



MAPPING NOWCASTING IN MACROECONOMICS RESEARCH: A BIBLIOMETRIC ANALYSIS

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ABSTRACT

This study adopted a bibliometric analysis that aims to examine the current dynamics of nowcasting implementation in macroeconomics. All data are obtained from the Scopus database. Based on the keywords used, which are related to the nowcasting and macroeconomic words searching, where the terms appear in the title, keywords, or abstract, the study managed to obtain 231 documents for further analysis. We mapped the recent application of nowcasting in macroeconomics by analyzing the subsequent trends, publications status based on source title, country and institution, and used VOSviewer to examine the publication's citations pattern. We found that nowcasting has caught more and more attention for government institutions. Early studies have been done for developed countries for forecasting macroeconomic variables, and this trend is now expanding to developing countries. We conclude that the potential for nowcasting in improving the current macroeconomic situation for a country is high. The findings of this study will motivate researchers to evaluate the scientific area of nowcasting. With the government and institutional interest in this issue, researchers and practitioners should thoroughly analyze and pay attention to this research domain. The advanced financial techniques implemented in the nowcasting are expected to help manage considerable uncertainty in both the current and future international macroeconomic environments.

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1. INTRODUCTION

Nowcasting is a contraction of "now" and "forecasting", the term is borrowed from meteorologists. In the economy, it is a technique for very short-range forecasting that maps the current situation of a state. The idea of applying nowcasting in macroeconomics has brought much more attention in recent years. The approach is to apply all valuable information from large datasets to get an estimate.

In recent years, nowcasting has come to the fore as an important tool for producing

timely predictions of macroeconomic variables. Bańbura, Giannone, and Reichlin (2010) defined nowcasting as predicting the present, the very near future, and the very recent past. It is particularly applicable for those key macroeconomic variables collected at low frequency and released with a substantial lag. Based on the model developed by Giannone, Reichlin & Small (2008), they found that nowcasting can track real-time traffic of information types monitored by the central bank without prejudging of the giving information since it can deal with large data sets with staggered data release dates. With the release of the new data, the nowcasting is updated based on the growing datasets. Nowcasting provides government institutions and policymakers with a timely track of the current state of the economy.

In 2017, the New York Federal Reserve developed nowcasting model which seeks to extract common trends in the economy from the high-frequency data, which can better decompose and reflect the impact of real-time data on the macroeconomic growth rate with an interval of about five months. By using the nowcasting framework, the model effectively disaggregates the effects of new data releases on growth expectations. Federal Reserve Bank of Atlanta also developed nowcasting model with current vintage data (Higgins, 2015). The Bank of England (BoE) (Anesti et al., 2017) employs a number of methods for current GDP, including the Mixed Frequency Data Sampling (MIDAS) model, which is used to nowcast its macroeconomic growth rates. To solve the issues such as mixed-frequencies data and too many parameters to estimate, this method employs a lag weight polynomial function to weight the number of high-frequency lag results.

The bibliometric analysis gives insights into focused research areas by revealing detailed information about collecting publications from specific databases. Initially, it was mostly composed of bibliographic overviews of scientific publications or selections of highly cited articles. These overviews were further separated into lists of author publications, country bibliographies, and bibliographies by subject. These methodologies have benefited significantly from the tremendous increase in the quantity of publications during the last decade, also attributable partly to the advancement of computerized techniques (Zakaria et al., 2020).

Bibliometric is gaining popularity as one of the strategies to report research trends and impacts in a specific area. Zhang et al., (2016) defined that bibliometric research as a method that utilizes a specific statistical technique to analyze published documents. According to Ahmi and Mohammad (2019), classification of publication, citations, publication impact, and country are commonly used indicators being observed in bibliometrics analysis.

Despite the growing interest in the nowcasting application in macroeconomics area, relatively limited literature attempts to report the trend in this topic, and none has been done by using a bibliometric approach. This paper attempts to map the current state of the distribution and major players in nowcasting in macroeconomics. The reason for applying bibliometric analysis rather than other literature summary methods, such as meta-analysis, is that we want to see the trend as well as focus on the intellectual structure of the topic by evaluating the social and structural interactions among various research components, such as authors, countries, institutions. In contrast, meta-analysis is frequently employed as a technique for theory extension (Donthu et al., 2021). Meanwhile, the growth trend of the research domain will be presented and discussed. The remainder of this paper is organized as follows. Section two present the methodology applied in this study. The results section displayed the analysis and findings.

The last section includes limitation and recommendation for future research.

2. METHODS

Scopus database provides a comprehensive overview of the world's research output. As aforementioned, researchers adopted nowcasting model from other fields, it has recently become a popular technique for forecasting the current macroeconomic situation. We want to focus on analysing the data that are relevant in macroeconomic area. This study used the data obtained from the Scopus database as of March 2021.

We applied the advanced search (the Boolean searching rules can be found via Scopus Search Solutions) in Scopus database by using the following keywords for the relevant articles which are related to nowcasting in macroeconomics area, using TITLE-ABS-KEY ((nowcast* OR now-cast*) AND (macroeconom* OR monetary OR econometric OR GDP OR unemployment)) that contained the relevant searching in the title, abstract and author keywords of the article at the date point, which considered all types of documents published in the Scopus database. As aforementioned, nowcasting has garnered considerable interest in recent years in the subject of economics; the term was also commonly used in other fields to refer to monitoring a projection for the very near future. Using the keywords macroeconomic, monetary, econometric, GDP, and unemployment in the query will likely return the most relevant documents. Other macroeconomic terms, such as interest rate and inflation, did not lead to increases in extra search results as of the quotation date. Therefore, the Boolean search string is applied to keep the query clean and fair. Figure 1 shows the detailed search strategy in this topic, a total of 231 documents have been obtained for us to conduct the bibliometric analysis.

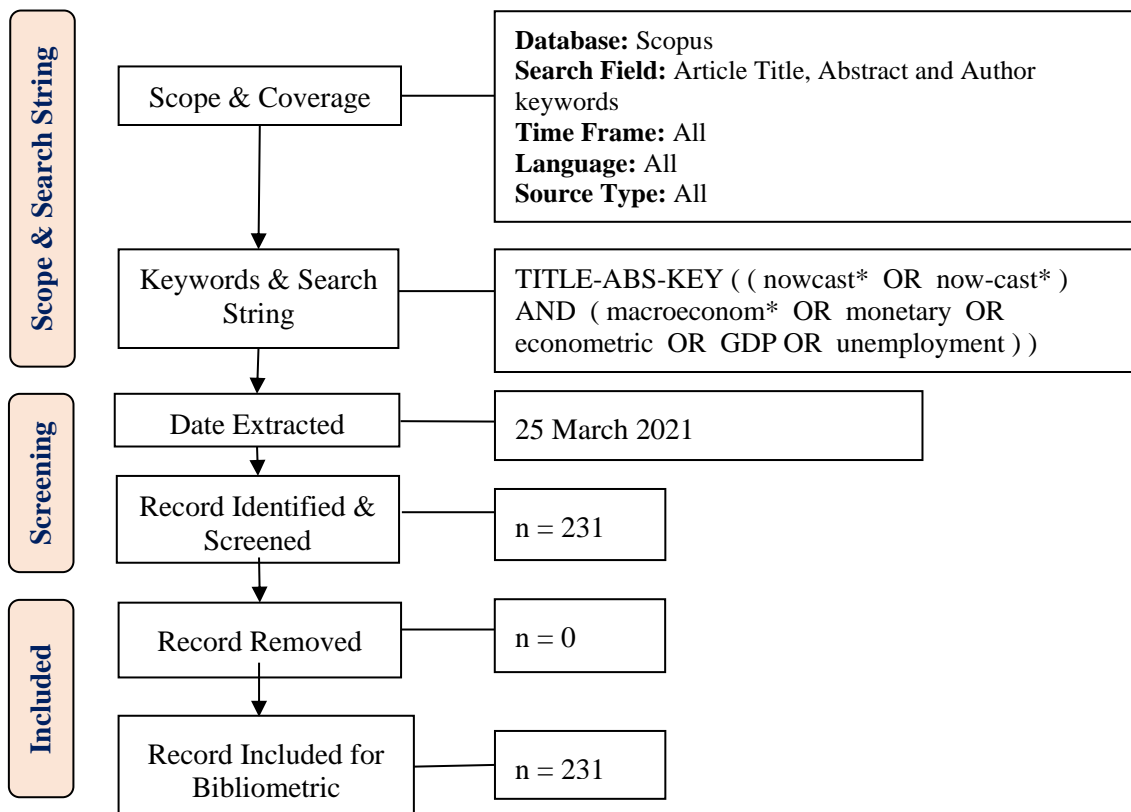


Figure 1: Flow diagram of the topic search strategy.

In examining the bibliometric analysis, there are some tools available to examine the data. We used Microsoft Excel to calculate the frequencies of the published documents. Moreover, Harzing's Publish and Perish software is applied to calculate the citation metrics and frequency analysis. Furthermore, VOSviewer is used to visualize the bibliometric network.

3. RESULTS

This section analyses the results conveyed from the Scopus database with bibliometric analysis. To address the nowcasting study in macroeconomics research trends, this study summarized the following data: the publication and citations by year, document types and source types, the document's language, country productivity, active institution. We further conducted citation analysis, report citation analysis as citation metrics and disclosed the top 10 most cited articles in nowcasting in macroeconomics. Keyword analysis has also been studied. Findings are presented as frequency and percentage as well as VOSviewer mapping.

Table 1: Nowcasting in macroeconomics publications and citations by year.

| Year | TP | NCP | TC | C/P | C/CP | h | g |
|-------|-----|-----|-----|-------|--------|----|----|
| 2005 | 1 | 1 | 22 | 22.00 | 22.00 | 1 | 1 |
| 2008 | 5 | 3 | 396 | 79.20 | 132.00 | 2 | 2 |
| 2009 | 4 | 4 | 65 | 16.25 | 16.25 | 3 | 3 |
| 2010 | 7 | 7 | 199 | 28.43 | 28.43 | 5 | 5 |
| 2011 | 5 | 5 | 252 | 50.40 | 50.40 | 5 | 5 |
| 2012 | 8 | 8 | 101 | 12.63 | 12.63 | 6 | 6 |
| 2013 | 16 | 15 | 532 | 33.25 | 35.47 | 9 | 9 |
| 2014 | 17 | 14 | 240 | 14.12 | 17.14 | 9 | 9 |
| 2015 | 18 | 18 | 394 | 21.89 | 21.89 | 10 | 10 |
| 2016 | 29 | 24 | 263 | 9.07 | 10.96 | 10 | 10 |
| 2017 | 18 | 14 | 80 | 4.44 | 5.71 | 5 | 5 |
| 2018 | 25 | 19 | 121 | 4.84 | 6.37 | 7 | 7 |
| 2019 | 26 | 15 | 32 | 1.23 | 2.13 | 3 | 3 |
| 2020 | 38 | 31 | 17 | 0.45 | 0.55 | 2 | 2 |
| 2021 | 14 | 2 | 2 | 0.14 | 1.00 | 1 | 1 |
| Total | 231 | | | | | | |

*Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

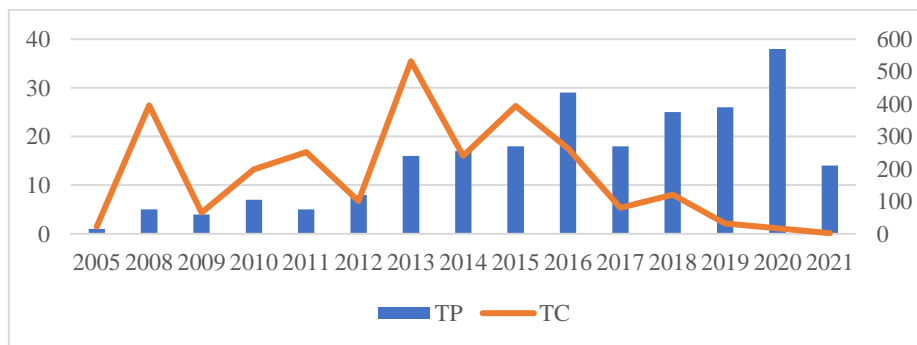


Figure 2: Total publications and citations by year.

Table 1 shows the statistics on annual publications of nowcasting in macroeconomics research from 2005 to 2020 and indicates that the publication has a growing trend. Nunes (2005) marks the first-year documents on nowcasting in macroeconomics that were indexed by Scopus, with only one document recorded with relevant keywords contained. Figure 2 gives a better view of the growing trend of this research domain. 2020 accounts for the most productive year with highest total publications, as such, 2021 is expected to exceed the previous year's total publications.

Table 2: Document type.

| DT | TP | Percentage |
|-------------------|-----|------------|
| Article | 200 | 86.58% |
| Conference Paper | 13 | 5.63% |
| Book Chapter | 11 | 4.76% |
| Review | 3 | 1.30% |
| Conference Review | 2 | 0.87% |
| Note | 2 | 0.87% |
| Total | 231 | 100.00 |

*Notes: DT=Document Type; TP=total publications

Table 3: Source type.

| Source Type | TP | Percentage |
|-----------------------|-----|------------|
| Journal | 203 | 87.88% |
| Book Series | 15 | 6.49% |
| Conference Proceeding | 8 | 3.46% |
| Book | 5 | 2.16% |
| Total | 231 | 100.00 |

Table 4: Languages.

| Language | TP | Percentage |
|------------|-----|------------|
| English | 227 | 98.27% |
| Russian | 3 | 1.30% |
| Portuguese | 1 | 0.43% |
| Total | 231 | 100.00 |

This study also analyses the data based on document type and source type. Table 2 summarised the distribution of the document type published on nowcasting in macroeconomics. Table 3 is for the source type, they are classified as journal, book series, conference proceedings and book. Scopus index shows there are 6 document types and 4 source types. The article is the most common document type, which counts for 200 (86.58%) of the documents. Moreover, 203 (87.88%) are journal articles. Based on Table 4, English stands for the most commonly used language in this research domain.

There are 41 countries recorded have publications on the related research domain. Table 5 listed countries that has over 5 publications at the data sourcing point. United States has listed on the top with a total of 53 documents, followed by United Kingdom 45 documents and Germany 40 documents. Based on the data observation, developed countries stand on the top of the most productive publications list. Emerging countries or territories, in comparison, reported fewer articles published during the study period. Figure 3 further shows the visualized map of the authors based on the affiliated countries based on the fractional counting method and filtered by minimum 5 number of citations of an author. The occurrence of the terms is weighted as the nodes size, while relationship strength is measured by the thickness of joining lines among the terms. Related words, as

indicated by the same colour, frequently occurred together. The mapping shows that the United States and the United Kingdom played a notable role in this research domain. Authors affiliated in the United Kingdom and Italy have worked closely.

Table 5: Countries contributed to the publications with a minimum of five publications.

| Country | TP | NCP | TC | C/P | C/CP | h | g |
|----------------|----|-----|------|-------|-------|----|----|
| United States | 53 | 40 | 728 | 13.74 | 18.20 | 14 | 26 |
| United Kingdom | 45 | 35 | 687 | 15.27 | 19.63 | 15 | 25 |
| Germany | 40 | 29 | 1100 | 27.50 | 37.93 | 12 | 29 |
| Italy | 33 | 27 | 592 | 17.94 | 21.93 | 13 | 24 |
| Belgium | 14 | 12 | 275 | 19.64 | 22.92 | 7 | 12 |
| France | 14 | 11 | 154 | 11.00 | 14.00 | 6 | 11 |
| Switzerland | 12 | 10 | 41 | 3.42 | 4.10 | 5 | 5 |
| Turkey | 11 | 8 | 33 | 3.00 | 4.13 | 3 | 5 |
| Canada | 9 | 9 | 42 | 4.67 | 4.67 | 5 | 6 |
| Netherlands | 9 | 6 | 112 | 12.44 | 18.67 | 5 | 6 |
| Spain | 9 | 6 | 134 | 14.89 | 22.33 | 3 | 6 |
| Norway | 8 | 8 | 219 | 27.38 | 27.38 | 7 | 8 |
| Australia | 6 | 4 | 28 | 4.67 | 7.00 | 3 | 4 |
| Portugal | 6 | 5 | 86 | 14.33 | 17.20 | 5 | 6 |
| Sweden | 6 | 5 | 9 | 1.50 | 1.80 | 2 | 2 |
| Austria | 5 | 4 | 92 | 18.40 | 23.00 | 2 | 5 |
| China | 5 | 2 | 13 | 2.60 | 6.50 | 1 | 3 |

*Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

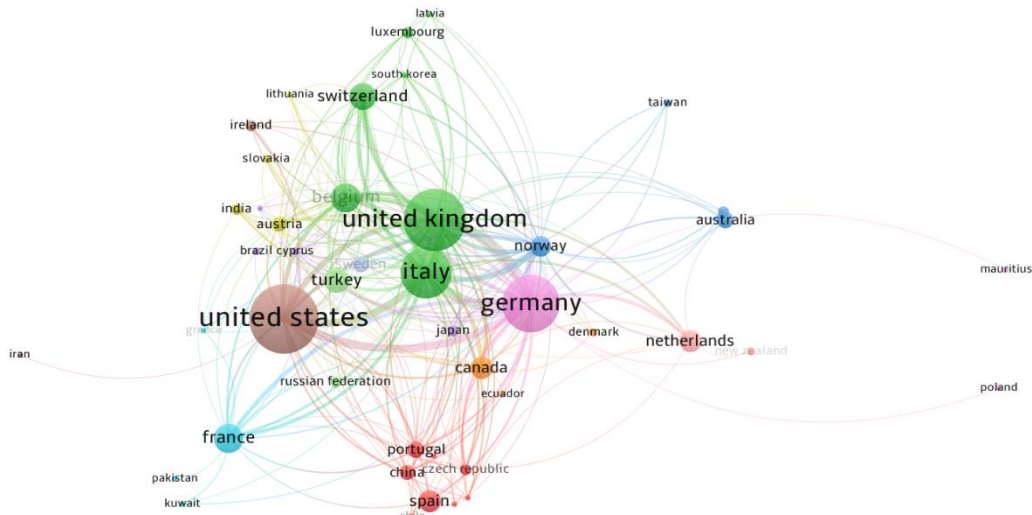


Figure 3: Network visualization map of the citation by countries with the minimum number of documents of one author and the minimum number of 5 citations

Table 6 presented the institutions with a minimum of six publications, London centre for macroeconomic policy research contributes the greatest number of publications. This was followed by University Bocconi in Italy, and European Central Bank in Germany ranked the third in nowcasting in macroeconomics research domain. Among

the top 10 listed institutions, it indicates that most of the affiliations in this research domain are banks and government institutions, others are universities.

Table 6: Most influential institutions with a minimum of six publications

| Affiliation | Country | TP | NCP | TC | C/P | C/CP | <i>h</i> | <i>g</i> |
|---|----------------|----|-----|-----|-------|-------|----------|----------|
| Centre for Economic Policy Research, London | United Kingdom | 13 | 12 | 353 | 27.15 | 29.42 | 9 | 13 |
| University Bocconi | Italy | 13 | 12 | 466 | 35.85 | 38.83 | 9 | 13 |
| European Central Bank | Germany | 12 | 10 | 12 | 1.00 | 1.20 | 5 | 12 |
| Norges Bank | Norway | 8 | 8 | 219 | 27.38 | 27.38 | 7 | 8 |
| University libre de Bruxelles ULB | Belgium | 7 | 7 | 246 | 35.14 | 35.14 | 5 | 7 |
| Deutsche Bundesbank | Germany | 7 | 7 | 363 | 51.86 | 51.86 | 5 | 7 |
| Banque de France | France | 7 | 7 | 85 | 12.14 | 12.14 | 5 | 7 |
| Federal Reserve System | United States | 6 | 5 | 48 | 8.00 | 9.60 | 4 | 6 |
| University of Strathclyde | United Kingdom | 6 | 4 | 22 | 3.67 | 5.50 | 2 | 4 |
| ETH Zürich | Switzerland | 6 | 5 | 23 | 3.83 | 4.60 | 4 | 4 |

*Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P = average citations per publication; C/CP=average citations per cited publication; *h*=*h*-index; *g*=*g*-index.

Table 7: Most active source title

| Source Title | Number of Documents | Percentage |
|---|---------------------|------------|
| International Journal of Forecasting | 36 | 15.58% |
| Empirical Economics | 14 | 6.06% |
| Journal of Forecasting | 13 | 5.63% |
| Economic Modelling | 8 | 3.46% |
| Journal of Econometrics | 7 | 3.03% |
| National Institute Economic Review | 7 | 3.03% |
| Journal of Business and Economic Statistics | 6 | 2.60% |
| Journal of Business Cycle Research | 5 | 2.16% |
| Oxford Bulletin of Economics and Statistics | 5 | 2.16% |

*Notes: TP=total number of publications; TC=total citations.

Table 7 reveals the most active source title that has been published in the research domain based on the minimum number of 5 publications produced. It shows that the International Journal of Forecasting hosts the highest publications on nowcasting in macroeconomics.

3.1 Keywords analysis

Table 8 summarizes the most frequently used keywords that appear with a minimum of 10 occurrences in Nowcasting macroeconomics studies. After removing the core keywords related to the query, forecasting was the most associated with nowcasting, followed by real-time data. This indicated that the methodology of this research domain helps include data in real-time processing for improving nowcasting accuracy. Other keywords that are clustered by the techniques used are dynamic factor model, Kalman filter and MIDAS. This can also be found in Figure 4, which also shows nowcasting also adopts the pilot technologies such as machine learning for the aim of the study.

Table 8: Top keywords.

| Author Keywords | Total Publications (TP) | Percentage (%) |
|-----------------------|-------------------------|----------------|
| Nowcasting | 112 | 48.48% |
| Forecasting | 57 | 24.68% |
| Real-time Data | 23 | 9.96% |
| Forecasting Method | 22 | 9.52% |
| Dynamic Factor Model | 21 | 9.09% |
| Google Trends | 15 | 6.49% |
| Kalman Filter | 15 | 6.49% |
| Factor Models | 14 | 6.06% |
| Dynamic Factor Models | 13 | 5.63% |
| Factor Model | 13 | 5.63% |
| MIDAS | 13 | 5.63% |
| Monetary Policy | 12 | 5.19% |
| Business Cycle | 10 | 4.33% |

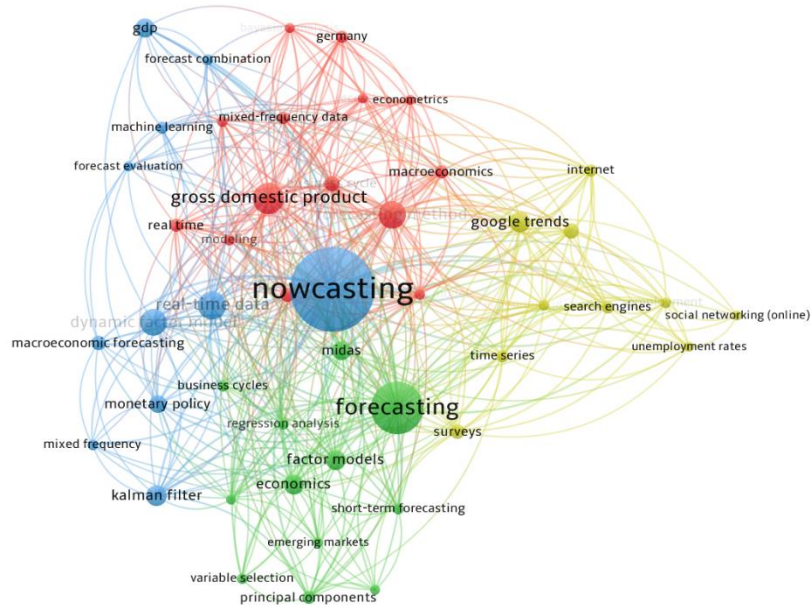


Figure 4: VOSviewer visualization of a keyword co-occurrence network with a minimum of 5 occurrences.

Figure 4 shows the visualization of a term co-occurrence network with full counting with the minimum of 5 occurrences. VOSviewer generated four different colours representing four clusters with 51 terms. The diagram suggested that nowcasting, real-time data, mixed frequency, dynamic factor model, Kalman filter and machine learning (all coloured blue) are closely related and usually occurred together.

3.2 Citation analysis

The citation per year measured the productivity of the research. Table 9 presented the citation metrics for the documents as of March 2013. As indicated, there are 2730 citations reported in 16 years, with an average of 170.63 citations per year and 11.82 for citations per paper.

Table 9: Citations metrics.

| Metrics | Data |
|-------------------|----------------|
| Publication years | 2005-2021 |
| Citation years | 16 (2005-2021) |
| Papers | 231 |
| Citations | 2730 |
| Citations/year | 170.63 |
| Citations/paper | 11.82 |
| Author/paper | 2.42 |
| h-index | 24 |
| g-index | 46 |

As per Scopus database, Table 10 discovers top 10 most cited articles, the article titled "Nowcasting: The real-time informational content of macroeconomic data" by Giannone, Reichlin and Small in 2008 is the most cited paper, which also stands for the most impactful article based on the citation per year among the list in this research domain.

Table 10: Top 10 cited articles.

| No. | Authors | Title | Year | Cites | C.Y. |
|-----|---|---|------|-------|-------|
| 1 | D. Giannone, L. Reichlin, D. Small | Nowcasting: The real-time informational content of macroeconomic data | 2008 | 389 | 29.92 |
| 2 | E. Andreou, E. Ghysels, A. Kourtellos | Should Macroeconomic Forecasters Use Daily Financial Data and How? | 2013 | 116 | 14.5 |
| 3 | M. Marcellino, C. Schumacher | Factor MIDAS for nowcasting and forecasting with ragged-edge data: A model comparison for German GDP | 2010 | 107 | 9.73 |
| 4 | M. Bańbura, D. Giannone, M. Modugno, L. Reichlin | Now-casting and the real-time data flow | 2013 | 106 | 13.25 |
| 5 | V. Kuzin, M. Marcellino, C. Schumacher | MIDAS vs. mixed-frequency VAR: Nowcasting GDP in the euro area | 2011 | 106 | 10.6 |
| 6 | B. Rossi, T. Sekhposyan Rossi & Sekhposyan | Macroeconomic uncertainty indices based on nowcast and forecast error distributions | 2015 | 88 | 14.67 |
| 7 | C. Foroni, M. Marcellino, C. Schumacher | Unrestricted mixed data sampling (MIDAS): MIDAS regressions with unrestricted lag polynomials | 2015 | 87 | 14.5 |
| 8 | E. Angelini, G. Camba-Mendez, D. Giannone, L. Reichlin, G. Rünstler | Short-term forecasts of euro area GDP growth | 2011 | 83 | 8.3 |
| 9 | M.D. Negro, F. Schorfheide | DSGE model-based forecasting | 2013 | 82 | 10.25 |
| 10 | J.H. Stock, M.W. Watson | Dynamic Factor Models, Factor-Augmented Vector Autoregressions, and Structural Vector Autoregressions in Macroeconomics | 2016 | 72 | 14.4 |

Figure 5 further shows the citations for documents with a minimum of 5 citations. The illustration presents the key authors in the research domain and how their ideas were situated in relation to each other.

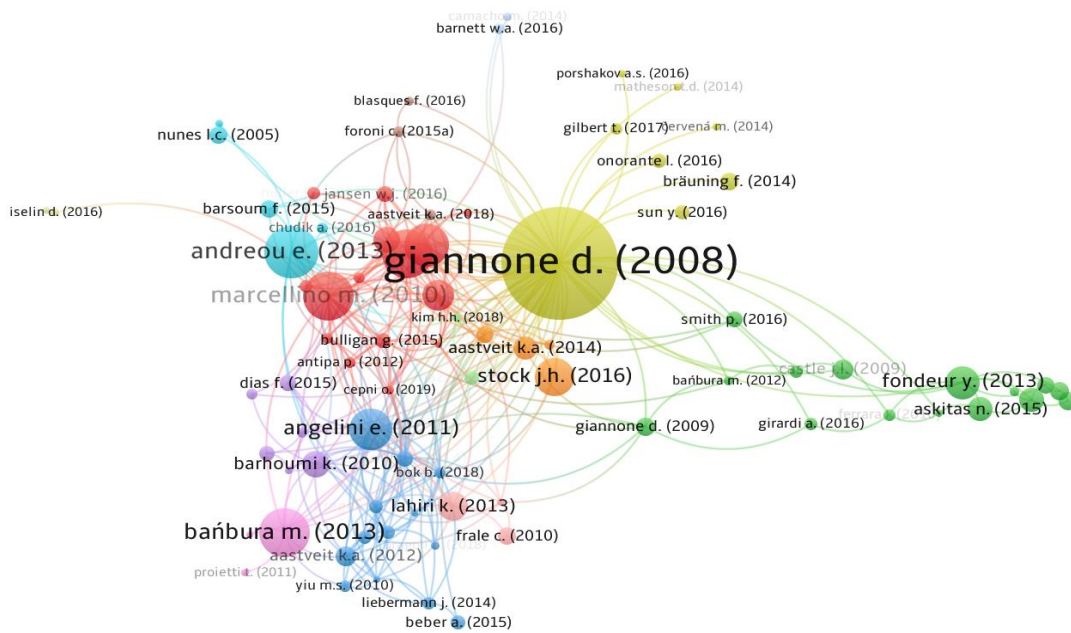


Figure 5: Network visualization map of the citation by documents.

4. CONCLUSION

The motivation of this study is by two observations. First, given the importance of nowcasting model development in the macroeconomics area, economic activities and indicators can be assessed timely, thus provide on-target insights to policymakers. By nowcasting higher frequency macroeconomic data, it is possible to give businesses and policymakers with a more nuanced knowledge of the impact of economic surprises and policy interventions, hence impacting subsequent policy and investment decisions. Secondly, nowcasting approaches have also suggested a robust model performance against institutional forecasters (Jansen et al., 2016). However, questions have been raised as the recent trend of its development and the collaboratively across different countries. To address the issue, we collected data from the Scopus database and conducted a bibliometric analysis of 231 terms of nowcasting in macroeconomics literature published during a period of 16 years (from 2005 to March 2021). Following research questions have been considered: a) the nowcasting in macroeconomics research distribution, b) the major players in the research domain, c) the collaboration of the contributions.

This study has reviewed nowcasting in macroeconomics publications during the study period. The trend of the previous nowcasting in macroeconomics studies is reported by using the selected bibliometric analysis. Overall, the study managed to obtain 231 documents from the Scopus database. The results indicate that the research domain has become an emerging topic since 2005; meanwhile, the recent increase of the data availability lead by the technology development has also helped significantly in booming and attached the importance on nowcasting in macroeconomics. Over 86% of the documents were published in journals, and English is a primary language. In terms of the contributing authors, the United States and the United Kingdom reported the highest numbers of authors contribution. Meanwhile, sizable scholarly contributions are led by developed countries. Moreover, we find most of the affiliations in this research domain are banks and government institutions; others are universities.

This study contributes to a better understanding of macroeconomic nowcasting and provide policymakers with new insights and important points of reference for assessing

its function. Since 2005, when Giannone et al. pioneered real-time nowcasting in macroeconomics data, the research domain has rapidly expanded and broadened in scope, and an increasing number of countries and international institutions have adopted it. Developing countries such as Turkey, Spain, China and India have also added efforts in the research domain. The analysis successfully revealed the shifted encouragement of emerging economics to participate in this research domain.

Apart from the insights offered by this paper, several limitations are also notable. Firstly, the employed data based on Scopus index does not cover all available sources, even though it is still the most extensive online database. As such, some exclusions are expected from this study. Furthermore, the query may not perfectly capture all the scholarly contributions in this area. Thus, false positive and false negative results are anticipated. Secondly, nowcasting is adopted recently in the macroeconomics area. Possibilities of other related research that has been deployed before with other keywords other than what is not directly called nowcasting are also high. Thus, those sourcing were excluded from this study. Despite these limitations, this study presents the aerial view of the current trend of the nowcasting in macroeconomics.

As a result of the high level of interest expressed by government, financial agencies and international institutions in this study, it is an area that researchers and practitioners should thoroughly investigate and pay attention to. Broadly, the findings of this study will inspire policymakers to evaluate the research area in their countries. The expectation is that the advanced financial techniques implemented in the nowcasting in macroeconomics studies will contribute to addressing the significant uncertainties that exist in both the current and the future international macroeconomic settings. This paves the way for further emphasis on the research domain.

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REFERENCES

- Aidi Ahmi, & Rosli Mohamad. (2019). Bibliometric Analysis of Global Scientific Literature on Web Accessibility. *International Journal of Recent Technology and Engineering*, 7(6S2), 250–258. <https://doi.org/10.1101/2020.03.19.20038752>
- Andreou, E., Ghysels, E., & Kourtellos, A. (2013). Should Macroeconomic Forecasters Use Daily Financial Data and How? *Journal of Business and Economic Statistics*, 31(2), 240–251. <https://doi.org/10.1080/07350015.2013.767199>
- Anesti, N., Hayes, S., Moreira, A., & Tasker, J. (2017). Peering into the present: the Bank's approach to GDP nowcasting. *Bank of England Quarterly Bulletin*, 57(2), 122–133.
- Angelini, E., Camba-Mendez, G., Giannone, D., Reichlin, L., & Rünstler, G. (2011). Short-term forecasts of euro area GDP growth. *Econometrics Journal*, 14(1). <https://doi.org/10.1111/j.1368-423X.2010.00328.x>
- Bañbura, M., Giannone, D., Modugno, M., & Reichlin, L. (2013). Now-casting and the real-time data flow. *Handbook of Economic Forecasting*, 2, 195–237. <https://doi.org/10.1016/B978-0-444-53683-9.00004-9>
- Bañbura, M., Giannone, D., & Reichlin, L. (2010). *Nowcasting* (ECB No.1275).

- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Marc, W. (2021). How to conduct a bibliometric analysis : An overview and guidelines. *Journal of Business Research*, 133(March), 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Foroni, C., Marcellino, M., & Schumacher, C. (2015). Unrestricted mixed data sampling (MIDAS): MIDAS regressions with unrestricted lag polynomials. *Journal of the Royal Statistical Society. Series A: Statistics in Society*, 178(1), 57–82. <https://doi.org/10.1111/rssa.12043>
- Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The real-time informational content of macroeconomic data. *Journal of Monetary Economics*, 55(4), 665–676. <https://doi.org/10.1016/j.jmoneco.2008.05.010>
- Higgins, P. C. (2015). GDPNow: A Model for GDP “Nowcasting.” *SSRN Electronic Journal*, July. <https://doi.org/10.2139/ssrn.2580350>
- Jansen, W. J., Jin, X., & de Winter, J. M. (2016). Forecasting and nowcasting real GDP: Comparing statistical models and subjective forecasts. *International Journal of Forecasting*, 32(2), 411–436. <https://doi.org/10.1016/j.ijforecast.2015.05.008>
- Kuzin, V., Marcellino, M., & Schumacher, C. (2011). MIDAS vs. mixed-frequency VAR: Nowcasting GDP in the euro area. *International Journal of Forecasting*, 27(2), 529–542. <https://doi.org/10.1016/j.ijforecast.2010.02.006>
- Marcellino, M. G., & Schumacher, C. (2011). Factor-MIDAS for Now- and Forecasting with Ragged-Edge Data: A Model Comparison for German GDP. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1094648>
- Negro, M. Del, & Schorfheide, F. (2013). DSGE model-based forecasting. In *Handbook of Economic Forecasting* (Vol. 2). Elsevier B.V. <https://doi.org/10.1016/B978-0-444-53683-9.00002-5>
- Nunes, L. C. (2005). Nowcasting quarterly GDP growth in a monthly coincident indicator model. *Journal of Forecasting*, 24(8), 575–592. <https://doi.org/10.1002/for.969>
- Rossi, B., & Sekhposyan, T. (2015). Macroeconomic uncertainty indices based on nowcast and forecast error distributions. *American Economic Review*, 105(5), 650–655. <https://doi.org/10.1257/aer.p20151124>
- Stock, J. H., & Watson, M. W. (2016). Dynamic Factor Models, Factor-Augmented Vector Autoregressions, and Structural Vector Autoregressions in Macroeconomics. In *Handbook of Macroeconomics* (1st ed., Vol. 2). Elsevier B.V. <https://doi.org/10.1016/bs.hesmac.2016.04.002>
- Zakaria, R., Ahmi, A., Ahmad, A. H., & Othman, Z. (2020). Worldwide melatonin research : a bibliometric analysis of the published literature between 2015 and 2019. *Chronobiology International*, 00(00), 1–11. <https://doi.org/10.1080/07420528.2020.1838534>
- Zhang, X., Chen, H., Wang, W., & Ordóñez de Pablos, P. (2016). What is the role of IT in innovation? A bibliometric analysis of research development in IT innovation. *Behaviour and Information Technology*, 35(12), 1130–1143. <https://doi.org/10.1080/0144929X.2016.1212403>