

ANALYSTS? FORECASTS: A BIBLIOMETRIC ANALYSIS

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Resumo

This paper examines analysts? forecasts research. We summarize the large literature on analysts? forecasts by presenting a bibliometric analysis. We present information related to the number of published papers, the number of citations and the h-index of journals and authors. It is possible to identify the main journals which have been publishing about analysts? forecasts over the years and the most relevant authors in the field. Additionally, the results show that there is only a modest correlation between the number of publications and the number of citations. Regarding h-index, the findings confirm that there is a mix of those with more publications and those with more citations.

Palavras-chave: Analysts? Forecasts; Analysts? Forecasts Accuracy; Forecasts? Accuracy; Forecasts Bias; Bibliometric Analysis.

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ABSTRACT

This paper examines analysts' forecasts research. We summarize the large literature on analysts' forecasts by presenting a bibliometric analysis. We present information related to the number of published papers, the number of citations and the h-index of journals and authors. It is possible to identify the main journals which have been publishing about analysts' forecasts over the years and the most relevant authors in the field. Additionally, the results show that there is only a modest correlation between the number of publications and the number of citations. Regarding h-index, the findings confirm that there is a mix of those with more publications and those with more citations.

Keywords: Analysts' Forecasts; Analysts' Forecasts Accuracy; Forecasts' Accuracy; Forecasts Bias; Bibliometric Analysis.

1. INTRODUCTION

In this paper, we present a general bibliometric analysis of the research about analysts' forecasts. Researchers have studied analysts' predictions since 1958. But only after 1970, the literature about analysts' forecasts has significantly increased. From the moment that analysts' forecasts guide the investment of the market, it becomes an essential and significant field to be studied. The market can collapse if the investments go to the "wrong" place. Thus, the literature tries to understand what can make some predictions better than others. The main question tries to find out factors that make some financial analysts' forecasts more accurate than others. Many authors have provided evidence that specific attributes appear to influence earnings forecast.

The literature on analysts' forecasts has appeared in finance and economics journals, but more often in accounting journals. The first journal in accounting, *The Accounting Review* (TAR) was created in 1926, by the American Accounting Association (AAA), the old American Association of University Instructors in Accounting. It played a fundamental role during the 20th century in spreading accounting re- search. The second journal in accounting, *Journal of Accounting Research* (JAR) only appeared almost 40 years later, in 1963, created by the University of Chicago. The journals of Accounting and Finance (AF) and Abacus (ABA) were created in 1961 and 1965, respectively. Lately, other journals have appeared in the following decades such as *Accounting and Business Research* (ABR) in 1971, *Journal of Business Finance and Accounting* (JBFA) in 1974, *Accounting, Organizations and Society* (AOS) in 1976, *Journal of Accounting Economics* (JAE) in 1979. Recently, the academic researchers have many options to publish, because many other journals have been created, such as *Contemporary Accounting Research* (CAR), and *Review of Accounting Studies* (RAS).

Over the years, the literature about analysts' forecasts has been spread between many journals around the world. The broad subject counts with many sources and specialized authors who have published papers with different goals. However, there is not a bibliometric analysis regarding analysts' forecasts. We believe that bibliometric analysis is a useful tool to state the art of the literature. It is a statistical tool that is used to summarize topic research, in this case, analysts' forecasts.

In this paper, we proceed with bibliometric analysis by studying and analyzing bibliographic material quantitatively about analysts' forecasts. We use biblioshiny for bibliometrix package as described in Aria and Cuccurullo (2017) to indicate the most relevant journals and authors regarding analysts' forecasts by analyzing the number of publications, number of citations, and the h-index.

This study has important implications for the literature regarding analysts' forecasts. A bibliometric analysis is a way to state the art of the literature in some field. Given that the

literature on analysts' forecasts is broad, it is essential to know which journals have been publishing about the subject, who are the most relevant authors and where they have been publishing.

There is a vast number of papers regarding analysts' forecasts accuracy. While previous literature has analyzed analysts' forecasts, we identify which journals and authors are the most relevant in the field across the years. We identify the most relevant journals and authors according to the number of publications, the number of citations, and the h-index. our contribution is investigating and show the literature about analysts' forecasts until July of 2019. Thus, this study may help other authors who want to board in analysts' forecasts literature.

2. RELATED LITERATURE

In this paper, we present a general bibliometric analysis of analysts' forecasts research, and the primary purpose of the studies is exploring the factors that may influence the accuracy of the forecasts. In this section, we present some papers that analyze analysts' forecasts accuracy.

Analysts' forecasts serve as a basis for investment decision-making in the market. Thus, these predictions serve as guiding principles to manage the choice of investments. Analysts recommend options to buy and sell stocks based on various information about the companies. Analysts' forecasts thus vary according to several factors.

According to Kothari et al. (2016) there are two properties of the analysts' forecasts that have received considerable attention in the literature: the forecast accuracy and the forecast bias. The forecast accuracy usually refers to the difference between the estimates and the realization. On the other hand, forecast bias usually refers to the average difference between these values. Forecasts accuracy and bias are due to some factors, for instance, the complexity of the forecast, the level of the analyst's skills, and the incentives faced by the analyst. According to the authors, the complexity of the predictions impairs accuracy, while the ability of analysts increases accuracy. Moreover, the authors indicate that incentives can influence both the accuracy and the bias of the forecasts.

2.1 Analysts' Forecasts Accuracy

The accuracy of analysts' predictions has been strongly studied, and the main purpose is to try to find the factors that may influence the analysts' prediction to be more accurate. For example, Kross et al. (1990) investigated the degree to which analysts' profit forecasts were more accurate depending on specific characteristics of the firm. The results indicated that, first, the higher accuracy of the analysts' predictions is related to the lower historical variability of the values of profits reported by the companies. Second, the authors found no evidence of a relationship between analysts' forecasts accuracy and firm size. This second finding, according to the authors, is at odds with other research that evoked the relationship. Finally, the authors pointed out that analysts' forecasts accuracy is positively related to the greater information available about the firms, for instance, if the firm is coverage in The Wall Street Journal Index. Then, the more accurate the information available, the more precise the analysts' forecasts.

Following Kross et al. (1990), Lang and Lundholm (1996) also analyze company disclosure practices. In particular, they analyze the number of analysts that accompany each company and the policies to disclose information. The authors used data from the Report of the Financial Analysts Federation Corporate Information Committee (FAF Report 1985-89). Their results provide evidence that shows more accuracy when more analysts are following companies with disclosure policies. Also, the authors suggest that there are potential benefits for companies with disclosure policies that include increased followers, as a consequence, increased investor and thus more accurate forecasts. There is also a reduction in the risk of estimating and reducing information asymmetry since both factors show to reduce the cost of capital of a company.

Clement (1999) also identifies that his study did not corroborate with previous studies regarding the analysts' forecasts accuracy. Using the I / B / E / S Database Detail, the author shows evidence that there is a positive relationship between predictor accuracy and analysts' experience (a proxy to identify analysts' ability and ability), as well as a positive relationship with firm size (a proxy for available resources). On the other hand, the authors identified a negative association between that the analysts' characteristics may be useful in greater accuracy of the forecasts and the number of "followers" of the companies. The authors suggest that the results indicate identifying greater accuracy in predicting firm performance. Predictions and market expectations studies can be improved by identifying these characteristics.

Brown (2001) also analyze the factors that influence the accuracy of the analysts' prediction and indicated that their results were consistent with those of Clement and Tse (2003). The authors suggest that based on the existing literature on the characteristics of the analysts, they create a model with six factors. These factors consist of the age of the prediction, and five aspects of the analysts suggested by the preexisting literature. Consistent with previous research, the authors have shown that the prediction bias increases with increasing "age" and the number of firms followed by the analyst, and decreases according to the time the analysts follow the company, the size of the brokerage firm the analyst works for, and the number of forecasts the analyst makes for the company.

In addition to the above factors, there is also another stream of researchers trying to identify whether there are compensating incentives that motivate analysts to provide more accurate predictions. These works are those of Stickel (1991) and Groyberg et al. (2011), and neither study found a relationship between analysts' forecasts accuracy and compensation. On the other hand, although there is no evidence to suggest that there is a relationship between compensation and the accuracy of the forecasts, there are some papers that document a strong correlation between analysts' estimates accuracy and other career outcomes, such as analysts turnover, stock recommendations and financial analysts' career outcomes (Mikhail et al., 1999; Wu and Zang, 2009a; Groyberg et al., 2011; Wu and Zang, 2009b).

There are studies that try to identify the relationship between analysts' forecasts accuracy and some characteristics of both, the company and the analysts. Also, the literature attempts to determine in which environment the estimates may be more accurate. Thus, not only researchers in accounting investigate analysts' forecasts, but also in finance and economic. The other way of analyzing the analysts' prediction is concerning forecast bias.

2.2 Forecast Bias

Another way to analyze analysts' forecasts is investigating the factors that may cause a bias. According to Kothari et al. (2016), the origin of the bias may be related mainly to two factors: information provided by the firm management or analysts economic motivations. In this section, we present the main papers that analyze the reasons for the bias.

Michaely and Womack (1999) analyze the initial offers of the company stocks recommended by analysts. The results show that these stocks perform worse than the recommendations. Thus, the authors conclude that the analysts' recommendations show significant evidence of bias. They also show that the market does not fully recognize this bias. According to the authors, the results suggest that there is a conflict of interests inherent to the different functions engaged by the agents involved.

For Francis and Philbrick (1993), one of the sources of bias is analysts' incentives to gain access to management. The authors indicate that analysts generate bias because they issue forecasts that respond to managers' preferences to distinguish themselves from competing analysts (who provided unfavorable recommendations) in the hope of gaining access to the management. Das et al. (1998) also provide findings that show that analysts are more optimistic for stocks in which the predictability is lower. That is, for those cases where profits are less predictable, analysts made favorable recommendations. According to the authors, the analysts

create a bias of the forecasts to guarantee access to private information.

Recently, researchers have been trying to analyze whether the social-professional network influences the analysts' forecasts bias. Westphal and Clement (2008) show that managers invest in personal relationships with analysts to prevent them from transmitting negative information. Thus, the authors point out that the bias that arises in the face of a reciprocal relationship in which managers and analysts perform favors among themselves.

Some pieces of evidence related to the social and professional network are shown by Brochet et al. (2013) who point out that analysts tend to recommend actions of companies that if there was a previous relationship with the management of the companies and these past relations are associated with forecast accuracy. This study also suggests that there is an influence of social and professional networks in informing and compromising the integrity of analysts' results, thus generating a prediction bias.

3. RESEARCH DESIGN

This paper aims to present a general bibliometric analysis regarding analysts' forecasts. We proceed with the bibliometric investigation by using biblioshiny for bibliometrix package as described in Aria and Cuccurullo (2017). We use the package to analyze primary information of the sample, such as the number of documents, number of journals, keywords, average citations per paper during the entire period, and authors information. Also, as advanced analyses and our results show annual scientific production, average citations per article/year, most relevant sources, most relevant authors, author impact, most relevant affiliations, most global and local cited documents, among other analyses. We divide the results between analysis of the sources (journals) and analysis of the most relevant authors.

We collect documents from Web of Science (WoS) to proceed with the bibliometrics in the biblioshiny package. WoS is recognized as the most influential database in academic research because it only includes recognized journals. Then, WoS has the highest standards. In WoS our search regards the leading subject analysts' forecasts accuracy. To find out papers that relates to the main topic, we execute an advanced search by using keywords in the title (TI) which are: analysts' forecasts accuracy, analysts' accuracy, forecast error, forecast bias, analysts' characteristics, financial forecast, forecast performance, analysts' recommendations. We also refine our search using the following Web of Science Category (WC): Business, Finance. Note that, the collection date of the data is 1st July of 2019. Note that, biblioshiny package does not capture forthcoming papers. Then, the data sample contains information only from the first half of 2019.

Our goal is indicate and analyze the number of publications, the number of citations, and the h-index, we refine our search in bibliometrix for papers only. In the beginning, our sample was composed of 787 documents of different types, including book chapters (35), proceeding papers (20), earlier access papers (1), retracted publications (3), published articles (726) and reviews (2). After we cut our sample, the remaining counts with 723 documents of published papers and five reviews. Table 1 shows the sample selection.

Table 1: Sample Selection

Types of Documents	Number of Documents
Number of observations in the initial data	787
Less:	
Book chapters	(35)
Proceeding/Earlier access Papers	(21)
Retracted Publications	(3)
Total Final Data	728
Published papers	726
Reviews	2

Table 2 describes the sample. As shown before, the number of documents we analyze in this paper is 728. All the articles are published in a total of 114 journals. The authors use 1018

keywords, which can contain keywords related to analysts’ forecasts accuracy or other subjects. The period of the analysis is between 1958 and 2019. The average of citations per documents is 31.31, which means each paper included in the analysis is cited by 31.31 other publications. The number authors in the sample is 1365. As shown in the study, only 132 documents are single-authored, while 1233 papers have more than 1 author. The average number of papers per author is 0.533, which means that there are approximately two times more documents than authors.

Table 2: Description of Sample Selection

Description	Results
Documents	728
Sources (Journals)	114
Keywords Plus (ID)	1018
Author’s Keywords (DE)	1198
Period	1958 - 2019
Average citations per documents	31.31
Number of Authors	1365
Author Appearances	1745
Authors of single-authored documents	132
Authors of multi-authored documents	1233
Single-authored documents	145
Documents per Author	0.533
Authors per Document	1.88
Co-Authors per Documents	2.4
Collaboration Index	2.11

Table 3 shows the number of papers per period or year. Between the first and second paper, it has pass ten years. As shown in the table, the third paper appeared two years after the second paper and from then on documents regarding analysts’ forecasts have become more common. Recall that, although the creation of the American Accounting Association (AAA) was in 1936, the research in accounting has received more attention only from 1968 with the seminal work of Ball and Brown (1968) and Beaver (1968). Also, although the creation of TAR and JAR was before 1965, the multiple numbers of journals in accounting could be perceived only after 1975 when more journals were created.

Table 3: Number of papers per Period/Year

Year	Papers	Year	Papers	Year	Papers
1958-1968	2	1988	5	2004	13
1970	1	1989	9	2005	13
1972	3	1990	7	2006	24
1973	2	1991	3	2007	18
1974	2	1992	4	2008	20
1976	3	1993	2	2009	31
1977	3	1994	7	2010	25
1978	5	1995	4	2011	38
1979	6	1996	3	2012	38
1980	4	1997	6	2013	36
1982	5	1998	6	2014	47
1983	4	1999	14	2015	56
1984	9	2000	1	2016	54
1985	4	2001	10	2017	46
1986	2	2002	13	2018	69
1987	6	2003	18	2019	27

As shown in Table 3, there are few studies before 1970. Therefore, from here on, our analyses only cover data between 1970.

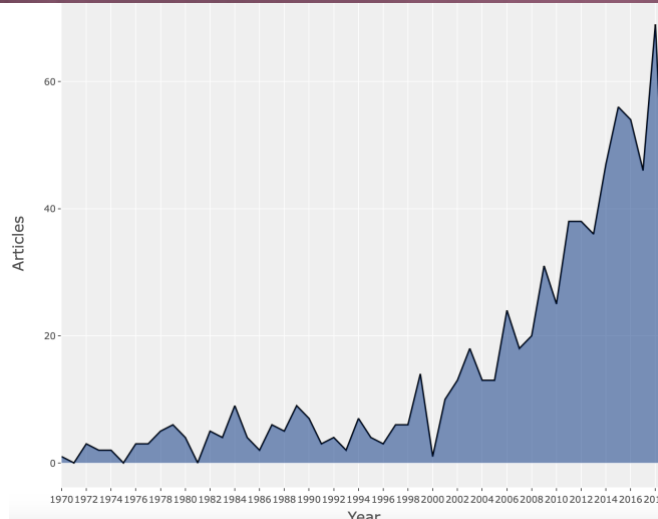


Figure 1: Publications per Year

As shown in Figure 1, the number of publications about analysts’ forecasts has been increased over the years.

4. RESULTS

4.1 Results for Sources/Journals

Table 4 shows the most relevant journals measured by the number of published papers regarding analysts’ forecasts.

Table 4: Most Relevant Source by Number of Published Papers

#	Sources	Articles
1	The Accounting Review	73
2	Journal of Accounting Research	61
3	Journal of Accounting & Economics	40
4	Journal of Business Finance & Accounting	36
5	Contemporary Accounting Research	35
6	Review of Accounting Studies	31
7	Accounting and Finance	20
8	Journal of Finance	19
9	Journal of Banking & Finance	18
10	Financial Management	16
11	Journal of Accounting and Public Policy	14
12	Asia-Pacific Journal of Financial Studies	13
13	International Review of Financial Analysis	12
14	Journal of Financial and Quantitative Analysis	11
15	Journal of Future Markets	11
16	ABACUS-A Journal of Accounting Finance and Business Studies	10
17	Accounting Horizons	10
18	European Accounting Review	10
19	Financial Analysts Journal	10
20	Journal of Financial Economics	9

As expected, table 4 shows that the top 5 Journals in Accounting are the top 6 journals listed in our sample - The Accounting Review (TAR), Journal of Accounting Research (JAR), Journal of Accounting and Economics (JAE), Contemporary Accounting Research (CAR) and Review of Accounting Studies (RAS). Also, the top 5 journals previously mentioned is Journal of Business, Finance, and Accounting, which counts with 36 papers.

Figure 2 shows in a graph the most relevant sources (journals) according to the number of publications about analysts’ forecasts. By analyzing the graph, it is clear that both TAR and JAR have more publications about the main topic with more than 60 papers. The following journals are JAE, Journal of Business, Finance and Accounting, CAR and RAS with between

30 and 40. The remaining journals have less than 20 published papers.

Figure 2: Most Relevant Source by Number of Published Papers

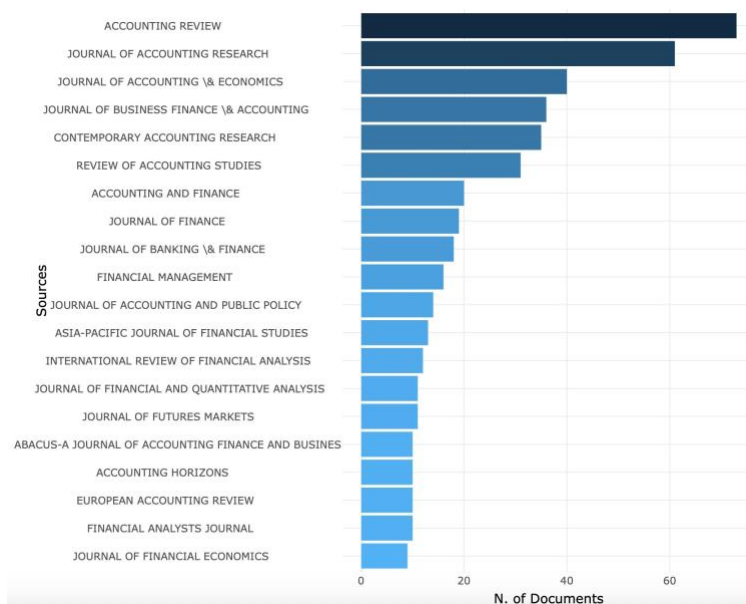


Table 5 shows the most relevant sources (journals) according to the number of citations each journal has. We also include a column of the most relevant source according to the number of published papers to compare both of analysis. JAE and TAR are the most cited journals followed by the Journal of Finance and JAR. That analysis shows that independent of the number of papers, journals can have more or fewer citations. It is interesting to analyze that JAE is the youngest journal when compared to the following three articles, but it is still the most cited journal. In table 4, Journal of Finance is not even between the five journals that have more published papers in the main topic, but it is the third most cited journal. Note that, Journal of Business Finance Accounting is one of the top 5 journals that have more published papers regarding analysts' forecasts, but here it is in 16th position of the most cited journals. Finally, it is interesting to note that eight journals are not in table 4, but are in table 5, showing that these journals are not in between the 20 journals that have more publications regarding the main topic, but they are in between the 20 most cited journals.

Table 5: Most Relevant Sources by Number of Citations

#MostCited	#MostPapers	Sources	Citations
1	3	Journal of Accounting & Economics	2707
2	1	The Accounting Review	2547
3	8	Journal of Finance	2325
4	2	Journal of Accounting Research	2286
5	20	Journal of Financial Economics	1357
6	5	Contemporary Accounting Research	872
7	+20	The Review of Financial Studies	639
8	2	Journal of Accounting Research	559
9	6	Review of Accounting Studies	456
10	+20	Journal of Financial and Quantitative Analysis	313
11	+20	Econometrica	307
12	17	Accounting Horizons	293
13	+20	The Journal of Business	286
14	+20	American Economic Review	253
15	+20	Journal of Political Economy	243
16	4	Journal of Business Finance & Accounting	205
17	9	Journal of Banking & Finance	195
18	19	Financial Analysts Journal	192
19	+20	International Journal of Forecasting	173
20	+20	Journal of Econometrics	151

Figure 3 shows the most relevant sources by number of published papers, and by analyzing it, it is possible to divide the journals into three main groups. The first group is composed by the first four journals which are featured with more than 2000 citations. The second group is formed just of Journal of Finance Economics with between 1000 and 2000 citations. The last groups are composed of the remaining of the journals with less than 1000 citations.

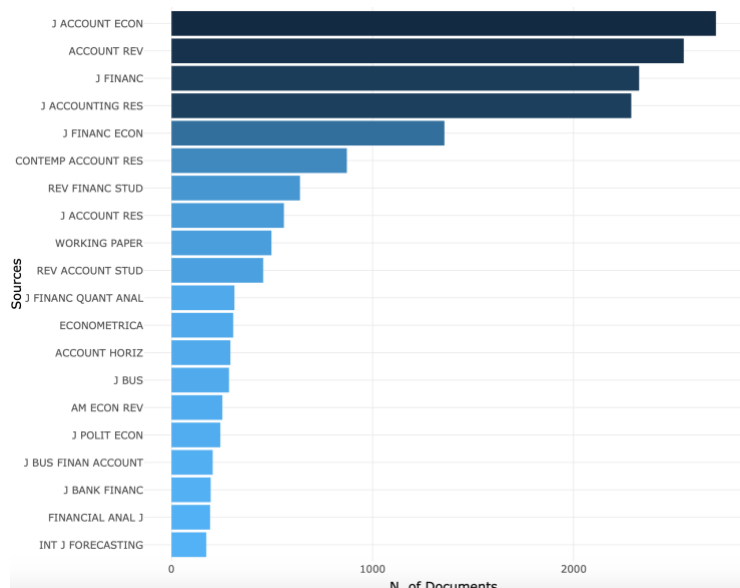


Figure 3: Most Relevant Source by Number of Citations

Table 6 shows the h_index of each journal. As expected, the first five journals with the best h_index are JAE, TAR, JAE, RAS, and CAR. Also, the Journal of Finance is between the top journals in accounting.

Table 6: Most Relevant Source by h-index

Source/Journal	h_index	N. of Citations	N. of Papers	Year of the First Paper
Journal of Accounting Research	36	4836	61	1979
Accounting Review	34	4229	73	1970
Journal of Accounting & Economics	25	3521	40	1982
Journal of Finance	18	3274	19	1976
Review of Accounting Studies	17	575	31	2004
Contemporary Accounting Research	14	1050	35	2003
Journal of Banking & Finance	9	288	18	1980
Journal of Business Finance & Accounting	8	422	36	2005
Journal of Futures Markets	8	239	11	1990
Journal of Financial and Quantitative Analysis	8	230	11	1972
Financial Management	8	163	16	1973
Journal of Financial Economics	7	352	9	1982
Accounting and Finance	7	182	20	2006
Journal of Accounting and Public Policy	7	116	14	1990
Review of Financial Studies	6	964	7	1994
Journal of Money Credit and Banking	6	412	6	1979
Financial Analysts Journal	6	188	10	2001
Accounting Horizons	4	187	10	2008
Journal of Financial Markets	4	148	5	2006
Journal of Monetary Economics	2	155	2	2003

As shown in table 6, it is possible to perceive that the h-index is not just a mix of the number of publications and citations. For instance, TAR has more than ten published papers

about analysts' forecasts than JAR, but as JAR has more publications, its h-index is higher. On the other hand, RAS has fewer citations and fewer published papers than CAR, but it has a higher h-index.

Figure 4 shows the graph of the results for h_index of the journals in our sample.

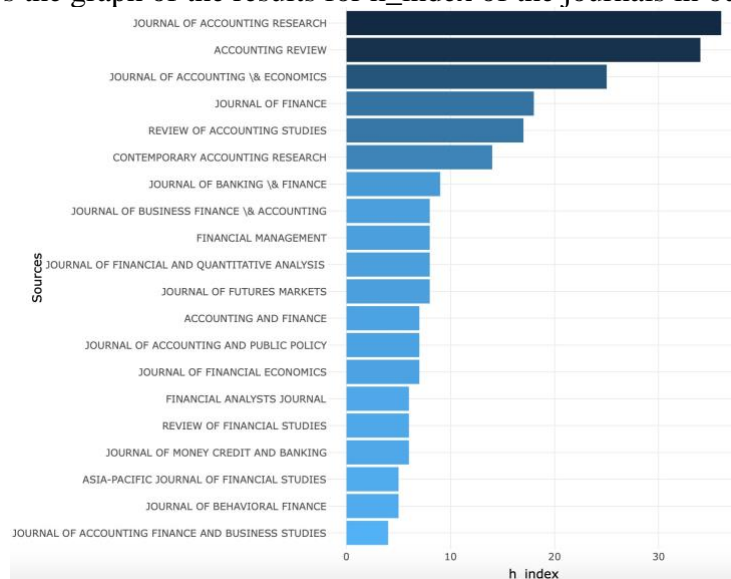


Figure 4: Most Relevant Source by h_index

As shown in figure 4, again, JAR and TAR make up a distinguished group with h_index higher than 30. JAE has h_index between 20 and 30. Journal of Finance, RAS and CAR have the h_index in between 10 and 20. Remaining journals have h_index lower than 10.

Figure 5 shows the journals co-citations network.

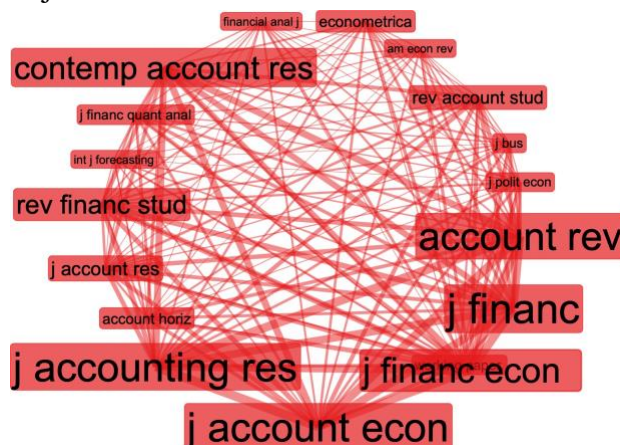


Figure 5: Journals Co-citation Network JAR, JFE, Journal of Finance, TAR and CAR.

As shown in figure 5, all of the top 17 journals by number of citations have been cited at least once by other of another journals. Also, the figure shows the biggest name of the most important journals by number of citations which are JAE, JAR, Journal of Finance and Economics, Journal of Finance, TAR and CAR.

Figure 6 shows the graph of the number of published papers by the ten journals which have more published articles regarding analysts' forecasts: Journal of Business, Finance, and Accounting, CAR, RAS, TAR, Accounting and Finance, JAE, Journal of banking and Finance, Financial Management, JAR and Journal of Finance.

The Journal of Business, Finance, and Accounting, CAR and RAS published for the first time a paper in analysts' forecasts in between 1988 and 1991. These journals have approximately the same number of published documents until 2010. Although CAR and RAS do not follow a linear growth, they still are the second and third journals which publish more about analysts' forecasts. TAR is the fourth journal which has more publications, although it has already

been in the top in between several years (approximately ten years in between 2005 and 2014).

JAE and the Journal of Banking and Finance have shown a smooth growth in the publications about analysts' estimates since 1970 and 1992, respectively. The Financial and Management Journal is the only one that appears to maintain more or less the same mean of publications per year since 1970. Finally, JAR and Journal of Finance appear not to publish much more papers regarding analysts' forecasts since 2016.

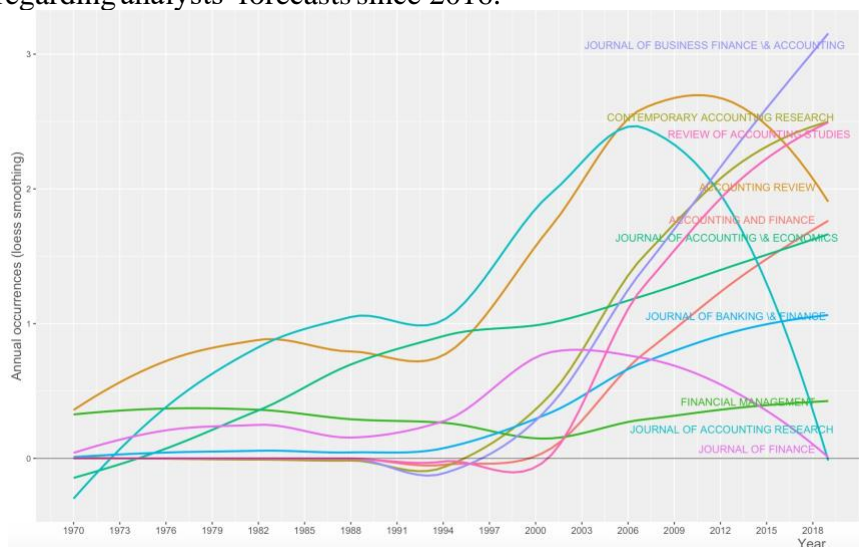


Figure 6: Annual Published Papers per Top 10 Journals Over Years

4.2 Results for Authors

Table 7 shows the results of the most relevant authors according to the absolute number of published papers by each author and according to the fractioned number of published articles by each author.

Table 7: Most Relevant Authors by Absolute and Fractionalized Number of Papers

#	Most Relevant Author by Abs. N of Papers	Number of Papers	#	Most Relevant Author by N of Fractionalized Papers	Number of Fractionalized Papers
1	Brown LD	9	1	Brown LD	4.7
2	Lehavy R	8	2	Waymire G	3.5
3	Clement MB	6	3	Baginski SP	3.3
4	Myers LA	6	4	Beyer A	3
5	Baginski SP	5	5	Clement MB	2.9
6	Barron OE	5	6	Lin Mc	2.8
7	Lobo GJ	5	7	Lehavy R	2.8
8	Song M	5	8	Hope OK	2.6
9	Trueman B	5	9	Ruland W	2.5
10	Yu Y	5	10	Xu W	2.5
11	Beyer A	4	11	Imhoff EA	2.3
12	Bradley D	4	12	Song M	2.3
13	Bradshaw MT	4	13	Hutton AP	2.2
14	Eames M	4	14	Li X	2.1
15	Hope OK	4	15	Trueman B	2.1
16	Hutton AP	4	16	Zhang L	2.1
17	Imhoff EA	4	17	Filip M	2
18	Kim K	4	18	Kudryavtsev A	2
19	Kim Y	4	19	Obrien PC	2
20	Koonce L	4	20	Penman SH	2

In our sample, Brown LD is the most relevant author regarding the absolute number as well as to the fractioned number of published papers regarding analysts' forecasts.

Clement and Baginski SP are considered in between the five most essential authors in analysts' forecasts independently if the analysis considers the absolute or the fractioned number of publications. Only Lehavy R. is in between the ten most relevant authors regardless of the

analysis. Although Waymire G is not in the most relevant authors with the more absolute number published papers regarding analysts' forecasts, he is in the second position of most relevant authors by the number of fractioned papers, which means fewer co-authors and more publications by him- self. The same analysis works for Beyer A who is in 11th position between the most relevant authors by the absolute number of published papers, but in the 2nd position in between the fractioned analysis.

In general analysis, nine authors are in between both the 20 most relevant authors independently of the analysis in our sample.

Figure 7 shows the production of the most relevant authors according to the absolute number of published papers over the years.

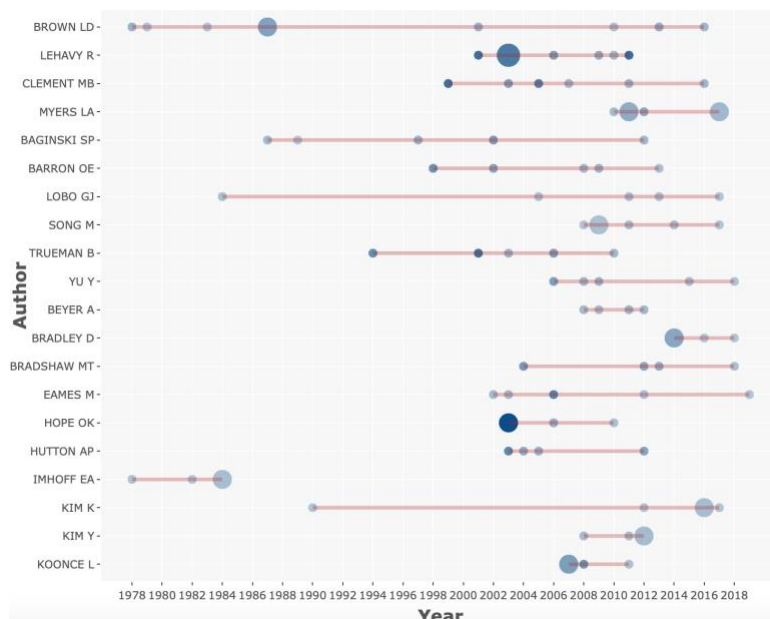


Figure 7: Top Authors Production over Time

Brown LD and Imhoff EA have started publishing about forecasts in 1978 followed by Lobo GJ, Baginski SP, Kim K, and Trueman B. The majority of the other authors have their first published paper in between 1998 and 2008. Only Myers LA and Beyer A have started publishing articles about analysts' forecasts after 2009. Also, the bigger and the darker the circle, the more published papers they have in that year.

Table 8 shows the results of the most relevant authors according to the number of citations.

Table 8: Most Relevant Authors by Number of Citations

#	Author	Total of citations	# Most Rel. Aut. by Abs. N. of Papers	# Most Rel. Aut. by Fract. N. of Papers
1	Womack KL	1012	+20	+20
2	Lehavy R	917	2	7
3	Trueman B	792	9	15
4	Clement MB	754	3	5
5	McNichols MF	629	+20	+20
6	Brown LD	513	1	1
7	Bhojraj S	492	+20	+20
8	Hope OK	479	15	8
9	Bhushan R	477	+20	+20
10	Michaely R	472	+20	+20
11	Lee CMC	464	+20	+20
12	Dhaliwal DS	442	+20	+20
13	Thomas J	438	+20	+20
14	Barron OE	415	6	+20
15	Miller DP	415	+20	+20
16	Jegadeesh N	408	+20	+20
17	Claus J	404	+20	+20

18	Lin HW	396	+20	+20
19	Hutton AP	388	16	13
20	Karamanou I	385	+20	+20

As shown in table 8, Womack KL is the author with more citations, although he is not in between the most relevant authors with more citations. On the other hand, Lehavy R, Trueman B, and Clement MB are in between the 5 top authors with more citations and in between the 20 top most relevant authors in an absolute and fractioned number of published papers in analysts' forecasts. In general, most of the authors who have more citations are not in between the most relevant authors according to the absolute and fractioned number of publications.

Figure 8 presents a graph of authors co-citations network.

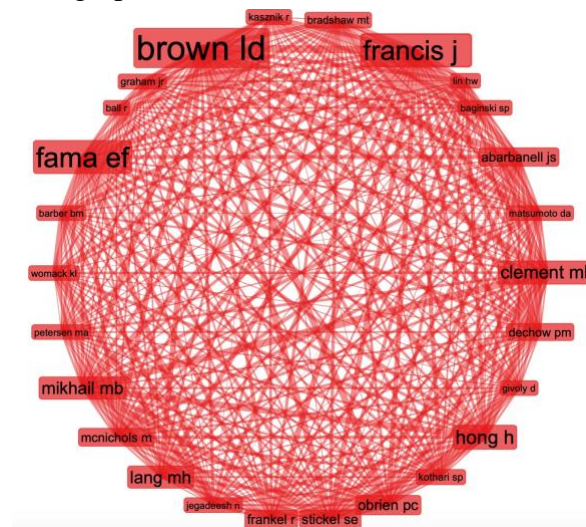


Figure 8: Authors Co-citations Network

As shown in figure 8, all of the 27 authors included in this analysis is cited or has cited at least once by some of the 25 of the other authors. It shows a strong network between the 27 most relevant authors in the area.

Table 9 shows the results of the most relevant authors, according to the h-index.

Table 9: Most Relevant Authors by h-index

#	Author	h_index	# Most Rel. Aut. by Abs.N. of Papers	# Most Rel. Authors by Fract. N. of Papers	# Most Relevant Authors by number of citations
1	Brown LD	9	1	1	7
2	Lehavy R	8	2	7	2
3	Clement MB	6	3	5	4
4	Myers LA	5	4	+20	+20
5	Barron OE	5	6	+20	15
6	Trueman B	5	9	15	3
7	Baginski SP	4	5	3	+20
8	Lobo GJ	4	7	+20	+20
9	Yu Y	4	10	+20	+20
10	Beyer A	4	11	4	+20
11	Hope OK	4	15	8	9
12	Hutton AP	4	16	13	+20
13	Kim Y	4	18	+20	+20
14	Koonce L	4	20	+20	+20
15	Lakonishok J	4	+20	+20	+20
16	Mc Nichools M	4	+20	+20	6
17	Sivaramakrishnan K	4	+20	+20	+20
18	Wather BR	4	+20	+20	+20
19	Waymire G	4	+20	2	+20
20	Wu JS	4	+20	+20	+20

According to table 10, the first 14 authors with higher h-index also have more publications (in between the 20 most relevant authors). The same analysis can be made only for

the first three authors when compared with the analysis regarding the fractioned number of papers and the total citations.

Figure 9 shows the h_index per author.

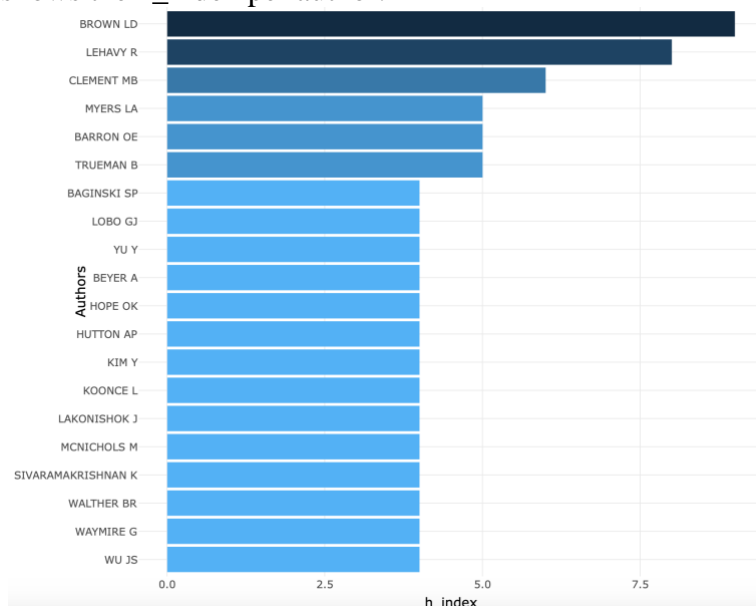


Figure 9: h_index per Author

As shown in figure 9, Brown LD and Lehavy R are featured with h_index higher than 7.5. They are followed by Clement MB, which has h_index in between 5 and 7.5. Myers LA, Barron OE, and Trueman B have the same value of h_index, 5. Other authors have h_index in between 2.5 and 5. Recall that, h_index is a modern measure which represents the quality.

4.3 More Results - Papers/Articles, Affiliations and Three-Fields Plot

Table 10 shows the number of citations, the mean of the number of the citations per article, the mean of citations per year and how many years the papers have to be cited.

Table 10: Citations per Article/Year

Year	Number of Articles	Mean of Citations per Article	Mean of Citations per Year	CitableYears
1970	1	1	0.02	49
1971	0	0	0	48
1972	3	2	0.04	47
1973	2	1	0.02	46
1974	2	1.5	0.03	45
1975	0	0	0	0
1976	3	28.67	0.67	43
1977	3	11.33	0.27	42
1978	5	43	1.05	41
1979	6	39	0.975	40
1980	4	17	0.44	39
1981	0	0	0	38
1982	5	45.4	1.23	37
1983	4	17.75	0.49	36
1984	9	26.67	0.76	35
1985	4	36	1.06	34
1986	2	24.5	0.74	33
1987	6	67.5	2.11	32
1988	5	71.2	2.30	31
1989	9	83.78	2.79	30
1990	7	42.29	1.46	29
1991	3	72.67	2.60	28
1992	4	44.5	1.65	27
1993	2	54.5	2.10	26

1994	7	57.71	2.31	25
1995	4	44	1.83	24
1996	3	222	9.65	23
1997	6	70.67	3.21	22
1998	6	182.67	8.70	21
1999	14	108	5.4	20
2000	1	19	1	19
2001	10	130.1	7.23	18
2002	13	79	4.65	17
2003	18	140.78	8.80	16
2004	13	104.08	6.94	15
2005	13	122.46	8.75	14
2006	24	51.79	3.98	13
2007	18	27.28	2.27	12
2008	20	29.3	2.66	11
2009	31	30.19	3.02	10
2010	25	17.36	1.93	9
2011	38	25.34	3.17	8
2012	38	21.79	3.11	7
2013	36	15.81	2.63	6
2014	47	8.34	1.67	5
2015	56	3.86	0.96	4
2016	54	3.48	1.16	3
2017	46	1.80	0.90	2
2018	69	0.75	0.75	1
2019	27	0	0	0

As shown in table 10, the number of papers regarding analysts' forecasts has gone up and down, but in general, it has smoothly increased over the years. The same analysis can not be done for the mean of citations per article and the mean os citations per year, because both of these analyses have smoothly increased until 1996, but not until 2019. These results turn out to be expected since the number of citable years is lower. Then, as 1996 is more or less in the middle of the entire database of dates, it is expected that the number of citations is going to increase more from that year. It is important to recall that I/B/E/S database was first compiled in 1976, which means an essential impact on the empirical research about analysts' forecasts from that year. It is possible to perceive that the mean of citations per article shoots for that year from 0 in 1975 to 28.67 in 1976.

Figure 10 shows the number of citations per article/year.

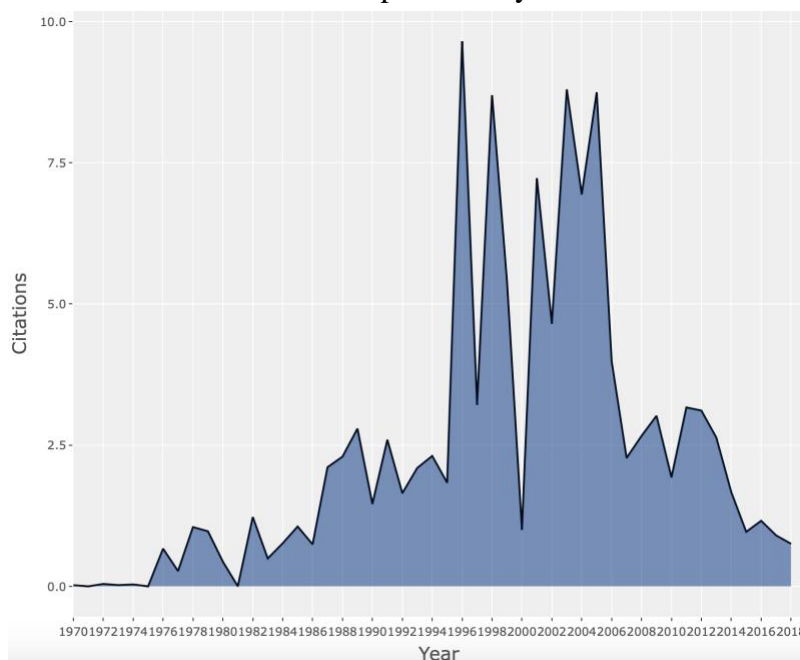


Figure 10: Citations per Article/Year

As shown in figure 10, the number of citations of the papers in our sample has increased until 2006. Note that papers from 2006 have fewer years to be cited. Then, it is expected that the citations of the documents from 2006 will increase over the years.

Table 11 shows the most relevant universities by the number of published papers.

Table 11: Most Relevant Affiliations by Number of Published Papers

#	Affiliations	Number of Papers
1	University Illinois	24
2	Cornell University	17
3	Indiana University	17
4	University Georgia	16
5	Stanford University	15
6	Northwestern University	14
7	Emory University	13
8	University Michigan	13
9	University Texas Austin	13
10	Penn State University	12
11	Singapore Management University	12
12	Texas A	12
13	University Toronto	11
14	Hong Kong University Sci and Tech	10
15	Florida State University	9
16	Santa Clara University	9
17	University Texas	9
18	Brigham Young University	8
19	Ohio State University	8
20	Rutgers State University	8

As shown in table 11, the University of Illinois is right on top, with 24 published papers regarding analysts' forecasts. After that, the universities lose one position because of one essay.

Thee-Fields Plot between authors, keywords and journals is shown in figure 11. It is possible to identify the most relevant authors according to the number of publications about analysts' forecasts and determine with which keywords they are used to combine with the main topic and in which journals they are publishing. In general, it is possible to identify that analysts' forecasts have been studied as earnings forecasts, forecasts' accuracy, earnings management, forecast bias, management forecasts, management earnings forecasts, and analysts' recommendations.

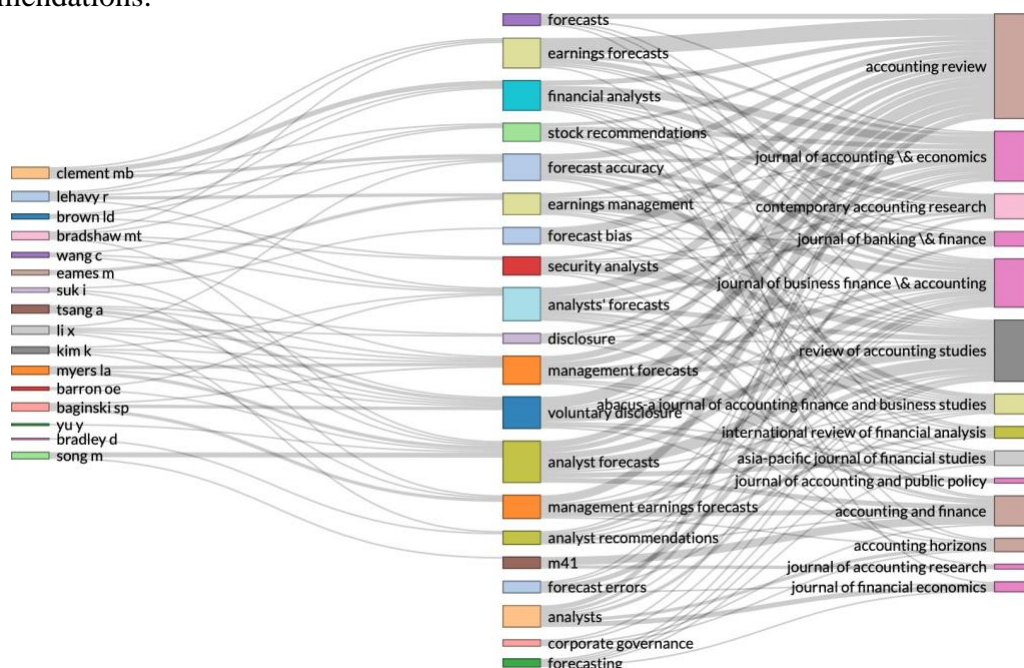
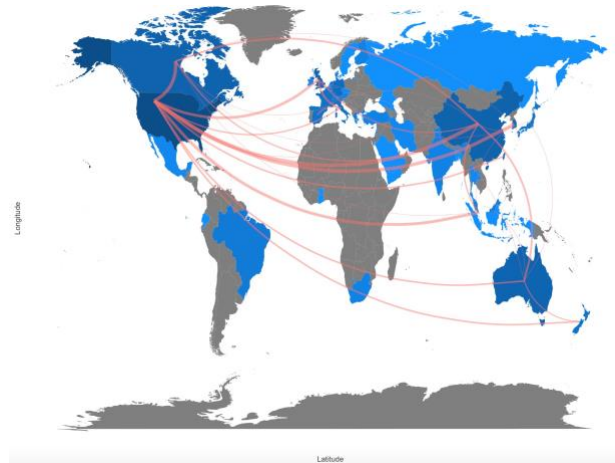


Figure 11: Thee-Fields Plot

Finally, we show our last analysis in figure 12 which shows the collaboration between countries. As shown in figure 12, the United States dominate the connections. It has connections with Canada, Australia, some countries in Asia and Europe. Also, the map shows that countries in gray don't have published papers and the darker the blue, the more published papers. Then, some countries have published papers and connections, but they are not as significant as the ones that draw attention to the map.

**Figure 12: Country Collaboration Map**

5. CONCLUSIONS

In this paper, we analyze the vast literature on analysts' forecasts. By analyzing the number of publications, the number of citations, and the h-index, we show the most relevant journals and authors in this field. The results for sources (journals) indicate that having as many published papers doesn't mean as many citations for both, journals and authors. Regarding h-index there is a mix of top journals that have more published articles and top journals with more citations.

Our results show that TAR, JAR, JAE, CAR, and RAS are in between the top 6 journals with more publications regarding analysts' forecasts, but only the journals JAR, TAR JAE, and CAR are in between the six most cited journals in the main topic. The Journal of Business, Finance, and Accounting is in between the top 6 journals that more publish in the field analysts' forecasts, but it is not in between the top 6 most cited. The Journal of Finance and the Journal of Financial Economics are in between the top 5 journals which have more citations but only in the top 20 list which more publishes regarding analysts' forecasts.

Between the journals that have a more significant number of publications, only a half are between the top journals with more citations. On the other hand, except for the Journal of Finance, the most relevant journals by the number of publications also have the higher h-index (JAR, TAR, JAE, RAS, and CAR). Our results also show that TAR and JAR have published less about analysts' forecasts in the last eight years while JAE, CAR, and Journal of Business and Accounting show a smooth growth in publishing about the topic.

The results for authors indicate the same thing as for journal. Having as many published papers doesn't mean as many citations. Regarding h-index there is a mix of top journals and top authors that have more published essays and more citations.

Note that, bibliometric analysis may present some limitations. They involve the choice of the database. Another limitation is related to research that has not been published in the English language, but that may be very relevant in their own languages. Some more recent papers may be unrelated due to the short time of publication, in addition to other issues that are difficult to quantify.

For this reason, our paper provides general information that may be useful to facilitate the understanding of the state of the art of science, however many other issues must be considered to have a more complete view of the construction of knowledge. This more in-depth view, in order to find the gaps in the research regarding analysts' forecasts, would take place through a more detailed analysis of the content of the published research by researchers or institutions and the most relevant papers in the area.

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