
SCIENTOMETRIC ANALYSIS OF ECONOMIC REGULATION OF HIGHER EDUCATION

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SUMMARY

The commodification of higher education has led various governments and states to establish a series of policies and practices regulating its actions. One of the areas that attract the most attention from stakeholders is economy, a fundamental pillar for the existence of higher education systems. Through the application of a search vector with 105 keywords in the Web of Science categories of "Education and Educational Research" and "Economics," this study primarily performed a scientometric analysis of the economic regulation

of higher education and identified a core of relevant articles constituting 554 documents. Through the analysis, the exponential growth of science, prolific authors, main countries, institutional affiliations, co-authorships and the used of bibliography were identified. The results revealed that more than 50% of the documents were clustered between 2010 and 2018, that the United States had the highest number of prolific authors and affiliations, and eleven clusters were identified for bibliographic use.

Introduction

With the globalization of higher education and the growth in the number, size, specialization, and mission of the private sector, there is strong competition in many university systems, particularly for financial resources (Psacharopoulos and Patrinos 2018; Rose and Kinley 2018; Shah *et al.*, 2019; Estrada-Real

and Cantú-Ortiz, 2022; Paniagua *et al.*, 2022). This was influenced, in many cases, by the World Bank report entitled "Financing Education in Developing Countries: an exploration of policy options", a document used as a guide for certain countries to establish reforms and new policies for their systems, diversifying the sources of resources and incentivizing the expansion of private higher education institutions (Bertolin, 2011).

The application of the above led to the representation of what is now known as the phenomenon of commodification, where the development of the purposes of higher education, both in the state and private sphere, undergoes a reorientation based on the principles and logics of the market (Bertolin, 2007), a matter opposed to the condition of public good that has traditionally implied and given an economic and legitimacy support to the functions of higher

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education (Brunner and Uribe, 2007; Gibbs, 2019).

A previous study (Brunner and Pedraja-Rejas, 2019) documented that three approaches related to commodification in higher education emerge from the literature: first, studies have been conducted on the market itself, analyzing the implementation and functioning of related issues; second, studies have focused on how universities, seen as an organization, respond to transformations in their environment (Mok, 2008; Ganga-Contreras, Quiroz and Fossatti, 2017; Barret, 2017; Brunner, Ganga-Contreras, Rodríguez-Ponce, 2018; Brunner *et al.*, 2019; Ganga-Contreras *et al.*, 2019; Araya-Castillo and Rivera-Arroyo, 2021); and thirdly, there have been analyses of policies associated with the implementation, acceleration and regulation of higher education markets (Santos, 2004).

It is in this third point where the role of the State is accentuated, where they acquire an evaluative and regulatory character of the system through quasi-market devices and the instruments of the new public management in state universities (Broucker and Wit, 2015; Broucker *et al.*, 2018), while proceeding as a guarantor of quality, supervisor, collector and financier of the student demand of private institutions. All under the assumption that there should be competition where possible and there should be regulation where necessary (Kay and Vickers, 1988).

Therefore, research on economic regulation represents a fundamental field of study for higher education, due to its impact on the efficiency, equity and quality of educational systems, as well as on the socioeconomic development of nations. The analysis of this topic provides tools to improve the allocation of resources, promote competition, academic excellence and strengthen institutional governance. Likewise, it is possible to glimpse the challenges, role and incidence of States in the economic area, mainly determined by financing, costs and efficiency in higher education (Izadi *et al.*, 2002; Abbott and Doucouliagos, 2003; Johnes, 2006; Johnes and Johnes, 2009; Stachowiak -Kudla and Kudla, 2017; Long, 2019; Nkisi, 2021).

All of the above serves as a context to point out the main objective of this article: to conduct a scientometric analysis of scientific articles on economic regulation in higher education. The above seeks to answer the question: what is the current situation of scientific production in this area? To achieve this, the Web of Science database and its

categories "Education and educational research" and "Economics" were used to search for journals, documents and keywords.

After applying a search vector, constructed on the basis of the keywords considered most significant in this field, a relevant collection of scientific articles was found, which was subjected to an analysis according to the exponential growth of the science, its prolific authors, the main countries and institutions of affiliation, co-authorships and groups of keywords and references used.

The main findings point to the great influence of researchers and institutions from the United States in this field, the existence of a semi-period of contemporary scientific production covering 54% of papers (between 2010 and 2018) and the identification of commonly used bibliography groups.

Methodology

A scientometric analysis is conducted on the subject of economic regulation in higher education, since it is the best way to study the quantitative aspects of the production, dissemination and use of scientific information, in order to achieve a better understanding of the concept, the mechanisms of research and its evolution (Bulick, 1978; Morse and Leimkuhler, 1979; Pontigo and Lancaster, 1986; André *et al.*, 2014; Chellappandi and Vijayakumar, 2018; Rodríguez-Rodríguez *et al.*, 2022).

For this reason, the universe of journals included in the Social Science Citation Index (SSCI) of the Web of Science (WoS) between 1975 (start of registration) and 2018 was used to conduct the scientometric analysis of the economic regulation of higher education. Subsequently, the search was restricted to a set of journals simultaneously belonging to the WoS categories of "Education & Educational Research" and "Economics," which cover the main topics of interest for this research. The first category covered resources across the entire spectrum of educational research, theoretical and applied, from kindergarten to doctoral level, covering topics such as pedagogy and methodology, as well as the history of education, reading, curriculum studies, educational policy, sociology, and the economics of education, such as the use of computers in the classroom. The second category included both theoretical and applied research resources on the production, distribution, and consumption of goods and services, including generalist and specialized research, in political economy, agricultural economics, macroeconomics, microeco-

nomics, econometrics, trade, and planning (Clarivate, 2019). From the above, a total of four journals intercepting both themes were identified: 1) Economics of Education Review, 2) Education Finance and Policy, 3) International Review of Economics Education, and 4) Journal of Economic Education.

In the aforementioned journals, 3,135 articles, in turn, provided 2,143 "keywords plus" assigned by WoS (Ekundayo and Okoh, 2018; Zhang *et al.*, 2016). With the idea of initially narrowing down the set of articles to be analyzed, a group of 105 relevant keywords were selected for this research, of which 94 corresponded to thematic-economic terms and the remaining 11 delimited the articles to the field of higher education. This allows for a search vector to be designed (Nasar *et al.*, 2019) based on these four referential sources, limited to the period from 1975 (the beginning of the record) to 2018, including the 105 keywords previously selected. Table I shows which search vector was used.

The vector limits applied resulted in the identification of 554 articles, referred to as the relevant core, derived from the four scientific journals. Based on this finding, a methodology was developed from the scientometric analysis, focusing on the scientific activity or production of scientific articles by researchers (Vega and Salinas, 2017; Iaria *et al.*, 2018; Borges and Benavas, 2019; Lara-Aparicio *et al.*, 2019; Castaño *et al.*, 2022) as well as relation between certain characteristics of the articles, such as countries, organizations of affiliation, authors, words in use, references used, or joint citations in a subsequent article (Caudel *et al.*, 2017; De Mesnard, 2017; Restrepo-Arango and Urbizagástegui-Alvarado, 2017; Vega and Salinas, 2017; Wang *et al.*, 2017; Cipresso *et al.*, 2018; Ribeiro *et al.*, 2018; Yan *et al.*, 2018).

In addition, analyses were performed on this set of identified articles based on the fundamental bibliometric laws, referring to the exponential growth of science and the existence of critical mass (Dobrov *et al.*, 1979; Arias, 2017; Moreno-Fernández and Moreno-Crespo, 2016; Adaba and Ayoung, 2017; Pike *et al.*, 2017; Hellstrom *et al.*, 2018; Vega-Muñoz *et al.*, 2020), to perform a refinement based on that time length of prolific authors (Gutierrez-Castanha and Wolfram, 2018; López-Bonilla *et al.*, 2018) limited to the contemporary semi-period (Gupta, 1998; Kohl, 2009; Arias, 2017; Moura, 2019). Accordingly, the articles of interest and the possibilities of geographical, organizational, and author concentration and/or areas of application

TABLE I
APPLIED SEARCH VECTOR

Search vector
((SO=(ECONOMICS OF EDUCATION REVIEW OR EDUCATION FINANCE AND POLICY OR INTERNATIONAL REVIEW OF ECONOMICS EDUCATION OR JOURNAL OF ECONOMIC EDUCATION)) AND (TS=((AFFIRMATIVE-ACTION) OR (AGENCY PROBLEMS) OR (ASYMMETRIC INFORMATION) OR (AUTONOMY) OR (BAR-GAINED HOUSEHOLD DECISIONS) OR (CAUSAL INFERENCE) OR (CAUSALITY) OR (CHARTER SCHOOLS) OR (CHICAGO PUBLIC-SCHOOLS) OR (CHILDRENS EDUCATION) OR (CHILE) OR (COLLEGE WAGE PREMIUM) OR (COMPENSATING DIFFERENTIALS) OR (COMPETITIVE-EQUILIBRIUM) OR (CROSS-SECTION) OR (DATABASE) OR (DECENTRALIZATION) OR (DEGREE COMPLETION) OR (DE-SCRIPTIVE ANALYSIS) OR (DIFFERENCE-IN-DIFFERENCES) OR (DYNAMIC-MODELS) OR (EARNINGS DIFFERENTIALS) OR (EARNINGS GAPS) OR (EARN-INGS INEQUALITY) OR (EARNINGS MOBILITY) OR (EARNINGS PROFILES) OR (ECONOMIC RETURN) OR (ECONOMIC RETURNS) OR (ECONOMIC-ANALYSIS) OR (EDUCATION) OR (EDUCATIONAL ATTAINMENT) OR (EDUCATIONAL DEBT) OR (EDUCATIONAL MISMATCH) OR (EDUCATIONAL OUTCOMES) OR (EDUCA-TIONAL PERFORMANCE) OR (EDUCATIONAL PRODUCTION) OR (EDUCATIONAL VOUCHERS) OR (EDUCATIONAL-ACHIEVEMENT) OR (EDUCATION-AL-ATTAINMENT) OR (EDUCATIONAL-PROGRESS) OR (EDUCATION-AL-STANDARDS) OR (EMPLOYABILITY) OR (EMPLOYMENT) OR (ESTIMATING RETURNS) OR (FINANCE REFORM) OR (FINANCIAL INCENTIVES) OR (GENDER COMPOSITION) OR (GENDER DIFFERENCES) OR (GENDER DISPARITIES) OR (GENDER GAPS) OR (GPA) OR (GRADE INFLATION) OR (GRADE RETENTION) OR (GRADE-POINT AVERAGE) OR (GRADES) OR (GRADUATE) OR (GRADUATE LABOR-MARKET) OR (GRADUATION RATES) OR (HOUSEHOLD) OR (HOUSEHOLD COMPOSITION) OR (HOUSEHOLD INCOME) OR (HOUSEHOLD-LEVEL ANALYSIS) OR (HUMAN-CAPITAL ACCUMULATION) OR (HYPOTHESIS) OR (IDENTIFICATION) OR (IDENTIFICATION PROBLEM) OR (INCOME DYNAMICS) OR (INE-QUALITY) OR (INTERNATIONAL COMPARISONS) OR (INTERNATIONAL DIF-FERENCES) OR (INTERNATIONAL EVIDENCE) OR (PANEL-DATA) OR (PANEL-DATA APPROACH) OR (PANEL-DATA EVIDENCE) OR (PANEL-DATA MODELS) OR (PUBLIC-EDUCATION) OR (PUBLIC-SCHOOLS) OR (REGULATIONS) OR (SUB-SIDIES) OR (TURNOVER) OR (UNEMPLOYMENT) OR (WAGE) OR (WAGE COM-PARISONS) OR (WAGE CURVE) OR (WAGE DETERMINANTS) OR (WAGE DIF-FERENTIALS) OR (WAGE DISCRIMINATION) OR (WAGE DISPERSION) OR (WAGE GAP) OR (WAGE GROWTH) OR (WAGE INEQUALITY) OR (WAGE PREMIUM) OR (WAGE STRUCTURE) OR (WAGES)) AND ((ELITE PRIVATE COLLEGE) OR (ELITE UNIVERSITIES) OR (GRADUATE-EDUCATION) OR (GRADUATE-STUDENTS) OR (PUBLIC HIGHER EDUCATION) OR (PUBLIC UNIVERSITY) OR (UNDERGRADUATE) OR (UNIVERSITIES) OR (UNIVERSITY) OR (UNIVERSITY-STUDENTS) OR (US COL-LEGES)))))) AND TYPES OF DOCUMENTS: (Article) Indices=SSCI Time period=1975-2018.

for both categories in WoS's Journal Citation Report, at 26%. Next, Education Finance and Policy had a minority article concentration of 7%, with the greatest impact and belonging to the first impact quartile (Q1) for both categories in WoS's Journal Citation Report. Finally, the International Review of Economics Education include only 2% of documents.

Determination of exponential growth of science

When determining the exponential growth of science in this area of study, based on the review of the 554 articles published between 1975 and 2018, the exponential growth of the field of research was determined according to the expression $ART(YEAR) = 46,879e^{0.071(-YEAR)}$, with an $R^2 = 0.6846$. A semi-period of contemporary scientific production was estimated between 2010 and 2018, corresponding to 54% and 299 articles, disaggregated into 41 articles for 2010 and 2011, 34 in 2012, 27 in 2013, 33 in 2014, 30 in 2015, 28 in 2016, 23 in 2017, and 42 in 2018. The aforementioned data allow us to conclude that more than half of the articles in this field have been produced over the last decade. The aforementioned information is shaded in Figure 1.

were established (Vega-Muñoz and Romero-Muñoz, 2006; Walters and Wilder, 2015; Vega and Salinas, 2017; Cipresso *et al.*, 2018; Nelson and Grubestic, 2018).

Results

Distribution of relevant core articles

Applying the vector led to the identification of a relevant collection with 554 scientific articles, distributed in the four scientific journals of the categories of "Education & Educational Research" and "Economics" from WoS.

Table II presents that 65% of articles were selected from the Economics of Education Review, which belongs to the second quartile of impact (Q2) for both categories in WoS's Journal

Citation Report. This was followed by the Journal of Economic Education, which belongs to the fourth quartile of impact (Q4)

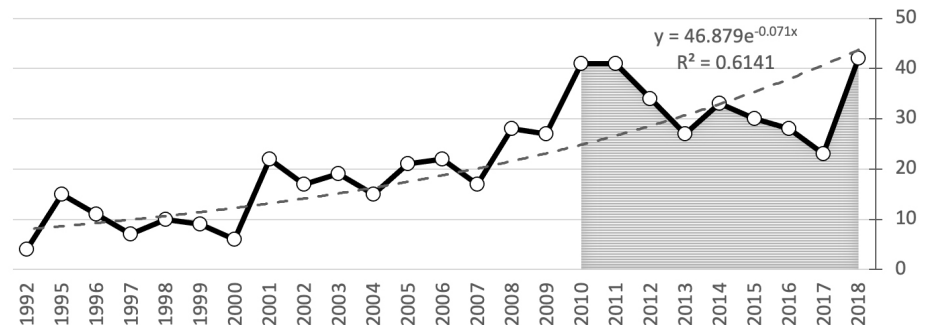


Figure 1. Exponential growth of science and contemporary scientific production. Source: Designed by the authors based on information from WoS.

TABLE II
NUMBER OF ARTICLES IN SELECTED WOS JOURNALS

Journal name	Number of items	% of total (554)	Place in "Economics" category according to impact factor	Place in "Education & Educational Research" category according to impact factor	Journal Impact Factor 2018	Impact factor in the last 5 years
Economics of Education Review	361	65	145 of 363	118 of 243	1.519	2.338
Journal of Economic Education	144	26	292 of 363	214 of 243	0.653	0.784
Education Finance and Policy	36	7	67 of 363	42 of 243	2.429	2.057
International Review of Economics Education	13	2	314 of 363	219 of 243	0.545	-

Source: Designed by the authors based on information from WoS.

Determination of prolific authors

Regarding the relevant collection of articles, 864 authors were identified, of which 31 can be considered prolific authors. If the level of scientific production is assessed with a minimum of 3 WoS articles for the entire study period, the figure is reduced to 25 authors, 18 of them being contemporary due to their production validity in the 2010–2018 period.

As indicated in Table III, Ronald Ehrenberg (Cornell University), John Siegfried (Vanderbilt University), and William Walstad (University of Nebraska-Lincoln) were positioned as authors with the highest number of articles published within the relevant collection, with 10, 7, and 7 papers, respectively, the latter being the one who published the most since 2010, with a total of 5 articles.

Countries and institutions of affiliation of the relevant collection of articles

The relevant core of articles revealed that 99% of the countries of affiliation mentioned included eight

countries: the United States, the United Kingdom, Germany, Australia, Italy, Canada, the Netherlands, and Spain, with the first encompassing about 70% of the total. Table IV details the amount and percentage of participation of each of the countries declared in the articles.

Focusing the review on the main institutions declared in the

relevant core of articles, it is found to align with the preponderance of the U.S. institutions. The University of London in the United Kingdom and the IZA-Institute of Labour Economics in Germany stand out from other countries, both from countries that are in the second and third places in the world ranking by affiliation. However, in terms of prolific authors,

TABLE IV
NUMBER OF ARTICLES IN SELECTED WOS JOURNALS

Country	Articles	% of total (554)
United States (USA)	385	69.5
United Kingdom (UK)	48	8.7
Germany	32	5.8
Australia	27	4.9
Italy	18	3.2
Canada	15	2.7
Netherlands	12	2.2
Spain	12	2.2

Source: Designed by the authors based on information from WoS.

TABLE III
CONTEMPORARY PROLIFIC AUTHORS

Author	Institution	A	B	C (%)
Ehrenberg RG	Cornell University - USA	10	4	40
Siegfried JJ	Vanderbilt University – USA	7	2	29
Walstad WB	Univ. of Nebraska-Lincoln – USA	7	5	71
Singell LD	Univ. of Indiana – USA (1)	6	2	33
	Univ. of Oregon – USA (5)			
Watts M	Purdue – USA	6	3	50
Bosshardt W	Florida Atlantic – USA	5	3	60
Stock WA	Montana State – Bozeman – USA	5	3	60
Becker WE	Univ. of Indiana – USA (2)	4	2	50
	University of South Australia - Australia (2)			
Hilmer MJ	San Diego State – USA (1)	4	1	25
	Brigham Young Univ. – USA (1)			
	University of Louisville – USA (1)			
Webber DA	Univ. of California at Santa Barbara – USA (1)	4	4	100
	Temple Univ. – USA (2)			
Fethke G	Cornell – USA (2)	3	2	67
	University of Iowa – USA			
Griffith AL	Wake Forest University – USA	3	3	100
Hernandez-Julian R	Public Univ. of Denver – USA	3	3	100
Jakubson GH	Cornell – USA	3	2	67
McCoy JP	Murray Public Univ. – USA	3	1	33
McGoldrick K	University of Richmond – USA	3	3	100
Milkman MI	Murray Public Univ. – USA	3	1	33

A: Number of articles as corresponding author. B: Articles since 2010. C: B/A. Source: Designed by the authors based on information from WoS.

only the American universities of Cornell, Vanderbilt, Nebraska-Lincoln, and Purdue are prominent. Table V presents the main institutions of affiliation, led by the aforementioned German institute.

Co-authors

By focusing the analysis on both the contemporary prolific authors and the main institutional affiliations, it is possible to visualize the levels of interaction through their co-authorships. Table VI presents the existing co-authorships among the prolific contemporary researchers exposed previously, highlighting the joint works of Siegfried and Stock (4), McCoy and Milkman (3), Ehrenberg with Jakobson (3) and Webber (1), Walstad with Bosshardt (2) and Becker (1), and Watts with Becker (1), Bosshardt (3), and Walstad (1).

After exposing the interactions between contemporary prolific authors, it is possible to develop networks indicating the intensity of these interactions with the participating institution. Figure 2 presents the interaction among four groups of authors (symbolized by a square), which is connected to their organizations of affiliation (represented by a circle for the universities in the United States and a triangle for the University of South Australia). The width of the lines represents the strength of the relationship as a function of the number of items. The first group includes the joint work of the universities of Indiana, South Australia, Nebraska-Lincoln, Florida Atlantic, and Purdue, with a strong connection between the last two. The second group includes the collaboration of the group of researchers from Cornell University, led by PhD Ronald G. Ehrenberg, with Temple University. In addition, there exists co-authored work between Montana State University and Vanderbilt University, and finally, joint work by two authors at Murray Public University.

Use of bibliography by the authors

By reviewing the bibliography used by the prolific authors of the core of relevant articles, it is possible to identify 11 groups (or clusters) of authors that use common bibliography, and it was possible to access the references in detail for each of these through their Digital Object Identifier (DOI). For instance, cluster 01 (C01) included 15 authors with their respective documents (via DOI), and cluster 11 (C11) contained only 2 authors. The specification of each cluster is provided in Table VII.

TABLE V
MAIN INSTITUTIONS OF AFFILIATION DECLARED IN THE TOTAL ARTICLES ANALYZED

Institutions	Country	Articles	% of total (554)
IZA – Institute of Labour Economics	Germany	19	3
National Bureau of Economic Research	USA	18	3
Cornell University	USA	16	3
University of Nebraska-Lincoln	USA	13	2
University of London	UK	11	2
University of North Carolina	USA	11	2
Princeton University	USA	10	2
Purdue University	USA	10	2
Vanderbilt University	USA	10	2

Source: Designed by the authors, based on information from WoS.

TABLE VI
CO-AUTHORSHIPS AMONG CONTEMPORARY PROLIFIC RESEARCHERS

	Becker WE	Bosshardt W	Ehrenberg RG	Fethke G	Griffith AL	Hernandez-Julian R	Hilmer MJ	Jakubson GH	McCoy JP	McGoldrick K	Milkman MI	Siegfried JJ	Singell LD	Stock WA	Walstad WB	Watts M	Webber DA
Becker WE		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Bosshardt W			0	0	0	0	0	0	0	0	0	0	0	0	2	3	0
Ehrenberg RG				0	0	0	0	3	0	0	0	0	0	0	0	0	1
Fethke G					0	0	0	0	0	0	0	0	0	0	0	0	0
Griffith AL						0	0	0	0	0	0	0	0	0	0	0	0
Hernandez-Julian R							0	0	0	0	0	0	0	0	0	0	0
Hilmer MJ								0	0	0	0	0	0	0	0	0	0
Jakubson GH									0	0	0	0	0	0	0	0	0
McCoy JP										0	3	0	0	0	0	0	0
McGoldrick K											0	0	0	0	0	0	0
Milkman MI												0	0	0	0	0	0
Siegfried JJ													0	4	0	0	0
Singell LD														0	0	0	0
Stock WA															0	0	0
Walstad WB																1	0
Watts M																	0
Webber DA																	

Source: Designed by the authors based on information from WoS.

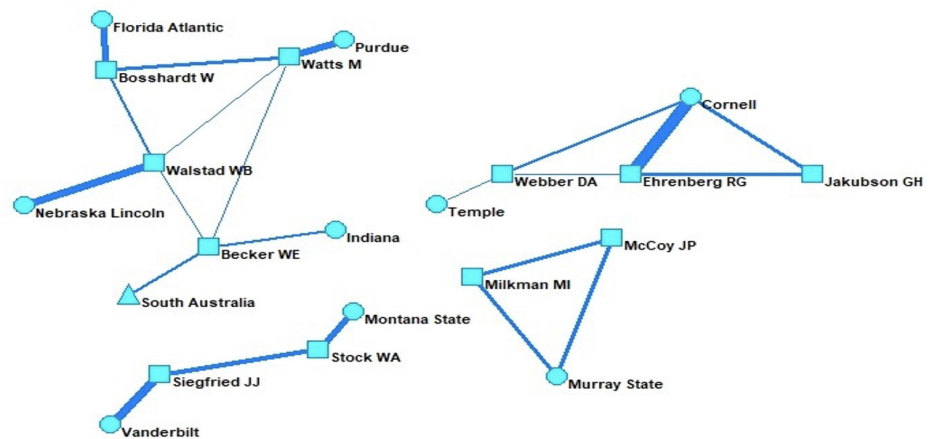


Figure 2. Co-authorship and affiliation of contemporary prolific researchers. Source: Designed by the authors based on information from Web of Science.

TABLE VII
COMMONLY USED BIBLIOGRAPHY CLUSTERS

Cluster	Total items	Items (authors)	Digital Object Identifier (DOI, https://www.doi.org/)
C01	15	Barbezat, B., Boudreau, N., Browne, M., Coats, A., Ereksion, O., Froyen, R., Hoag, J., Marks, S., McCoy, J., Milkman, M., Quddus, M., Ram, R., Raynold, P., Rukstad, M., Salemi, M.	10.3200/JECE.37.3.359-375
			10.2307/1183229
			10.2307/1183372
			10.2307/1183309
			10.2307/1183017
			10.2307/1183018
			10.2307/1183021
			10.2307/1183371
			10.1080/00220485.2016.1179148
			10.3200/JECE.39.1.92-99
			10.2307/1183311
C02	9	Duchesne, I., Hilmer, M., Nonneman, W., O'Toole, D., Peterson, S., Price, J., Quinn, R., Weiler, W., Wetzel, J.	10.1016/0272-7757(94)00029-6
			10.1016/S0272-7757(97)00024-1
			10.1016/S0272-7757(00)00036-4
			10.1016/S0272-7757(99)00021-7
			10.1016/S0272-7757(96)00018-0
			10.1016/S0272-7757(97)00013-7
			10.1016/S0272-7757(98)00003-X
			10.1016/0272-7757(95)00023-2
			10.2307/1183110
			10.2307/1183242
			10.2307/1182689
C03	9	Becker, W., Eubanks, C., Highsmith, R., Kennedy, P., Lawson, C., Raymond, J., Siegfried, J., Toutkoushian, B., Walstad, W.	10.2307/1182186
			10.1016/0272-7757(95)00006-6
			10.1016/0272-7757(95)90393-M
			10.1016/0272-7757(95)90395-O
C04	7	Albaramirez, A., Balderston, F., Dundar, H., Heaton, C., Lewis, D., Sansegundo, M., Throsby, D.	10.1016/S0272-7757(96)00079-9
			10.1016/S0272-7757(97)00019-8
			10.1016/0272-7757(94)00031-Z
C05	6	Brewer, D., Ehrenberg, R., Eide, E., Miller, C., Wahrer, G., Wilson, B.	10.1016/0272-7757(95)00030-5
			10.1016/S0272-7757(97)00004-6
			10.2307/1183427
C06	5	Behrman, J., Birdsall, N., Khan, S., Ross, D., Sabot, R.	10.1016/S0272-7757(96)00028-3
			10.1016/S0272-7757(96)00045-3
C07	5	Ballou, D., Devijlder, F., Podgursky, M., Ritzen, J., Vandommelen, J.	10.1016/0272-7757(95)00005-5
			10.1016/S0272-7757(96)00078-7
C08	3	Bradley, J., Cohn, E., Cohn, S.	10.2307/1182993
C09	2	Dynan, K., Rouse, C.	10.2307/1183419
C10	2	Al-Samarrai, S., Peasgood, T.	10.1016/S0272-7757(97)00052-6
C11	2	Lopez-Valcarcel, B., Quintana, D.	10.1016/S0272-7757(97)00010-1

Source: Designed by the authors based on information from Web of Science.

The presence of the references defined in the previous table allows us to identify the common influences or schools of reference to which the prolific authors theoretically ascribe within the scientific discussion, as depicted in Figure 3. The width of the lines joining the circles (authors) denotes the number of times of interactions.

Discussion and Conclusions

For many higher education systems, competition is not a new phenomenon. The institutions that comprise them have competed for different types of goods, whether tangible (student enrollment, financial resources, projects, etc.) or intangible (reputation, positioning in university rankings, and other

distinctions). This situation also occurs within the institutions themselves, with competition among departments, research groups, or individuals, generally for financial resources.

The above phenomenon responds to the concept of academic capitalism, part of the global trend of the commodification of higher education. In practical terms, it refers to the reorientation of the means and ends of the system to the logic of the market, in contrast with the condition of public good that is almost always assigned to it. However, commodification is framed within a context of development given the intervention or action of states, which mainly act as evaluators and regulators in public institutions and as over-seers and guarantors of quality in private institutions.

In this context, one area of interest for governments, families, and other stakeholders in the university system is economics, which integrates issues such as financing, costs, and efficiency. A State is one of the main agents participating in the system, and it can do so by adopting measures and implementing policies that will be determined by the level of involvement desired, thereby establishing participation as a regulator in an area of social consideration.

Clearly, there are many ways of approaching these subjects, but we have chosen to analyze a set of articles based on the essential bibliometric laws that support scientometrics, which has become an indispensable tool for studying production in the various fields of scientific communication. Therefore, this scientometric study addressed economic regulation of higher education based on the information gathered in the WoS between 1975 and 2018.

The most obvious findings indicate the exclusion of the Spanish language and Latin American researchers from the core of relevant articles identified for this field, as well as the low collaboration between prolific authors. Furthermore, the United States greatly stands out in terms of the number of prolific authors (e.g., Ehrenberg, Siegfried, Walstad, Singell, and Watts) and the number of affiliations (followed by the United Kingdom and Germany). Accordingly, narrowing down the search to the WoS categories of "Education & Educational Research" and "Economics" revealed that the Economics of Education Review contributed the greatest number of scientific articles to the relevant collection, with 361 documents representing 65% of the total. With respect to the keywords and bibliographic use, 6 and 11 clusters were identified,

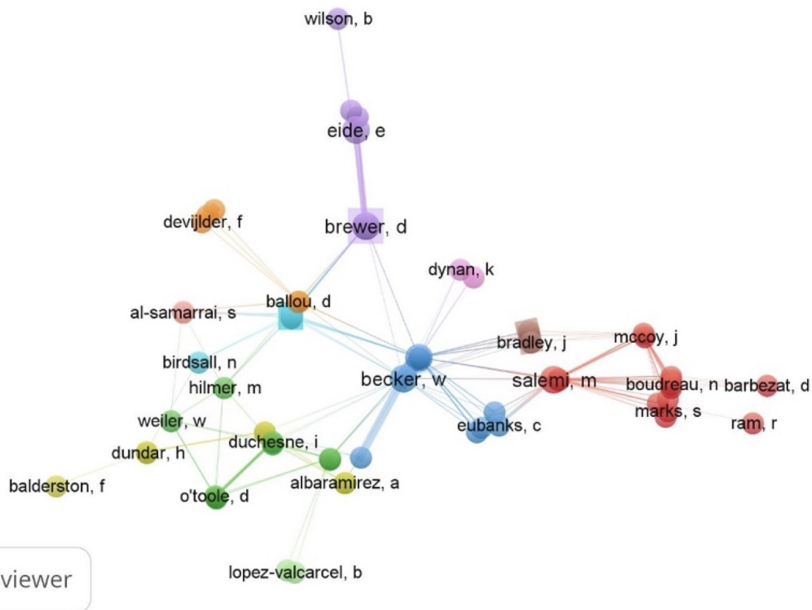


Figure 3. Use of common bibliography. Source: Designed by the authors, based on information from WoS.

respectively, with their corresponding links or interactions.

Finally, the results revealed that more than half of the documents were grouped between 2010 and 2018, with an increasing line in this matter, but were still low compared with other areas. Despite the fact that the total information provided by the four journals from the two WoS categories analyzed was 3,135 documents, the research only focused on those considered relevant after applying the vector, i.e., almost 18% of this figure.

The main limitations of the research are its global nature, which makes it difficult to generate analyses of institutions or researchers from regions or countries outside the relevant core of articles; in addition to the use of Web of Science over other databases. This situation creates an opportunity to continue with future work in this field, starting with the application of new search filters, the possibility of a systematic review of the concept or the inclusion of databases such as Scopus and Scielo (regional) in the analysis. Although there are criticisms of scientometrics for considering only the possibility of quantitative measurements, this research provides a consistent basis of information for those who wish to continue with future studies in this area.

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ANÁLISIS CIENCIOMÉTRICO DE LA REGULACIÓN ECONÓMICA EN LA EDUCACIÓN SUPERIOR

Carmen Gloria Jiménez-Bucarey, Luis Araya-Castillo, Francisco Ganga-Contreras y Walter Sáez

RESUMEN

La mercantilización de la educación superior ha llevado a diversos gobiernos y estados a establecer una serie de políticas y prácticas que regulan su accionar. Una de las áreas que más llama la atención de los actores es la economía, pilar fundamental para la existencia de los sistemas de educación superior. A través de la aplicación de un vector de búsqueda con 105 palabras clave en las categorías de Web of Science de "Educación e investigación educativa" y "Economía", este estudio realizó principalmente un análisis cuantitativo de la

regulación económica de la educación superior e identificó un núcleo de artículos relevantes que constituyen 554 documentos. A través del análisis, se identificó el crecimiento exponencial de la ciencia, los autores prolíficos, los principales países, las afiliaciones institucionales, las coautorías y la bibliografía utilizada. Los resultados revelaron que más del 50 % de los documentos se agruparon entre 2010 y 2018, que Estados Unidos tuvo el mayor número de autores prolíficos y afiliaciones, y se identificaron once grupos para uso bibliográfico.

ANÁLISE CIENCIOMÉTRICA DA REGULAÇÃO ECONÓMICA NO ENSINO SUPERIOR

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RESUMO

A mercantilização da educação superior tem levado diversos governos e estados a estabelecer uma série de políticas e práticas que regulam suas ações. Uma das áreas que mais atraem a atenção dos stakeholders é a economia, pilar fundamental para a existência dos sistemas de ensino superior. Através da aplicação de um vetor de busca com 105 palavras-chave nas categorias "Educação e Pesquisa Educacional" e "Economia" da Web of Science, este estudo realizou principalmente uma análise quantitativa da

ca do ensino superior e identificou um núcleo de artigos relevantes que constituem 554 documentos. Por meio da análise, identificou-se o crescimento exponencial da ciência, autores prolíficos, principais países, afiliações institucionais, coautorias e o uso de bibliografia. Os resultados revelaram que mais de 50% dos documentos foram agrupados entre 2010 e 2018, que os Estados Unidos tiveram o maior número de autores prolíficos e afiliações, e onze clusters foram identificados para uso bibliográfico.