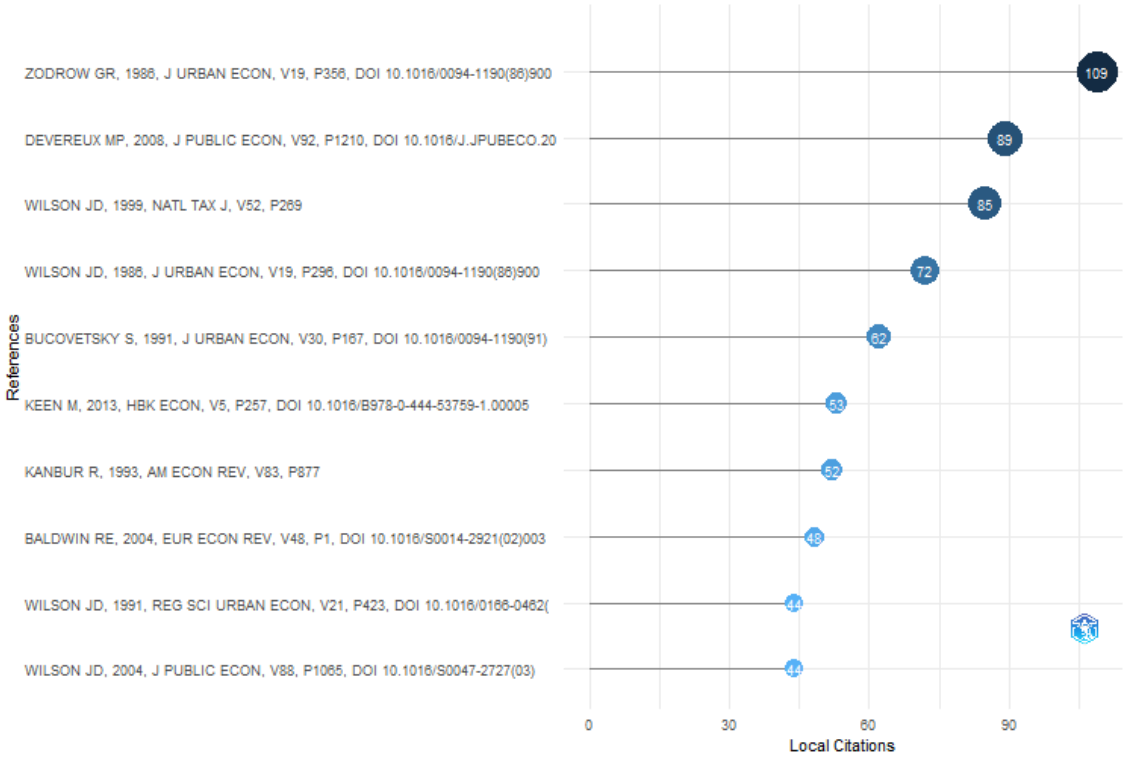

Figure 16 - Most local cited references

Source: Own elaboration from Bibliometrix

Figure 16 visualizes the most cited references among the 495 publications considered in this bibliometric analysis. Naturally, the references dates of publication are significantly older than the dates of the local citations since they represent earlier stages of the research in this field. But independently of their importance, most recent publications are left out of the analysis, since the number of citations is still low.

4.3.2 Analysis of cited authors

Citation analysis assumes that citations express intellectual linkages established when a publication cites the other (Appio *et al.*, 2014). The number of citations a publication receives will determine its impact in a research field. In figure 17, the most cited document among the other 494 was a publication by Michela Redoano with 16 citations (out of 28 globally).

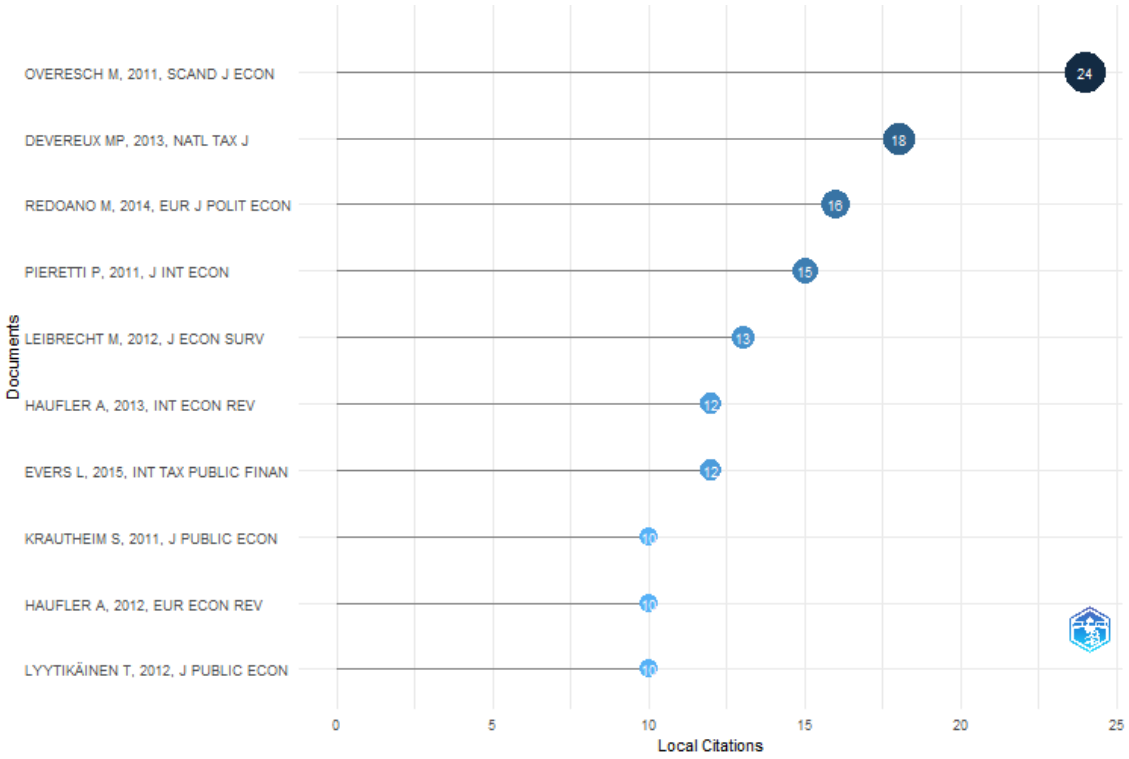

Figure 17 – Most local cited documents

Source: Own elaboration from Bibliometrix

4.4 Co-word analysis

The co-word analysis is a technique used to study the content of the publication, namely the keywords, important words found in the abstract or even in the full text (Baker *et al.*, 2020). This analysis assumes that the association of certain words in a publication implies a thematic connection between them.

In figure 18, the most relevant words are displayed in ranking frequency as the accumulated of all the years. Without surprise, tax competition and taxation appear in the first two places. However, tax harmonization only occurs once, although being part of the search topics in Web of Science.

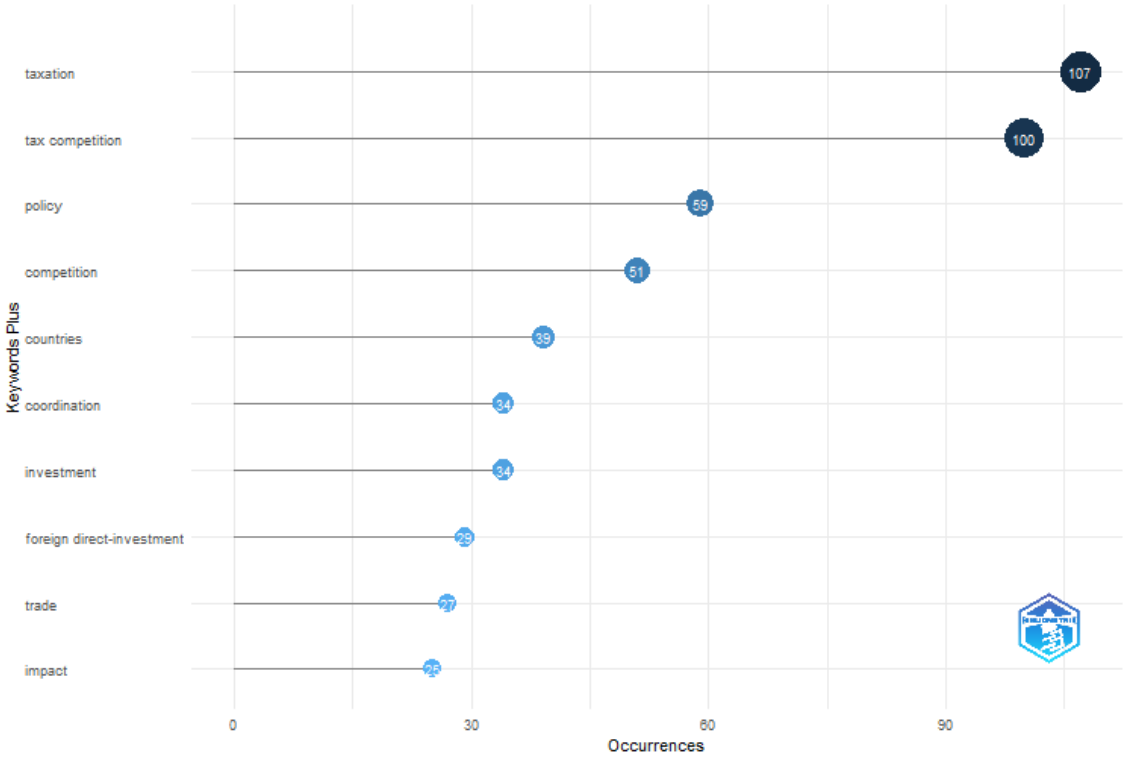

Figure 18 – Most relevant words

Source: Own elaboration from Bibliometrix

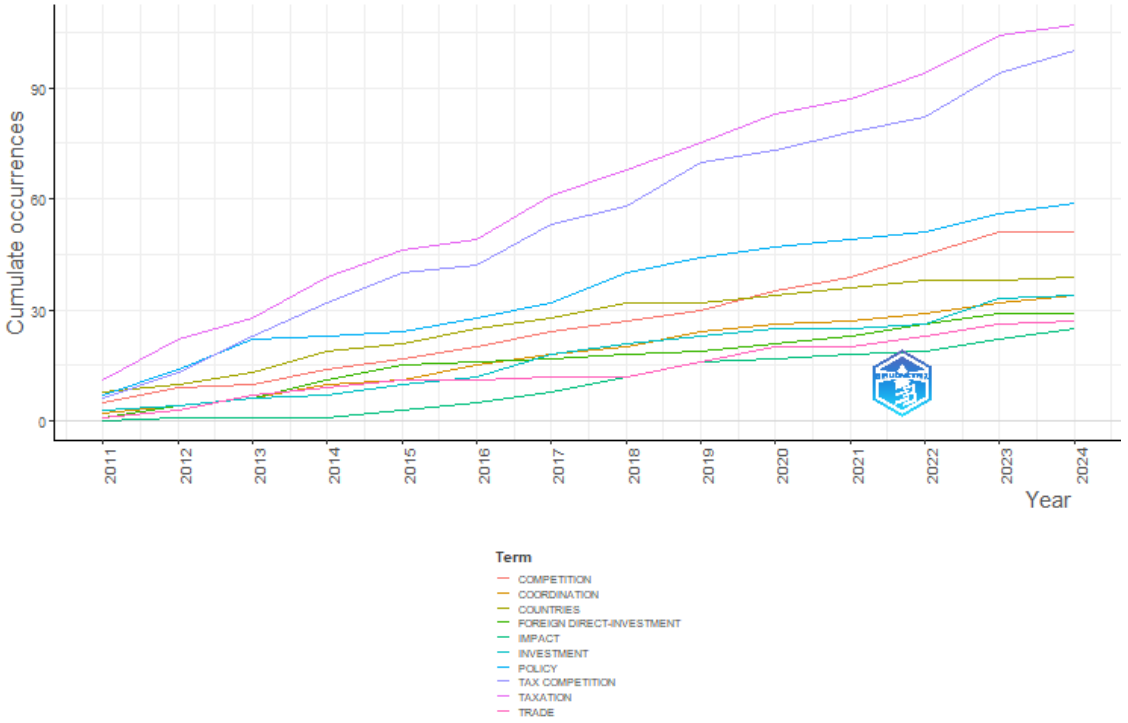

Figure 19 – Words' frequency over time

Source: Own elaboration from Bibliometrix

Figure 19 shows the word frequency over time, with minor exchanges in position for certain words, to reach the same number of relevant words presented in the previous figure.

In a different way, Figure 20 unveils the trend topics, current central words in this research field and allows the understanding of the timing for some keywords. For instance, even if not often used, harmonisation has been present since 2019, side by side with federalism.

This raises the possibility of forecasting. Since BEFIT was recently presented and formula apportionment is a central part to it, becoming again a relevant word seems very possible.

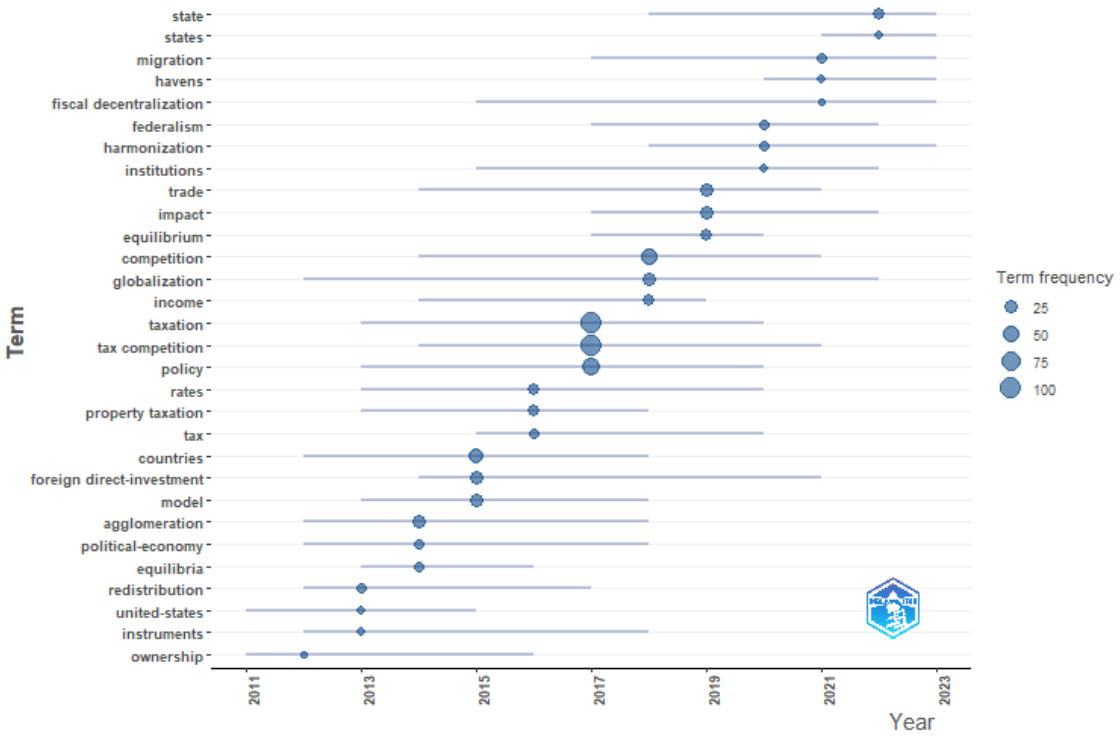

Figure 20 – Trend topics

Source: Own elaboration from Bibliometrix

The relationship among cited references (CR), authors (AU) and keywords (DE) is shown in the Sankey diagram, in Figure 21. This diagram correlates the research keywords with the main cited references and the main authors in the field, being the height of the rectangles a sign of its significance. Analysing the diagram, we can see that most of the authors use most of the keywords and most of the cited references.

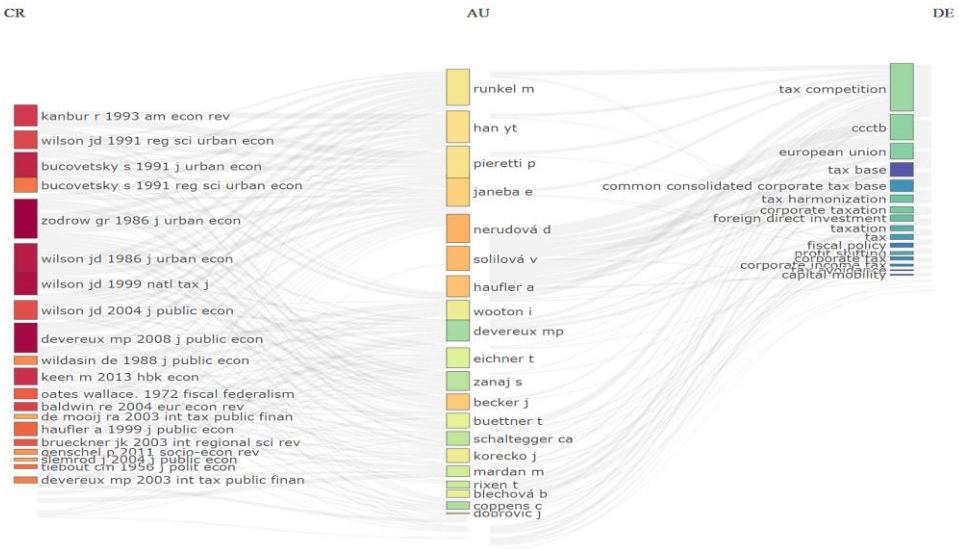

Figure 21 – Sankey diagram

Source: Own elaboration from Bibliometyrix

4.5 Network analysis

Network analysis uses a set of tools to enrich the results obtained by the techniques employed in bibliometric analysis. Centrality measures are metrics used in network analysis to identify the most important and influential nodes within a network. These measures help to understand the significance of individual nodes in the structure and dynamics of the network (Borgatti & Everett, 2006). Centrality measures (e.g.betweenness, closeness and PageRank) have a significant correlation with citation counts (Yan & Ding, 2009)

4.5.1 Network metrics

Network metrics highlight the relative importance of research elements, as keywords, authors or affiliations, for instance.

4.5.2 Betweenness centrality

Betweenness centrality measures the importance of a node in a network by counting how often it acts as a bridge along the shortest path between two other nodes and dividing by the total number of shortest paths in the entire network (Freeman *et al.*, 1991). Nodes with high betweenness centrality have the potential to lead to transformative breakthroughs (Chen *et al.*, 2009)

4.5.3 Closeness centrality

Closeness centrality considers the distance of a node to all others in the network with the focus on the distance from each node to all others (Yin *et al.*, 2006). This means that authors with high closeness centrality can rapidly co-operate with others or get his research noticed.

Table 7. Collaboration network

Node	Cluster	Betweenness	Closeness	PageRank
Haufler A	1	16	0,090909091	0,031935059
Runkel M	1	6	0,066666667	0,034726456
Eichner T	1	0	0,047619048	0,024517035
Mardan M	1	11	0,076923077	0,052399959
Nishimura Y	1	6	0,066666667	0,039290324
Stimmelmayr M	1	0	0,052631579	0,031562689
Agrawal DR	1	0	0,052631579	0,013746703
Hindriks J	1	0	0,047619048	0,029886291
Han YT	2	9	0,142857143	0,061801951
Pieretti P	2	0	0,1	0,048927187
Wooton I	2	0	0,071428571	0,0109034
Zanaj S	2	0	0,1	0,020259507
Hynes K	2	5	0,111111111	0,028539719
Zou BT	2	0	0,1	0,040430391
Davies RB	2	0	0,1	0,014944297
Nerudová D	3	1	0,5	0,047079337
Solilová V	3	0	0,333333333	0,037352877
Krchnivá K	3	0	0,333333333	0,012341979
Becker J	4	1	0,5	0,047079337
Schneider A	4	0	0,333333333	0,024847428
Fuest C	4	0	0,333333333	0,024847428

Schaltegger CA	5	0	1	0,032258065
Feld LP	5	0	1	0,032258065
Buettner T	6	0	1	0,032258065
Overesch M	6	0	1	0,032258065
Coppens C	7	0	0,333333333	0,032258065
Roggeman A	7	0	0,333333333	0,032258065
van Cauwenberge P	7	0	0,333333333	0,032258065
Verleyen I	7	0	0,333333333	0,032258065
Rixen T	8	0	1	0,032258065
Hakelberg L	8	0	1	0,032258065

Source: Own elaboration from Bibliometrix

4.5.4 PageRank analysis

PageRank analysis was initially an algorithm designed by Google to rank their webpages but was found useful for bibliometric analysis. PageRank can estimate the influence of publications on the research field so that highly cited publications suffer that influence (Donthu *et al.*, 2021).

Table 8. Co-word network

Node	Cluster	Betweenness	Closeness	PageRank
property taxation	1	8,456540169	0,0117647	0,0192749
tiebout	1	0,644169534	0,0108696	0,0125369
underprovision	1	0,610001314	0,0106383	0,0115701
taxation	2	270,9536454	0,0188679	0,1007195
tax competition	2	297,293392	0,0185185	0,0903156
policy	2	134,9015312	0,0178571	0,0676424
competition	2	31,35265927	0,0142857	0,0449566
countries	2	23,05946531	0,0138889	0,0382457
coordination	2	9,716067852	0,0131579	0,0283927
investment	2	13,90159798	0,0135135	0,0302717
governments	2	3,664117294	0,0123457	0,0230808
globalization	2	3,953661121	0,0125	0,0216456
model	2	6,483916762	0,0121951	0,0177596
fiscal competition	2	0,695228712	0,0116279	0,015224
government	2	2,940307607	0,0120482	0,0163204
size	2	1,686153729	0,0119048	0,0150559
state	2	0,199902364	0,0113636	0,0131293
politics	2	0,141862804	0,011236	0,0111052

equilibrium	2	0,514236364	0,0116279	0,0140762
reform	2	0,00929368	0,010989	0,0074897
spillovers	2	0,612015133	0,0116279	0,013492
growth	2	0,333154733	0,0116279	0,0122931
tax	2	0	0,0105263	0,0049501
efficiency	2	0,146809253	0,0111111	0,0088928
evasion	2	0	0,0105263	0,0069826
political economy	2	0,18440602	0,011236	0,0103663
harmonization	2	0	0,0107527	0,0059199
migration	2	0,011152416	0,010989	0,0076341
redistribution	2	0,486370755	0,0113636	0,0097954
regimes	2	0,02020202	0,010989	0,0069202
foreign direct investment	3	10,12334756	0,0135135	0,0348924
trade	3	6,145950069	0,0126582	0,0292911
impact	3	10,64875089	0,0125	0,0212763
location	3	13,90292432	0,0131579	0,031154
agglomeration	3	2,915605992	0,0126582	0,0243843
fdi	3	1,659510231	0,0121951	0,0214291
integration	3	0,627393878	0,0121951	0,0197902
income	3	1,403093059	0,0121951	0,0172609
rates	3	1,2000221	0,0116279	0,0152489
firms	3	0,248289354	0,0117647	0,0134701
multinationals	3	0,55181622	0,0120482	0,0150608
determinants	3	0,288404575	0,0113636	0,0112318
eu	3	0	0,0107527	0,0054312
incentives	3	0,11192154	0,010989	0,0067557
panel-data	3	0,382368982	0,0116279	0,0115526
choice	3	0,021164021	0,0107527	0,0063171
externalities	4	2,192943804	0,0114943	0,0124797
federalism	4	0,189088836	0,010989	0,0067757
decentralization	4	1,415543739	0,011236	0,0101388

Source: Own elaboration from Bibliometrix

Some of the words and clusters are shown in Table 8 that states quantitatively what Figure 22 displays visually in terms of network metrics. Taxation and tax competition are undoubtedly the most important words. In terms of betweenness centrality, these words influence the flow of information since they are present most of the times in the shortest path between two other nodes. Looking at the closeness centrality, they are close to the other nodes, being efficient in establishing connection even to the nodes at the edges of

the network. Regarding PageRank, the words taxation and tax competition are also the most influential and present.

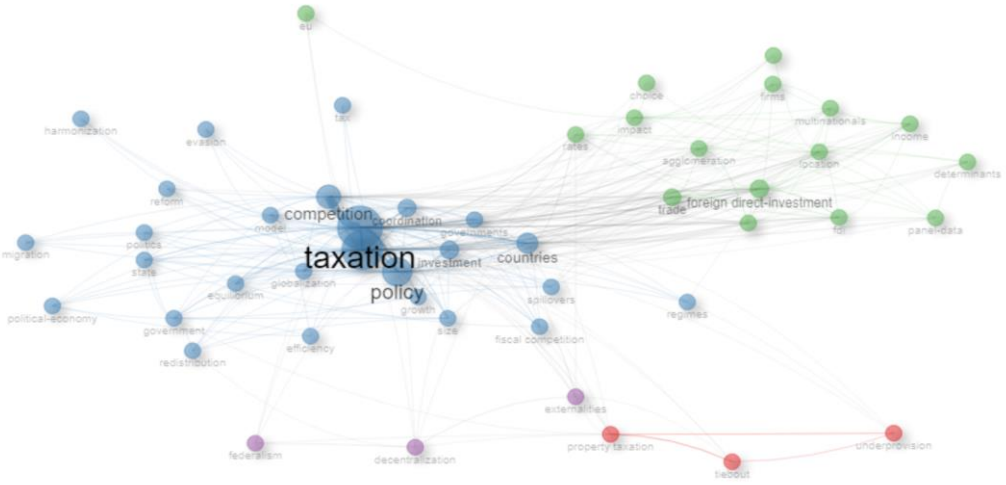

Figure 22 – Co-word network

Source: Own elaboration from Bibliomatrix

In Figure 23, the thematic map represents the main themes in this research field, based on co-ocurrence of keywords. The size of each bubble indicates the importance or centrality of the theme and its position shows conceptual relationships; proximity between bubbles implies conceptual similarity.

Without surprise, taxation (the main word), with tax competition and policy represent the bigger bubble, with its position revealing high relevance and a low development degree, being considered a basic theme. When considering the bubble of EU, with profit and apportionment, there is relevance but also a high development degree assuming it as a motor theme.

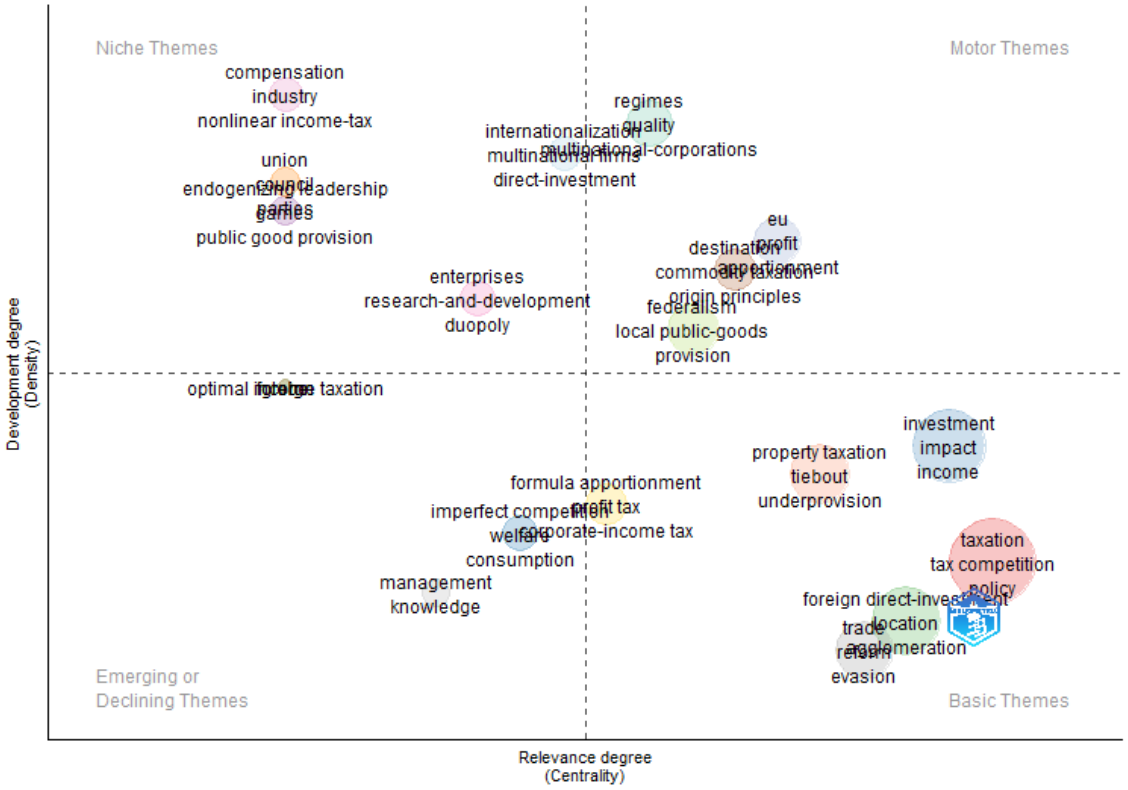

Figure 23 – Thematic map

Source: Own elaboration from Bibliomatrix

5 Conclusions

This dissertation started with a brief introduction on the corporate income tax harmonization process in the European Union. We analysed the reasons for the EU to address this issue and propose solutions, from the first CCCTB to BEFIT. These proposals, if realised, could represent a major transformation in EU's fiscal landscape. So, we decided to analyse scholars' interest on this topic by conducting a bibliometric analysis. We presented a systematic overview of corporate income tax harmonization, based on 495 articles and proceeding papers, issued between 2011 and 2024, retrieved from Web of Science. We identified the main authors, sources, countries, affiliations keywords and references. Performance analysis and science mapping were conducted using Bibliometrix and Biblioshiny.

5.1 Main findings and contributions

The present dissertation contributes to the existing research on tax harmonization in the European Union, by gathering information on the most significant publications on the subject, from 2011 to 2024, helping to understand where the EU stands on the matter and to unveil patterns and trends, revealing research opportunities for the future.

In short, after presenting the empirical results of the conducted bibliometric analysis allow us to answer the proposed research questions:

RQ1- Which are the most prolific and the most cited authors?

The most prolific authors may not always be the more cited ones, but they all contribute to advancing in the field of research. Considering both the number of publications and total citations, Haufler presents the best balance. Rixen is the most cited but with fewer publications. Nerudová is the most productive, but one of the least cited. Could it be in part due to her affiliation and country of origin?

Something became clear, though. Almost 80% of researchers write only an article in this research field and less than 10% write 3 or more. These results only reinforce the importance of conducting bibliometric analysis, due to the dispersion of researchers.

RQ2- Which journals are the most relevant in this field?

The *Journal of Public Economics* and *International Tax and Public Finance* are probably the journals more relevant. Either in terms of number of publications, or in total citations, as well as with all three indexes, they distance from all others. Nevertheless, *EC Tax Review* started publishing in this topic in 2019 but has already catch up in terms of publications most of the top ten journals.

RQ3- Which words are used the most?

"taxation" and "tax competition" are the most used words, by far. "policy", "competition" and "countries" follow the lead, and only then appears "coordination". Strangely, "tax harmonization" only can be found in the 52nd position. But the trend topics indicate that "harmonization" stands among the most recent research words, as well as "State", "states", "havens" and "federalism". It will be interesting to monitor if the discussion on the recent BEFIT proposal has been changing the focus on relevant words in this field of research.

RQ4- Which countries publish and correspond in this field?

Germany stands as the driver of this research field. Not only represents the most productive country but, in absolute terms, constitutes also the most collaborative in this topic. The Czech Republic and the UK complete the podium. It is interesting to note that even after Brexit, the UK researchers kept scientific interest in this topic.

RQ5- How does the scientific production in the field evolve over time?

Since 2011 until 2024, scientific production within this topic had annual variations; the number of yearly publications ranged from 26 to 49, with peaks in 2012, 2014, 2017 and 2023. The consulting and discussion over both CCCTB proposals, in 2011 and 2016, as well as BEFIT proposal in 2016 may have influenced scholar's research.

5.2 Limitations and future research directions

Even though the bibliometric analysis on tax harmonization revealed interesting results, this dissertation has several limitations. Qualitative research is crucial when studying any social science discipline, and taxation is no exception. However, computing a vast amount of information makes room for surprise, for the non-expected. And that may become a starting point for researchers, since investigating more deeply an unexpected result, the researcher can bypass some habits of investigation, adopting a fresh point of view.

We retrieved the publications from Web of Science only, thus reducing the chance of duplicates and of compatibility problems. However, using a single database has limitations. There can be important publications not available in Web of Science that this study did not consider.

Although we tried to choose the most appropriate search terms, influential publications may have been left out, either for the terms not being present in the title, abstract or keywords, or for not using better ones.

We chose the English language, since it covered approximately 97% of the publications, but some relevant ones may have not been considered.

All these limitations can be dealt with in future work, and the upcoming implementation of BEFIT will provide an important and interesting field of research.

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