

# Scientific Literature on Financial Technology (FinTech): A Citation and Altmetric Analysis

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**Abstract: Background:** There has been a growing need to demonstrate the impact of research in recent decades. One of the conventional ways used to evaluate the impact of scientific output is citation analysis. The non-conventional metrics which evaluate academic production through social media are called altmetrics or alternative metrics.

**Purpose:** The study aimed to identify and characterize the top-cited and top altmetric publications in the field of FinTech.

**Methods:** We performed a search of the Dimensions database using the keyword “FinTech” to identify the 25 top-cited and 25 top altmetric publications respectively. The identified publications were screened for data related to traditional citation-based indicators and altmetric indicators.

**Results:** There were marginal overlaps between the top-cited and top altmetric articles. The top-cited articles were published in 24 high impact journals. These articles were published from 2015-2019. The majority of the articles (72%) originated from three countries (China 28%, the United States 24%, and Germany 20%). Compared to top-cited articles, altmetric attention scores of top 25 publications ranged from 16 to 123. These articles were published in 18 journals with high impact factors. Top 25 altmetric articles originated from 13 different countries. Twitter and Mendeley were the most popular altmetric data resources. Strong correlation was found between citation counts and altmetric scores ( $r = .81, p < .01$ ).

**Conclusion:** This study presents the characteristics of top-cited and top altmetric articles in the field of FinTech, thereby providing two different perspectives for assessing their impact on related scientific production.

**Keywords:** Altmetrics, Bibliometrics, Citation, Dimensions, FinTech.

**Paper Type:** Review paper

## I. INTRODUCTION

During the last decades, there has been an increasing need to show the impact of research. Evaluations of research output and impact are particularly relevant given the emphasis today on accountability and documenting the value of research. One of the traditional ways that have been used to evaluate research is citation analysis. Since 1960s, citation analysis has been used as a significant tool for assessing the quality of research publications (MacRoberts and MacRoberts, 1989; Kostoff, 1996) [54], [43]. The more number of times an article gets cited by another article reflects the extensive impact of the scholarly work. Citations are also part of the academic reward system (Merton, 1968) [56], with highly cited authors tending to be recognized as having made a significant contribution to science. Holmberg and Thelwall (2014) [31] have noted that citations are important in scholarly communication. They indicate the use of earlier research in new research. But no method is perfect alone and citation analysis is not an exception. Vinkler (2007) [79] pointed out some gaps in citation analysis. Some scientific works are only recognized several years after their publication, while any citation analysis is limited to a predetermined citation window (Lindsey, 1989) [48]. Papers that are never cited do not necessarily have zero impact (Seglen, 1997) [69]. Negative citations are counted the same way as positive citations (Ophof, 1997) [61]. In addition, traditional citation-based metrics have generally dealt with journals or articles and have not measured other significant research outputs like blog posts, slideshows, databases and other important scholarly outputs. New ways are needed to measure the visibility and impact of research. In this context, social media may generate new ways to measure scientific output (Priem and Hemminger, 2010) [67]. The newest indicators which measure scientific output through social media are collectively called altmetrics. Altmetrics or social media metrics were introduced in 2010 by Priem *et al.* (2010) as an alternative way of measuring broader research impacts in the social web via different tools [68]. From that moment on, the interest for altmetrics increased gradually to join and finally surpassed bibliometrics, according to Google

Trends (Fig. 1). The Google Scholar statistics reveal the same trend (Fig. 2). No study on altmetrics before 2011, and then a steady growth from 4 studies in 2010 to 141 in 2017. The

interest for bibliometrics remained relatively stable, with 65-95 publications between 2011-2017, but was exceeded by research work on altmetrics from 2013 onwards.

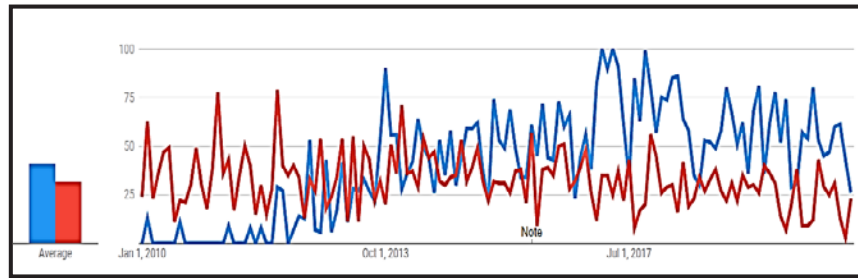


Fig. 1: Altmetrics (Blue) on Google Trends, Compared to Bibliometrics (Red)

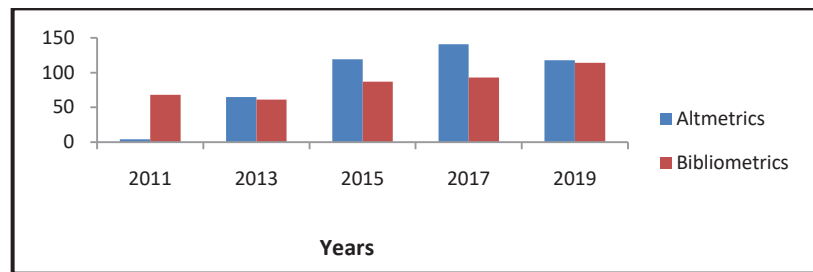


Fig. 2: Scientific Production on Bibliometrics and Altmetrics (2010-2020)

Basically, altmetrics are “social web metrics for academic publications” (Sud and Thelwall, 2014) [72]. Altmetrics provide immediate feedback because they rely on real-time data and interactions and can be quantified quickly. Altmetrics quantifies the attention received by an article through different sources. The attention received by an article is reflected by altmetric attention score which is the weighted count of the attention received by an article from different sources including public documents, mainstream media, reference managers, Wikipedia, social media and blogs among others. Piwowar and Priem (2013) [65] described the benefits of altmetrics in these terms: “Altmetrics provide additional, supplementary information and can balance misleading metrics tied to particular journals. More timely than traditional metrics, altmetrics quickly reveal the impact of recent work and add authority to different types of scholarly products not captured as articles. Altmetrics can capture social media references that escape traditional metrics and reflect public engagement prompted by scholarly writing”.

There have been several studies to identify top-cited publications (Paladugu *et al.*, 2002; Brandt *et al.*, 2010; Kelly *et al.*, 2010; Shadgan *et al.*, 2010; Yoon *et al.*, 2013; Ho, 2014a; Dokur and Uysal, 2018; Azer and Azer, 2019; Baek *et al.*, 2020) [63], [13], [36], [71], [83], [30], [21], [5], [6] and top altmetric publications (Wang *et al.*, 2015; Kolahi and Khzaei, 2016; Barbic *et al.*, 2016; Araujo *et al.*, 2017; Delli *et al.*, 2017; Livas and Delli, 2017; Kolahi and Isanmanesh, 2018; Kim *et al.*, 2018; Kim *et al.*, 2019; Garcovich *et al.*, 2020) [80], [41], [8], [3], [19], [51], [40], [38], [39], [27]. Some bibliometric studies focused on FinTech research (Wu, 2017; Cai, 2018; Junior and

Cherobim, 2020; Liu *et al.*, 2020; Li *et al.*, 2020; Ahmi *et al.*, 2020) [82], [15], [35], [50], [46], [1]. However, none of these studies presented a bibliometric analysis of top-cited and top altmetric publications related to FinTech. Therefore, the present study aimed to identify and characterize the top-cited and top altmetric publications in FinTech field.

## II. LITERATURE REVIEW

*Bibliometric Studies on Top-Cited Articles:* Various bibliometric studies have been carried out to disclose the features of highly cited publications on specific fields, such as obstetrics and gynecology (Brandt *et al.*, 2010) [13], environmental science (Khan and Ho, 2012) [37], material science (Ho, 2014a) [30], horticulture (Fu and Ho, 2015) [24], species distribution predictive models (Barbosa and Schneck, 2015) [9], the Antarctic (Fu and Ho, 2016) [25], poverty (Sweileh *et al.*, 2016) [74], traumatology (Dokur and Uysal, 2018) [21], ecosystem services (Zhang *et al.*, 2019) [86], sharing economy (Lima and Filho, 2019) [47], medical professionalism (Azer and Azer, 2019) [5], gastric disease (Yuan *et al.*, 2020) [84], nuclear medicine (Baek *et al.*, 2020) [6].

*Altmetric-Supported Research:* Researchers worldwide used altmetric data to make discoveries in the field of altmetrics. The percentage of research discussed online doubled between 2011 and 2015. A number of other studies (Haustein and Costas, 2015; Wang *et al.*, 2015; Paul-Hus *et al.*, 2015; Friedrich *et al.*, 2015; Kousha and Thelwall, 2015; Thelwall and Kousha,

2015; Loach and Evans, 2015) [29], [80], [64], [23], [44], [76], [52] were published in 2015 that moved knowledge forward in the area of altmetrics. The year 2017 saw an explosive growth in the number of researchers (Hassan *et al.*, 2017; Finch *et al.*, 2017; Sugimoto and Lariviere, 2017; Moradi, 2017) [28], [22], [73], [59] investigating altmetric data. In 2018, the amount of altmetric-related research tripled (Didegah and Thelwall, 2018; Mohammadi *et al.*, 2018; Serghiou and Ioannidis, 2018; Bornmann and Haunschild, 2018; Lorenz and Mikki, 2018; Huang *et al.*, 2018) [20], [58], [70], [11], [53], [32]. Typically, this research is quantitative in nature and offers new insights into the way research is communicated.

*State-of-the-Art of FinTech Research:* Based on searches in the databases, such as Scopus, Web of Science, Dimensions, SSRN, Emerald and Science Direct, various bibliometric studies on FinTech were identified. The bibliometric article by Wu (2017) [82] conducted searches in the Web of Science database and identified 80 keywords used in publications on the concept. He also mentioned that the articles published with the term started in 2014. The article by Cai (2018) [15] contained a bibliographic review of the terms crowdfunding and blockchain. Junior and Cherobim (2020) [35] conducted a bibliometric study on FinTech enterprises. They used three approaches related to the types of articles, concentration of articles and interest lines of publications and treatment of the subject by selected articles. The first approach showed 45 percent of papers without blind review. The second approach showed no concentration on any journal and the third approach showed four kinds of contents (FinTech categorization, FinTech related to the theory of disruptive innovation, FinTech and theories of administration or economy and FinTech and regulatory and legislative aspects) in all research papers. Ahmi *et al.* (2020) [1] reported the trend of FinTech research using selected bibliometric indicators. The study found a tremendous growth of publications on FinTech over the years since 2015. Liu *et al.* (2020) [50] presented the scientometric analysis on the 629 FinTech business model papers from the Web of Science database. They concluded that the latest hot topics in FinTech were mobile payment, microfinance, peer-to-peer lending and crowdfunding.

It is clear from the literature review that there is still a lack of comprehensive bibliometric work focusing on FinTech research at the global level that also considers citation and altmetric analysis, which is the scope of this study.

### III. MATERIALS AND METHODS

The present study used the Dimensions citation database, which was created by the London-based technology firm Digital Science ([www.dimensions.ai/](http://www.dimensions.ai/)). The product goes beyond traditional bibliometric data and connects publications to their related grants, funding agencies, patents and clinical trials (Kolahi *et al.*, 2019) [42]. The Dimensions citation database is able to detect the articles with an altmetric attention score higher than one and delivers a break-down of all the altmetric

data involved in the calculation of the aggregated score, comprehensively monitoring the online activity surrounding search articles (Garcovich *et al.*, 2020) [27]. We accessed the Dimensions database (Accessed: 06.01.2021) using the keyword “Fintech” in the title and abstract between 2010 and 2020. Consequently, we obtained 2660 publications. All records were downloaded into an Excel spreadsheet and then compiled into two databases: one each for top-cited and top altmetric articles. The articles were ranked in descending order based on citation counts and altmetric attention score. The 25 top-cited and 25 top altmetric articles were selected for analysis. Data were analyzed by Microsoft Office Excel 2016 using descriptive statistics.

## IV. RESULTS AND DISCUSSION

### A. Citation Analysis

Citation analysis is the examination of frequency and patterns of citations in documents. Citation analysis aims to identify the most influential documents in a collection. Table I shows the total number of citations with average citation per year for all extracted publications. As indicated, there are 5975 citations received in 11 years by 2660 retrieved publications with an average of 543.18 citations/year.

TABLE I: CITATIONS METRICS

Metrics	Data
Publication years	2010-2020
Citation years	11
Publications	2660
Citations	5975
Cites/year	543.18
Cites per paper	2.25
Authors per paper	2.04
Citations mean	2.35

Further, Table II lists 25 highly cited publications as per the Dimensions database. In case of a tie in the number of citations, the most recent publication appears first. Citations have been counted from the reference list in all publications that have been indexed by the Dimensions database. The highly cited research article was one written by Lee and Shin in 2018. This publication in *Business Horizons* has been cited 128 times. 95 percent of its citations have been received in the past two years, suggesting that it is currently receiving a lot of interest. This research work has been cited recently in the article “Drivers and barriers of mobile payment adoption: Malaysian merchants’ perspective” published in the *Journal of Retailing and Consumer Services* in March 2021. The citation counts of 25 highly cited articles ranged from 35 to 128 (mean 62.56, median 58, IQR 52, 95% confidence interval 50.77 to 74.35). Top-cited articles were published from 2015 to 2019, with 56

percent being published in 2018-2019. These articles were published in 24 journals (Table III). Most journals have high impact factors (>3) and high cite scores (>5). The majority of the journals (68%) were among JCR highest quartile score (Q1), five journals were among middle-high JCR quartile score (Q2) and two were among middle-low quartile score (Q3). The Scimago Journal Rank (SJR) values of 21 journals were in the range of .11 to 12.84 (mean 2.54, median 1.40) and Source Normalized Impact per Paper (SNIP) ranged from 0 to 5.28 (mean 2.41, median 2.51). These articles originated from 19 different countries, with China, the United States and Germany accounting together for about 72 percent.

Compared to other publications in the same field, the publication “Digital Finance and FinTech: current research and future research directions” was extremely highly cited and has received approximately 82 times more citations than average. Another aspect to highlight in this ranking is citing research categories. Research in one subject may be applicable to other areas. Last column of Table II shows the research categories finding these publications relevant. It is clear from the table that major citing category is “Commerce, Management, Tourism and Services”. 56 percent of the top-cited publications have been referenced by the research work belonging to this category.

TABLE II: 25 HIGHLY CITED PUBLICATIONS

Rank	Title	Year of Publication	Citations	Recent Citations	FCR	Source	Major Citing Category (%)
1	Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges	2018	128	122	n/a	Business Horizons	Commerce, Management, Tourism and Services (42.42%)
2	Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks	2018	114	96	n/a	Journal of Financial Economics	Economics (41.13%)
3	On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services	2018	104	98	n/a	Journal of Management Information Systems	Commerce, Management, Tourism and Services (39.47%)
4	Digital Finance and FinTech: Current Research and Future Research Directions	2017	103	86	82.04	Journal of Business Economics	Commerce, Management, Tourism and Services (47.17%)
5	A Survey on FinTech	2018	98	80	n/a	Journal of Network and Computer Applications	Information and Computing Sciences (47.47%)
6	The Digital Revolution in Financial Inclusion: International Development in the Fintech Era	2016	97	76	58.15	New Political Economy	Studies in Human Society (35.19%)
7	Blockchain Technology: Transforming Libertarian Cryptocurrency Dreams to Finance and Banking Realities	2017	81	71	36.45	Computer	Information and Computing Sciences (52.75%)
8	Analyzing China’s Fintech Industry from the Perspective of Actor–Network Theory	2016	60	41	32.17	Tele-communications Policy	Information and Computing Sciences (26.98%)

Rank	Title	Year of Publication	Citations	Recent Citations	FCR	Source	Major Citing Category (%)
9	Governance on the Drug Supply Chain via Gcoin Blockchain	2018	59	55	n/a	International Journal of Environmental Research and Public Health	Information and Computing Sciences (50%)
10	The Emergence of the Global Fintech Market: Economic and Technological Determinants	2018	59	58	n/a	Small Business Economics	Commerce, Management, Tourism and Services (41.43%)
11	Nurturing a Fintech Ecosystem: The Case of a Youth Microloan Startup in China	2017	59	56	30.57	International Journal of Information Management	Commerce, Management, Tourism and Services (31.78%)
12	Fintech	2017	58	49	n/a	Business & Information Systems Engineering	Commerce, Management, Tourism and Services (42%)
13	Taming the Beast: A Scientific Definition of Fintech	2017	58	51	46.2	Journal of Innovation Management	Commerce, Management, Tourism and Services (37.93%)
14	Future Living Framework: Is Blockchain the Next Enabling Network?	2018	57	53	n/a	Technological Forecasting and Social Change	Commerce, Management, Tourism and Services (29.63%)
15	Blockchain Technology for Social Impact: Opportunities and Challenges Ahead	2017	53	47	26.32	Journal of Cyber Policy	Information and Computing Sciences (30.91%)
16	Fintech and Regtech: Impact on Regulators and Banks	2018	43	43	n/a	Journal of Economics and Business	Commerce, Management, Tourism and Services (46.51%)
17	Understanding Fintech Start-Ups – A Taxonomy of Consumer-Oriented Service Offerings	2017	42	39	33.45	Electronic Markets	Commerce, Management, Tourism and Services (43.48%)
18	Bitcoin, Blockchain and Fintech: A Systematic Review and Case Studies in the Supply Chain	2019	38	38	n/a	Production, Planning & Control	Information and Computing Sciences (53.06%)
19	A New Method for Probabilistic Linguistic Multi-Attribute Group Decision Making: Application to the Selection of Financial Technologies	2019	38	38	n/a	Applied Soft Computing	Information and Computing Sciences (52.83%)
20.	How Valuable Is Fintech Innovation?	2019	36	36	n/a	Review of Financial Studies	Commerce, Management, Tourism and Services (45.24%)

Rank	Title	Year of Publication	Citations	Recent Citations	FCR	Source	Major Citing Category (%)
21	The FinTech Revolution	2015	36	22	n/a	London Business School Review	Commerce, Management, Tourism and Services (51.52%)
22	Fintech and the Transformation of the Financial Industry	2018	36	33	n/a	Electronic Markets	Commerce, Management, Tourism and Services (48.57%)
23	What Makes Users Willing or Hesitant to Use Fintech?: The Moderating Effect of User Type	2018	36	34	n/a	Industrial Management & Data Systems	Information and Computing Sciences (39.39%)
24	Affordances, Experimentation and Actualization of Fintech: A Blockchain Implementation Study	2019	36	36	n/a	The Journal of Strategic Information Systems	Information and Computing Sciences (54.05%)
25	From Fintech to Finlife: The Case of Fintech Development in China	2016	35	30	21.71	China Economic Journal	Commerce, Management, Tourism and Services (34.38%)

Abbreviations: FCR: Field Citation Ratio; n/a: not available

TABLE III: TOP JOURNALS WITH 25 HIGHLY CITED PUBLICATIONS

Rank	Source Title	No. of Articles	Cite Score (2019)	Impact Factor (2019)	JCR Quartile (2019)	SJR (2019)	SNIP (2019)	Publisher
1	Business Horizons	1	7.4	3.444	Q2	1.4	2.7	Elsevier
2	Journal of Financial Economics	1	8.7	5.731	Q1	11.999	5.285	Elsevier
3	Journal of Management Information Systems	1	7.7	3.949	Q1	2.863	2.585	Taylor & Francis
4	Journal of Business Economics	1	2.9	n/a	Q2	0.502	1.005	Springer Nature
5	Journal of Network and Computer Applications	1	13.8	5.57	Q1	1.389	3.154	Elsevier
6	New Political Economy	1	5.4	3.157	Q1	1.748	2.337	Taylor & Francis
7	Computer	1	n/a	4.419	Q1	n/a	n/a	n/a
8	Telecommunications Policy	1	4.8	2.224	Q3	0.888	1.732	Elsevier
9	International Journal of Environmental Research and Public Health	1	3	2.849	Q1	0.739	1.248	Multidisciplinary Digital Publishing Institute (MDPI)
10	Small Business Economics	1	7.3	4.803	Q1	1.989	2.723	Springer Nature
11	International Journal of Information Management	1	14.1	8.21	Q1	2.88		Elsevier
12	Business & Information Systems Engineering	1	7.6	5.837	Q1	1.306	3.192	Springer Nature
13	Journal of Innovation Management	1	n/a	n/a	n/a	n/a	n/a	n/a

Rank	Source Title	No. of articles	Cite Score (2019)	Impact Factor (2019)	JCR Quartile (2019)	SJR (2019)	SNIP (2019)	Publisher
14	Technological Forecasting and Social Change	1	8.7	5.846	Q1	1.815	2.617	Elsevier
15	Journal of Cyber Policy	1	n/a	n/a	n/a	n/a	n/a	Taylor & Francis
16	Journal of Economics and Business	1	2.3	n/a	Q2	0.409	1.196	Elsevier
17	Electronic Markets	2	6.7	2.981	Q2	1.006	2.2	Springer Nature
18	Production Planning & Control	1	6.9	3.605	Q1	1.394	1.809	Taylor & Francis
19	Applied Soft Computing	1	10.1	5.472	Q1	1.405	2.52	Elsevier
20	Review of Financial Studies	1	8.5	4.649	Q1	12.837	4.903	Oxford University Press
21	London Business School Review	1	0	n/a	Q4	0.107	0	Wiley-Blackwell
22	Industrial Management & Data Systems	1	7.9	3.329	Q2	1.39	2.502	Emerald
23	The Journal of Strategic Information Systems	1	10.1	5.231	Q1	2.698	3.158	Elsevier
24	China Economic Journal	1	2	n/a	Q1	0.439	1.393	Taylor & Francis

Abbreviations: SJR: Scimago Journal Rank; SNIP: Source Normalized Impact per Paper; JCR: Journal Citation Report

### B. Altmetric Analysis

“Altmetrics is a movement that aims to capture new and previously invisible types of impact of scholarly publication on social web platforms such as news sites, Wikipedia, blogs, microblogs, social bookmarking tools and online reference managers” (Pooladian, 2018) [66]. Table IV lists the top 25 altmetric publications in the field of FinTech. Altmetric attention score of 25 publications ranged from 16 to 123 (mean 41.32, median 27, IQR 29.50, 95% confidence interval 28.73 to 53.91). The highest scoring altmetric article was “FinTech and the transformation of the financial industry” by Alt *et al.*, 2018. Top 25 articles with the highest altmetric attention score were published in 18 journals, mostly with high impact factors (>2) and highest quartile score (Q1). 48 percent of the most discussed articles were published in 5 journals, led by Electronic Markets (16%) and followed by Journal of Asset Management, New Political Economy, Review of International Political Economy and Journal of Financial Regulation (2 articles each respectively). These articles were published between 2014 and 2020, with 84 percent being published in 2018-2020. This finding emphasizes that altmetrics are particularly sensitive to recent news, and more recent publications receive higher altmetric attention scores. The top 25 online attention gaining publications originated from 13 different countries. Majority of the publications came from the United Kingdom (36%), followed by Germany (20%) and The Netherlands (12%). The magnitude of the UK scientific community and the levels of funding available for research may account for the proportion

of scientific publications originating there. The leading research categories were “Studies in Human Society” and “Commerce, Management, Tourism and Services”, with 68 % of the top altmetric articles falling in these categories. Strong correlation was found between citation counts and altmetric scores ( $r = .81$ ,  $p < .01$ ). This strong correlation indicates that altmetrics are not independent of citation metrics. A more holistic assessment of research output can be accomplished by combining citation metrics and altmetrics. According to the breakdown of altmetric data, Twitter was the most popular altmetric data resource followed by Mendeley (Fig. 3). Tweets were generally from the United States (16.53%), United Kingdom (11.90%) and Germany (3.32%). The demographic breakdown of all the tweets (1094) showed that 78.79 percent were generated by the members of the public, 12.16 percent by scientists, 4.02 percent by science communicators (journalists, bloggers and editors) and 0.46 percent by practitioners (doctors and other healthcare professionals).

Altmetric attention score in context shows the score in some different contexts to help you understand if the level of attention is typical compared to similar articles. As shown in Table IV, the research output “Fintech and the transformation of the financial industry” received a high attention score compared to outputs of similar age from Electronic Markets (88<sup>th</sup> percentile) and all outputs from Electronic Markets (#3 of 434). Comparing altmetric attention score of this research output to the 280720 tracked outputs that were published within six weeks on either side of this one in any source, this has done particularly well, scoring higher than 97 percent of its contemporaries.

TABLE IV: TOP 25 PUBLICATIONS WITH THE HIGHEST ALTMETRIC ATTENTION SCORES

Rank	Title	AAS	AAS in Context				Source	Month and Year of Publication	Main Source of Attention	Raw Number of Mentions
			Outputs of Similar Age from Same Source	Outputs from Same Source	Outputs of Similar Age	All Research Outputs				
1	FinTech and the Transformation of the Financial Industry	123	#2	#3	#5835	#179054	Electronic Markets	August, 2018	Twitter	170
2	Temporal Reframing and Participation in a Savings Program: A Field Experiment	117	#3	#11	#7673	#190194	Marketing Science	November, 2020	Twitter	128
3	The Digital Revolution in Financial Inclusion: International Development in the Fintech Era	84	#1	#9	#10199	#279865	New Political Economy	November, 2016	Twitter	83
4	Central Banking and Fintech: A Brave New World	56	n/a	n/a	n/a	n/a	Journal of Asset Management	July, 2018	Twitter	79
5	How Blockchain can Impact Financial Services – The Overview, Challenges and Recommendations from Expert Interviewees	67	#3	#25	#17535	#512208	Electronic Markets	September, 2020	Twitter	67
6	Cashing in on Innovation: A Taxonomy of Fintech	47	#1	#1	#17534	#512,016	Journal of Asset Management	May, 2020	Twitter	70
7	Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges	37	#2	#27	#21,154	#615,872	Business Horizons	January, 2018	Twitter	47
8	Understanding Fintech Start-Ups – A Taxonomy of Consumer-Oriented Service Offerings	36	#1	#3	#21,911	#639,776	Electronic Markets	November, 2017	Twitter	39
9	Blockchain Technology for Social Impact: Opportunities and Challenges Ahead	36	#1	#6	#21,608	#648,984	Journal of Cyber Policy	September, 2017	Twitter	45
10	Understanding Technological Change in Global Finance Through Infrastructures	33	#1	#49	#19,028	#700,487	Review of International Political Economy	June, 2019	Twitter	28

Rank	Title	AAS	AAS in Context				Source	Month and Year of Publication	Main Source of Attention	Raw Number of Mentions
			Outputs of Similar Age from Same Source	Outputs from Same Source	Outputs of Similar Age	All Research Outputs				
11	The Platform Political Economy of Fintech: Reintermediation, Consolidation and Capitalisation	29	#5	#38	#25,604	#790,379	New Political Economy	May, 2020	Twitter	47
12	Explainable AI in Fintech Risk Management	27	n/a	n/a	n/a	n/a	Frontiers in Artificial Intelligence	January, 2020	Twitter	42
13	Technology v Technocracy: Fintech as a Regulatory Challenge	26	#1	#2	#27,259	#826,698	Journal of Financial Regulation	June, 2020	Twitter	37
14	The Racial Landscape of Fintech Mortgage Lending	26	#3	#43	#32,959	#875,033	Housing Policy Debate	November, 2020	Twitter	35
15	Regulating Fintech in the EU: The Case for a Guided Sandbox	24	#2	#10	#25811	#937911	European Journal of Risk Regulation	March, 2020	News outlets	4
16	The Need for an Innovation Principle in Regulatory Impact Assessment: The Case of Finance and Innovation in Europe	24	#1	#35	#18,029	#909,181	Policy & Internet	December, 2014	Twitter	21
17	Mobile Payment in Fintech Environment: Trends, Security Challenges, and Services	23	#1	#3	#32,492	#920,452	Human-centric Computing and Information Sciences	October, 2018	Twitter	31
18	Steps Towards an Ecology of Money Infrastructures: Materiality and Cultures of Ripple	23	#2	#16	#34,283	#953,922	Journal of Cultural Economy	January, 2020	Twitter	29
19	The Poverty of Fintech? Psychometrics, Credit Infrastructures, and the Limits of Financialization	84	#1	#9	#10,199	#279,865	Review of International Political Economy	May, 2019	Twitter	83
20	Exploring Characteristics and Transformational Capabilities of Insurtech Innovations to Understand Insurance Value Creation in a Digital World	21	#2	#6	#30,841	#1,035,240	Electronic Markets	June, 2018	Twitter	17

Rank	Title	AAS	AAS in Context				Source	Month and Year of Publication	Main Source of Attention	Raw Number of Mentions
			Outputs of Similar Age from Same Source	Outputs from Same Source	Outputs of Similar Age	All Research Outputs				
21	Capital Markets Union and the Fintech Opportunity	20	#1	#3	#35,277	#1,070,196	Journal of Financial Regulation	January 2018	Twitter	27
22	Can Financial Technology Innovate Benefit Distribution in Payments for Ecosystem Services and REDD+?	19	#3	#249	#29,827	#1,101,100	Ecological Economics	September, 2017	Twitter	5
23	Fintech: AI Powers Financial Services to Improve People’s Lives	18	#3	#115	#34850	#1178681	Communications of the ACM	October, 2018	News outlet	3
24	Towards an Economic Geography of Fintech	17	#10	#97	#38,802	#1,280,700	Progress in Human Geography	July, 2020	Twitter	25
25	Financializing Authoritarian Capitalism: Chinese Fintech and the Institutional Foundations of Algorithmic Governance	16	n/a	n/a	n/a	n/a	Finance and Society	December, 2019	Twitter	20

Abbreviation: AAS: Altmetric Attention Score

Rank	Title	Altmetric Attention score	News outlets	Blogs	Policy source	Wikipedia	Twitter	Google+user	Facebook	Citations	Mendeley
1	FinTech and the transformation of the financial industry	123	0	0	0	0	169	0	1	36	345
2	Temporal Reframing and Participation in a Savings Program: A Field Experiment	117	2	0	0	0	125	0	1	2	15
3	The digital revolution in financial inclusion: international development in the fintech era	84	1	2	1	0	78	0	1	97	578
4	Central Banking and Fintech: A Brave New World	56	0	0	0	0	79	0	0	5	69
5	The overview, challenges and recommendations from expert interviewees	67	0	0	0	0	67	0	0	8	158
6	Cashing in on innovation: a taxonomy of FinTech	47	0	0	0	0	70	0	0	4	61
7	Fintech: Ecosystem, business models, investment decisions, and challenges	37	0	0	0	0	47	0	0	128	1305
8	Understanding FinTech start-ups a taxonomy of consumer-oriented service offerings	36	0	1	0	0	38	0	0	42	311
9	Blockchain technology for social impact: opportunities and challenges ahead	36	0	0	0	0	44	0	0	53	174
10	Understanding technological change in global finance through infrastructures	33	1	1	1	0	25	0	0	16	42
11	The Platform Political Economy of FinTech: Reintermediation, Consolidation and Capitalisation	29	0	0	0	0	47	0	0	5	41
12	Explainable AI in Fintech Risk Management	27	0	0	0	0	42	0	0	1	13
13	Technology v Technocracy: Fintech as a Regulatory Challenge	26	0	0	0	0	37	0	0	0	10
14	The Racial Landscape of Fintech Mortgage Lending	26	0	0	0	0	35	0	0	0	6
15	Regulating Fintech in the EU: the Case for a Guided Sandbox	24	2	1	0	0	0	0	1	2	28
16	The Need for an Innovation Principle in Regulatory Impact Assessment: The Case of Finance and Innovation in Europe	24	0	1	1	0	19	0	0	12	62
17	Mobile payment in Fintech environment: trends, security challenges, and services	23	0	0	0	0	31	0	0	22	212
18	Steps towards an ecology of money infrastructures: materiality and cultures of Ripple	23	0	0	0	0	29	0	0	2	25
19	The poverty of fintech? Psychometrics, credit infrastructures, and the limits of financialization	84	0	1	0	0	22	0	0	13	68
20	Exploring characteristics and transformational capabilities of InsurTech innovations to understand insurance value creation in a digital world	21	0	1	0	0	15	0	1	15	197
21	Capital Markets Union and the Fintech Opportunity	20	0	0	0	0	28	0	0	10	97
22	Can Financial Technology Innovate Benefit Distribution in Payments for Ecosystem Services and REDD+?	19	1	1	0	0	2	0	1	19	179
23	Fintech: AI powers financial services to improve people's lives	18	2	0	0	1	0	0	0	9	85
24	Towards an economic geography of FinTech	17	0	0	0	0	25	0	0	4	35
25	Financializing authoritarian capitalism: Chinese fintech and the institutional foundations of algorithmic governance	16	0	0	0	0	20	0	0	4	11

Fig. 3: Visualisation of Breakdown of Different Altmetric Data Resources of the Top 25 Publications

## V. CONCLUSION

FinTech refers to the use of technology to deliver financial services and solutions (Arner *et al.*, 2015; Nicoletti, 2017) [4], [60]. Since the innovation of ATM, financial and banking-related technologies have moved forward with various developments such as mobile banking, internet banking, cryptocurrencies and blockchain technology. These developments are evidenced by the vast amount of research work published in this growing area of scientific literature. In the present study, we identified and characterized the 25 top-cited and 25 top altmetric publications related to FinTech. Our results found marginal overlapping between top-cited and top altmetric articles. Besides, substantial differences were found between the characteristics of top-cited and top altmetric publications. This finding may be explained by the differences between what is considered influential in academia versus what social media perceives as being interesting. Citation counts and altmetric scores measure different aspects of scientific publications. The number of citations reflects the academic impact of a scholarly article, whereas altmetric score appears to reflect the disseminative impact based on public interest.

The present study has some potential limitations. First, we limited the search to the Dimensions database. We did not include articles on financial technology published in the journals listed in Scopus and Web of Science databases. Second, there are inherent shortcomings that should be considered in the use of altmetrics. Altmetrics do not cover the nature of each mention (positive or negative). Furthermore, the credibility of commentators and the validity of their comments in online media is hindered due to the anonymity of the online world (Thelwall, 2014; Barbaro *et al.*, 2014; Butler *et al.*, 2017) [75], [7], [14]. Third, only data supplied by Altmetric.com was used for assessing alternative metrics. Other tools, such as Plum Analytics, ImpactStory, Crossref Event Data and ALM-PLoS, also provide article-level alternative metrics that use different online sources and algorithms, which may lead to different results (Jobmann *et al.*, 2014; Ortega, 2018) [34], [62]. Fourth, some well-known social media outlets are not covered by Altmetric.com, for example, LinkedIn and Pinterest mentions are no longer available because the companies closed their open data stream via their application programming interface (API). LinkedIn in May 2015 changed its API Terms of Use and restricted broad API use to approved partners, for example Microsoft and Salesforce. Research Gate data are not obtainable because of a lack of an API. Instagram posts do not include links, so could not be included in the altmetric analysis. Despite these limitations, this study presents a bird's-eye view of the scientific and societal impact of FinTech research.

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