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Debt Financing and Capital Structure Influencing the Firm's Financial Performance: A Bibliometric Analysis

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Debt financing, Capital structure, Financial leverage, Profitability, Financial performance, Bibliometric analysis

JEL Classification G30, G32, L25

Abstract: Debt financing plays a prominent role in deciding future growth and the earning capacity of any company. Debt financing is a part of capital structure; hence both terms are interlinked with each other. The main aim of this study is to provide widespread view of previous studies associated with debt financing and capital structure. For this purpose, a Bibliometric analysis is performed with the aid of Bibliometrix Library along with BiblioShiny tools in R Studio software. Web of Science is elected as main database consisting data of 21 years from 2002-2022, gathered by using keywords "debt financing", "capital structure", "financial leverage", "financial performance" and "profitability". USA and China has been found as top contributing countries. Most of the authors belong to the USA, China, Canada, UK etc. Texas Christian University from United Statusis discovered as most active institute in writing documents/articles related to this field.

1. Introduction

Capital structure is a combination of owned and borrowed funds. This Borrowed segment of capital structure represents the debt financing portion of an organization. Thus, debt financing is an integral part of capital structure. Debt financing decisions are of prime importance both for the long term growth and survival of the firms. Debt can be defined as borrowed money which needs to be repaid in future along with interest charged on them. Usually a fixed rate of interest is charged upon the amount borrowed and if the money is not repaid as per the terms agreed, the lender (from whom the money is borrowed) can start the legal proceedings to collect the funds. Debt financing is basically connected with the capital structure of a company. While deciding about the sources and proportion of sources in a capital structure, it is essential to take decision regarding the proportion of debt and equity financing as well. Debt financing is considered as the foremost component of outer funding for any corporation

which is in need of raising additional capital for its business (Baltic and Ayaydin, 2014). As sources of debt carry a fixed charge as interest on them, thus it is imperative to take such decisions with utmost care. Because High leverage may jeopardize the survival and low leverage may prevent a firm from having tax benefit. The decision regarding, whether to opt debt or not, falls under the category of financing decisions. The topic of capital structure (combination of debt and equity) was initially highlighted by Modigilani and miller and later on various researches conducts their study on it. According to Modigilani and Miller (1958), the choice about the combination of capital structure is irrelevant and does not have any effect on corporation's value or its performance. The outcomes of Phillips and Sipahioglu (2004) support the theoretical views of Modigilani and Miller and found that capital structure decisions are not relevant in context of firm performance. But many researchers found to have opposite results as compared with it. Das and Swain (2018) disclosed a significant association of capital structure with the fiscal performance of the concern. Similarly Opoku-Asante *et al.* (2022) stated a negative relationship of capital structure with firm's financial performance.

Debt financing is interlinked with capital structure. While measuring the impact of capital structure on financial performance of any organization, it becomes inevitable to measure the efficacy of debt portion as well. For measuring the impact of capital structure, different leverage ratios have been employed as its indicators. If the focus has been set on borrowed portion of capital structure then it can be seen that the there are number of studies analyzing the impact of debt financing on financial performance of an organization. Mohammad and Jaafer (2012) stated that profitability of any corporation has an unassertive but significant relationship with total debt (short and long term debt). Anandasayanan and Subramaniam (2013) investigated that corporation's debt was significantly and negatively related with its profitability. Debt financing has a two way effect, positive as well as negative, on the growth level of the company. Although different researchers used discrete parameters for measuring the financial performance of an organization and they gauged the level of debt with the help of leverage ratios of that organization Dakua (2019) used debt ratio to portray the presence of leverage in Indian steel industry and found its positive association with profitability of the firm. Kurfi et al. (2021) described ROA and ROE as basic parameters to measure the monetary performance of banks while used long term debt as independent variable for computing debt level. Hung et al. (2002) employed debt to equity ratio for gauging the composition of capital structure in construction sector Hong Kong. Similarly, Mumtaz et al. (2003), Birru (2016) and Al-Taani (2013) also used debt to equity ratio as major independent variable to compute the impact of debt financing and borrowed fund on the fiscal health of the company. Omollo et al. (2010) used three different configurations (short-term debt, long-term debt & total debt) to improvise the concept of leverage in capital structure while projecting their linkage with monetary performance (ROA) of quoted firms in Kenya. Zhou et al. (2021) portrayed financial leverage of firms with the help of leverage ratio. Thus different authors used different variables to measure the level of debt in a firm as per the relevance of the study concern.

The focus of this study is to conduct a bibliometric analysis of the studies portraying the impact of debt financing and capital structure on firm's financial performance and gather the information about the data published during the year 2002 to 2022. For this purpose Web of Science is used as

main database and an attempt is made to enhance the knowledge about the keywords used in previous studies, top authors, citations, contributing countries etc.

The aim of this study is to find out the answers of following questions on the basis of the articles cited and published duringlast 21 years on the topic of debt financing and capital structure influencing the financial performance of a concern:

- RQ1. What is the growth pattern of articles published during the study period?
- RQ2. What are the common and most relevant keywords used so far and what is the thematic evolution of words during the study period?
 - RQ3. Which journal is most relevant in publishing articles relating with debt financing?
 - RQ4. Who are the main contributing authors during the period of the study?
- RQ5. Which is the highest contributing country & institute and what is the status of country collaboration network?

2. Research Methodology

For the accomplishment of the study, a dataset was required having information regarding publications, numbers of articles published, details of authors, data regarding article citations etc. With the assistance of Bibliometric analysis, the data have been gathered and evaluation has been performed to fulfill the intentions of this study. Before operating Bibliometric analysis, it simperative to have a glance regarding this analysis technique. Bibliometric analysis is a statistical way of analysing and evaluating the published articles, book chapters, proceedings paper, books etc. to gauge the major impact of publications on scientific league. In this study, the Bibliometric analysis was performed with the support of R programming software. Bibliometric analysis was executed with the aid of Bibliometrix library along with BiblioShiny online platform. Biblioshiny is an online platform, working by developing a web interface for performing bibiometrix.

2.1. Data Collection

The data is assembled on 22nd January 2022 from the database of 'Web of Science' for a period consisting 21 years from 2002 to 2022. Entire time period of the database is included in this study so that it willprovide more authenticity to the output. All the published articles, related with the study topic, falling under this time period has been included in the study. This search is made with the keywords "Debt Financing" or "Financial Leverage" or "Capital Structure" and ("Financial Performance" or "Profitability") which provides a result of 1,035 documents from the hub of Web of Science. After that, certain filters are employed on these results. Firstly these documents are purified on the root of language criteria and found that 32 documents are not presented in English Language. Such documents have been excluded and a set of remaining 1003 documents are used for applying further criteria. Another refinement was done on the grounds of document type like articles, proceedings paper, book chapters etc. We include only articles type documents for the convenience of the study and 37 documents belongs to other categories have been excluded. 966 articles were used for applying another filtering criterion of area category like economics, business finance, management etc. Articles falling under the

category of business finance are taken as final output for the study and remaining 272 articles were excluded. After applying certain filters of language, document type and article category, 694 documents were obtained. From all theses 694 documents or articles, a further refinement is done on the basis of study title and keywords used in them. After performing this task, 432 documents found to be relevant as per the study purpose. Bibliometric tools have been applied on these compiled results and with the aid of RStudio and BiblioShiny, an attempt is made to expose all pertinent areas relating to this study.

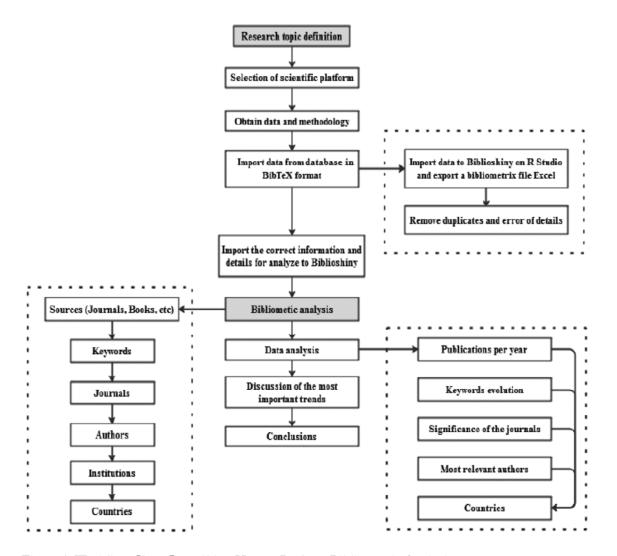


Figure 1: Workflow Chart Describing How to Perform Bibliometric Analysis

Source: Described by Garcia-Leon et al.

3. Findings and Discussions

3.1. Descriptive and Statistical Analysis

Table 1: Main Information Regarding Data Compiled

Description	Results
Main Information About Data	
Time duration	2002 to 2022
Sources (Journals, Books, etc)	71
Documents	432
Average years from publication	7.16
Average citations per documents	26.8
Average citations per year per doc	2.603
References	11920
Document Types	
No. of articles	408
article; book chapter	1
article; early access	13
article; proceedings paper	10
Document Contents	
Number of Keywords Plus (ID)	838
Number of Author's Keywords (DE)	1048
Authors	
Authors	910
Author Appearances	1033
Authors of single-authored documents	83
Authors of multi-authored documents	827
Authors Collaboration	
Single-authored documents	85
Documents per Author	0.475
Authors per Document	2.11
Co-Authors per Documents	2.39
Collaboration Index	2.38

Source: Authors' Own Compilation

Table 1 depicts general information about the dataset which is collected from Web of Science and analyzed with the help of R studio & R tools. The table portrays basic details like the time duration of

the study (21 years from 2002-2022), the types of documents involved, author details etc. A sum of 432 documents, consisting published articles, articles from book chapters, proceeding papers and early access was investigated. The average number of document citations is 26.8. In compiled data, it is found that there are 910 foremost authors contributing in this field. Apart from this, figure 2 clearly portrays the immense growth of published articles over the years. The article produced in 2002 is just one tenth portion of the year 2021. The annual growth rate of published articles, if including the year 2022, is 1.12% as computed from the data. The maximum publications are from 2021 till now. Although there are fluctuations, but from the year 2008, there is a steady growth in publishing process till 2011. After little downfall in 2012, an increasing trend can be seen with some variations.

Annual Scientific Production

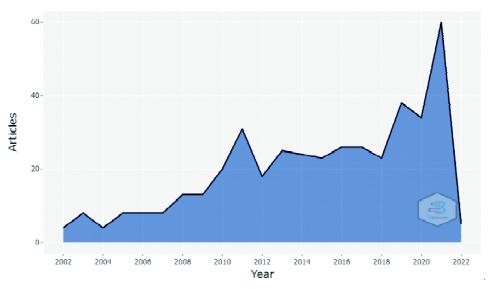


Figure 2: Annual Growth of Published Articles during 2002-2022

Source: Authors' Own Compilation

3.2. Keyword Evolution

Keyword plays a very prominent role in every study. The summary of entire study generally centralized around the keywords used in that study. Keyword represents the main idea or the topic which works as an essence in any study. It makes the study searchable and provides convenience to the researchers in finding appropriate study as per their requirements.

Figure 3 of this paper depicts the word cloud of keywords used so far in previous studies. Word cloud represents a bunch of core words in pictorial format. Impact, equity, finance, debt, performance, ownership structure, leverage are some basic keywords used in studies. Different authors used different combinations of keywords as per the requirement of their studies.



Figure 3: Word Cloud of Keywords

"Capital Structure" was highly frequented keyword used in studies then it is followed by "determinants" and "debt" as stated by the analysis performed in BiblioShiny.

Apart from this, there were some keywords used in references as mentioned by the authors in their studies, popularly termed as keyword plus. These keywords can be referred as most relevant keyword because these were searched and reviewed by authors in convening base for their studies. The

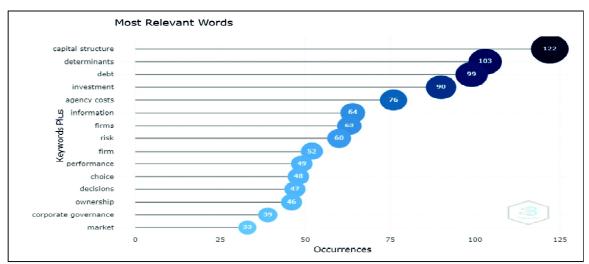


Figure 4: Occurrence of most Relevant Keywords

most relevant terminology was "capital structure", having a frequency of occurring 122 times as shown in figure 4. The next most frequent word was "determinant" appearing 103 times whereas the word "debt" occurred only 99 times. Dakua (2019) used both keywords "capital structure" and "determinants" in his study.

Figure 5 represents the thematic evolution of the keywords over the years. In this process, the study period is diverged in to two parts and an attempt is made to identify the relationship pattern between two sections. To ascertain the evolution of keywords, during the study period, the year 2016 was abandoned and the period was divided into two sections, one from 2002-2016 and another one from 2017-2022.

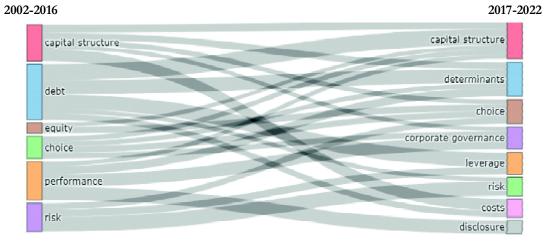


Figure 5: Thematic Evolution of Keywords

Source: Authors' Own Compilation

It is clearly visible from the figure 5 that period prior to 2016 does not involve that much variety of keywords as compared to the years after 2016. The word "capital structure" is the essence of the studies reviewed so far.

Figure 6 defines the co-occurrence between the keywords. Co-occurrence means arrival of keywords together. Different colors in clusters represent different combinations of keywords. The most highlighted keyword "capital structure" in red cluster represented as the most prominent keyword which was assisted with the related words like information, choice, equity, costs, maturity etc. Similarly, blue cluster represents agency costs and determinants as prominent keywords while ownership, performance, firm has been considered as related core words.

Figure 7 depicts a dendrogram of keywords in which these core words were interconnected with each other. The cluster of blue color represents terms closely associated with capital structure decisions of the firm while the red cluster portrays only corporate related terms like corporate governance and agency theory of adjustment.

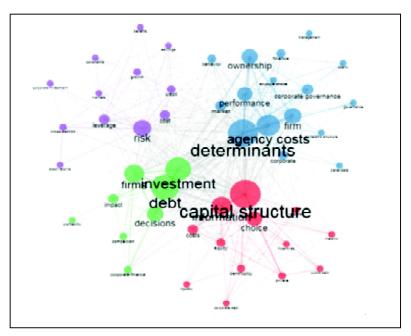


Figure 6: Co-Occurrence of Keywords

3.3. Source's Significance

Sources are the platforms from where one can get access of any paper, article, book chapter etc. Now days, when use of technology becomes so immense in every sector, these sources provide online required documents. Every journal has their impact factor which can be measured with the assistance of h_Index. The value of H index is calculated generally on the basis of number of citations of that journal or it can be depend upon the number of published articles under that journal. Figure 9 describes that Journal of Corporate Finance has published 30 articles so far, as related with the topic of our study. This is the uppermost number of articles published by a journal in the study. But H index of this journal is 13, which is quite good.

From the figure 9 it can be affirmed that Journal of Financial Economics has the largest value of H_index which is 17. But only 21 papers have been published under this journal so far. From the figure 9 mentioned below, it can be concluded that Journal of Financial Economics and Journal of Corporate Finance are of most important and valuable journal in this field.

Figure 10 depicts about the citation history of the sources. Over the years, which journal have how much number of citations, is being answered in this figure. It is spotlessly viewable that "Journal of Finance" topped in this list on the basis of number of citations done by the researchers. This journal is cited around 3336 times by the researchers then it is followed by "Journal of Financial Economics" in ranked second with 2846 citations among all listed journals.

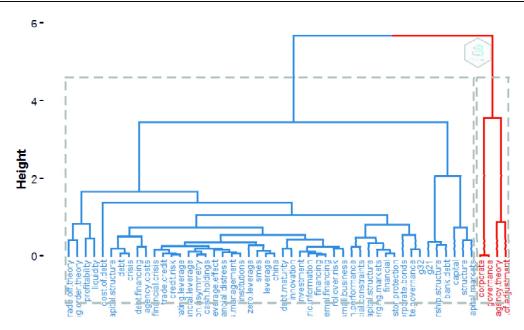


Figure 7: Dendrogram for Keywords

Word Growth

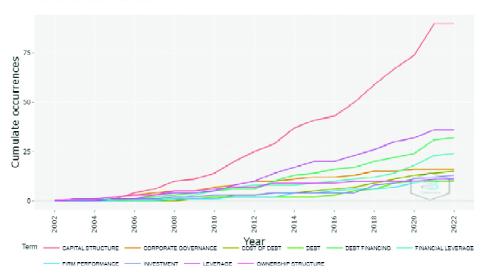


Figure 8: Word Growth of Keywords

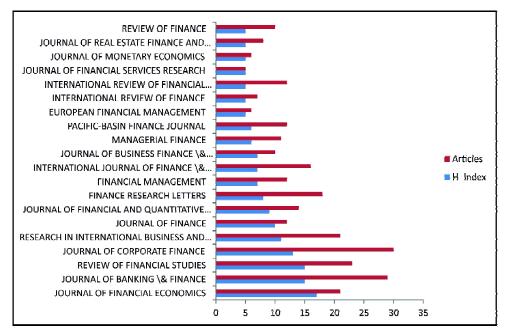


Figure 9: Top 20 Main Journals/Sources

"Journal of Financial Economics", as seen in previous figure, has the highest value in H_index. It can be deduced that "Journal of Financial Economics" is the best one among all Journals of business finance group. All these journals belong to the group of business finance as we refine the data on the basis of journal category for study purpose.

In figure 11, growths of different journals have been disclosed. This trend or the growth pattern of the journals has been gauged on the roots of articles published in them over the study period of past 20 years. "Research in International Business and Finance" starts publishing articles in 2016 in that year only 3 articles had been published by them. Figure 9 has an inter-relation with figure 11. As stated in figure 9 "Journal of Corporate Finance" has the highest published articles 30. And similarly in growth figure the mustard yellow line represents the "Journal of Corporate Finance" which is on the topmost of all colored lines. Figure 11 depicts the production of articles in journals in growth pattern.

3.4. Top Authors

This dataset involve 910 authors who write around 432 articles & book chapters. Figure 12, portrays top most 20 authors as per the basis of citations of their papers. To find out the relevance of any author, number of citations of their paper plays a very prominent role.

Anderson et al. (2003) from University of Alabama, U.S.A., found to have largest number of citations 680 on their paper titled "Founding Family Ownership and Agency Cost of Debt". The second highest

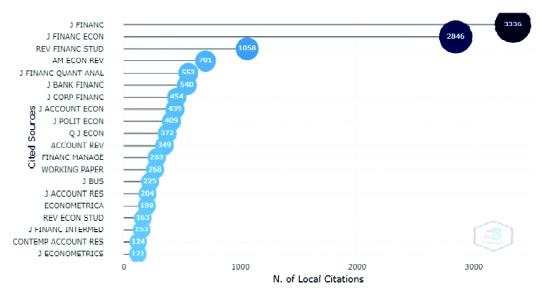


Figure 10: Top 20 Most Local Cited Sources

citation of 285 belongs to Mackay and Phillips (2005) from HongKong University of Science and Technology, Hong Kong, on paper entitled "How does industry affect firm's financial structure".

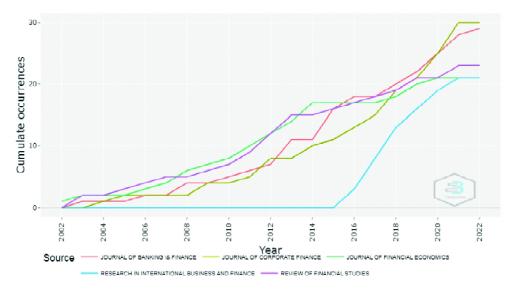


Figure 11: Growth of the Sources over the Past 20 Years

In context of contribution of authors in this field, it can be observed from figure 13 that Zhang, H. has longer contribution period. He worked in this field around 16 years from 2006 to 2022. In 2006, he wrote an article on "Capital structure and political patronage: A case of Malaysia" which has been cited in other papers for 103 times. From the figure 13, it is visible that Lin of National Chiao Tung University, Hsinchu, Taiwan and Guedhamifrom University of South Carolina, Columbia, U.S.A. were the main active authors during the study period. Guedhami (2018) investigated in his article about the 'Zero Leverage Puzzle: An International Comparison' which was cited 24 times in other articles and 108 times cited in references.

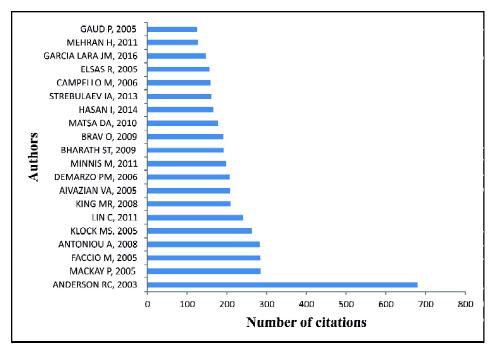


Figure 12: Relevance of Authors Measured by Number of Citations

Source: Authors' Own Compilation

From the observed data, it is found that authors collaborate with the author of other countries to make the work more authentic and free from biasness. This also helps in filling the research gap more effectively. As the researchers belong from different geographical areas, it will automatically broaden up their perspective and the entire work blossom with innovative and different ideas. Figure 14 depicts different colored clusters which portrays the collaboration network between authors. Red color cluster represents collaboration or association between Guedhami, from University of South Carolina, Columbia, U.S.A. and ElGhoul from University of Alberta, Edmonton, Canada. They jointly wrote an article on "Zero Leverage Puzzle: An International Comparison" as discussed earlier.

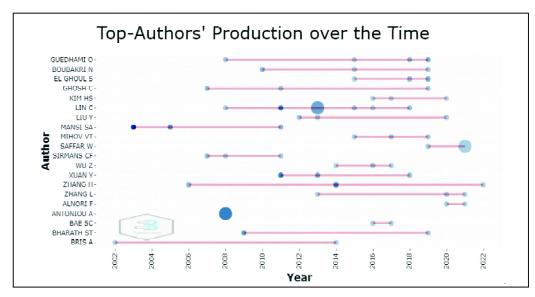


Figure 13: Time Evolution of Top 20 Author's production

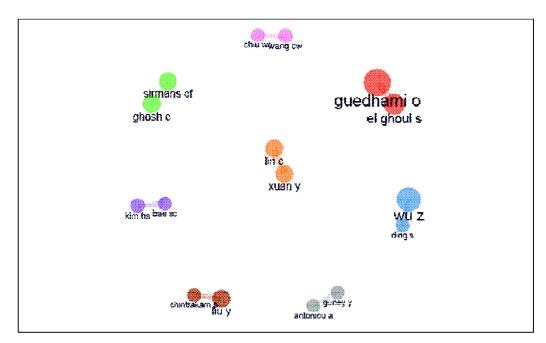


Figure 14: Collaboration Network between Authors

Figure 15 clearly represents the inter-relationship of references, authors and keywords used by them. A three field plot has been developed to visibly understand the association between these three main components of the research. The left side of the plot represents the references used in studies during the period of 20 years. The middle portion portrays the most influential authors in this field whereas the right side of this plot is used to show the keywords used in the studies. The gray lines display the relationship between aforesaid three terms. It is evident from the figure 15 that the core words capital structure and debt financing were used by most of the authors in their study and references. Ownership structure, firm performance and cost of debt are some of valuable core words used by the authors in connection with debt financing and capital structure.

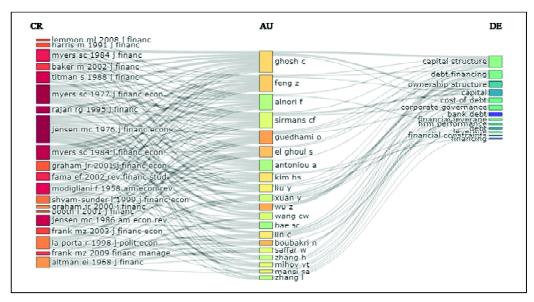


Figure 15: Three Field Plot for Reference-Authors-Keywords

Source: Authors' Own Compilation

3.5. Top Institutions and Countries

In order to ascertain the top most imperative 20 institutes or universities across the world in the field of debt financing and capital structure, a list was prepared on the basis of affiliations of concerned authors. And this list represented in the form of bar graph in figure 16. As per the data of this figure, Texas Christian University from Fort Worth, Texas, United Status had published highest number of articles, 11, as compared to other institutes. After that, there were three universities namely; City University of HongKong from Kowloon Tong, HongKong, University of Florida, Gainesville, United Status and University of Illinois at Urbana-Champaign from Illinois, United Status, falling on second rank with 10 published articles. However, as per the figure 2, the rate of growth in this field is emerging rapidly. Thus it will significantly boost the research work in this study area.

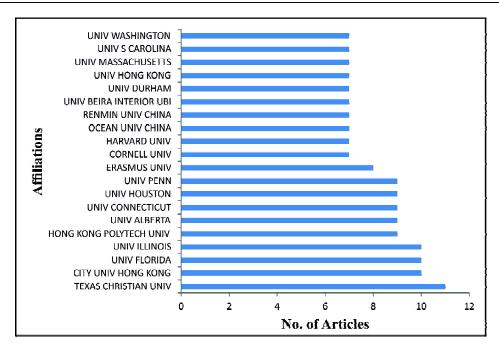


Figure 16: Top Affiliated Institutes

As per the information derived from figure 17, it can be depicted that USA has a huge collaboration network with other countries. Also the research work contributed by the USA was largest among all contributing countries. Whether it was Single Country Publication (SCP) or Multiple Country Publication (MCP), USA had published highest number of articles on the topic of debt financing and capital structure. China and United Kingdom were the second and third highest contributing country in this field of research and their work is quite appreciable.

Figure 18 shows the amount of documents produced or published by the countries over the past 20 years. USA topped in the list of scientific production of documents. USA had published around 489 documents and then it was followed by China with 199 published articles. Pakistan and Saudi Arabia fallen at the bottom of top 20 list of producing documents.

Different countries work together to make the research more authentic and free from biasness. And also to cover all the relevant research gaps positively. From the observed data in figure 19, it is visible that USA is the country having largest collaboration networks. It works jointly with Australia, Canada, China, India etc. almost with 26 countries (as per the details observed from the data) on the topic of debt financing and capital structure. USA collaborates 23 times with China, to work upon the topic related with the study area. Different colors in clusters depict the network of association among the countries. The red colored cluster represents the collaboration of USA with other countries while the blue one represents the association of United Kingdom with Germany, Luxemburg etc.

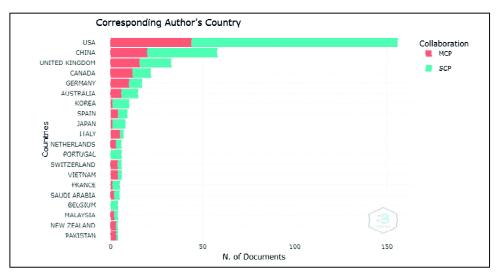


Figure 17: Corresponding Authors' Country

3.6. Co-citation

Co-citation is a terminology used when two different articles or documents are cited by another document. To represent the relationship among these co-citations, figure 20 has been drawn.

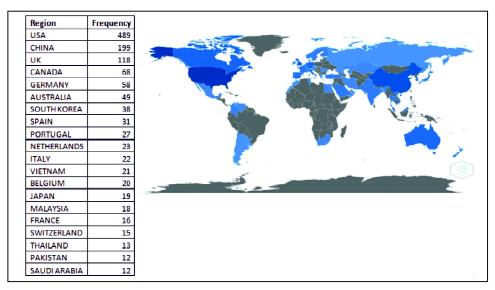


Figure 18: Country's Scientific Production

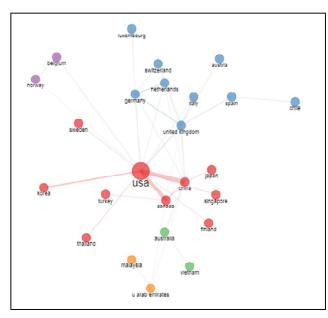


Figure 19: Collaboration Networks of Countries

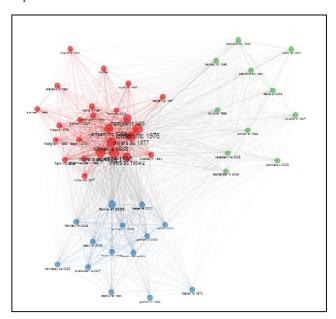


Figure 20: Co-citation Network of Papers

In this figure, it can be seen that there are three different colored clusters and these clusters represents the different combinations of papers and their references which were used particularly to write related articles. As it can be seen in red colored cluster that study conducted by Jensen MC in 1976 and Myers SC in 1977 found to be more frequently cited in related documents. The size of the dots depicts how frequently a study was cited by other related literatures. The lines between the dots define the association or network between studies. Same goes for green and blue colored clusters.

4. Conclusion

To deciding the proportion of debt and equity in a capital structure is most crucial task. These decisions are of irreversible in nature and have a significant impact on performance of a firm. The present study involved all previous studies and researches related with the topic of debt financing and capital structure and the collected data was analysed by using bibliometric analysis. This task was performed with the help of R Studio and BiblioShiny web interface. From the observed data it can be seen that there is an uninterrupted growth in this area of study. From 2002 to 2022, the studies were growing with a rate of 1.12%. The word "capital structure" was most relevant and frequently used keyword in previous studies. Apart from this, determinants, debt, choice and agency cost were used as basic core words for the citations of further references. The study showed that Journal of Corporate Finance had published 30 articles and becomes one of the most prominent source related with the study. Another source, Journal of Financial Economics also considered as relevant source because of their huge impact in h index.

Highest contributing authors in this field was Lin and Anderson had published highest articles while Anderson had highest number of citations during study period. Guedhami from University of South Carolina, Columbia, U.S.A. also referred as one of the major contributing author in research period. Texas Christian University from Fort Worth, Texas, United Status had published highest number of articles, 11, and ranked on top among all institutes. City University of Hong Kong from Kowloon Tong, Hong Kong, University of Florida, Gainesville, United Status and University of Illinois at Urbana-Champaign from Illinois, United Status, ranked on second place with 10 published articles and categorized as one of most relevant universities.

Whether it was Single Country Publication (SCP) or Multiple Country Publication (MCP), USA had published highest number of articles on the topic of debt financing and capital structure. China and United Kingdom were the second and third highest contributing country in this field of research and their work is quite appreciable. Thus, it can be said that USA topped in the category of articles production. USA had collaborations with many countries but with China, it had the highest frequency of collaboration or association. Both these countries jointly and separately put a remarkable contribution in this field.

This study has certain limitations. It is based on a time period of 21 years from 2002-2022 due to availability of data. But for further research in this field, time span can be expanding up to the maximum point so that one can generate more accurate and authentic results from the study. This study involves only single database which is Web of Science. But for future purpose, different database can be accessed to make the research more relevant.

Future study can be conducted by employing different sets of database to find more accurate results. In this study, many relevant and worth contributing studies were not included during analysis

because they belong from database like Scopus, Google Scholar etc. Different combination of databases will definitely provide more accurate results in finding out the most valuable or cited document and author in this field of debt financing. Apart from this, different combinations of keywords, which belongs from the same field of debt financing, can be used to gather the data for future studies in this field like external financing, borrowed funds, financial liabilities, firm performance etc. It will help the researcher in finding out the more authentic and relevant results.

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