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The "secret life" of the Statement of Cash Flow: A bibliometric analysis

La "vida secreta" del Estado de Flujo de Efectivo: un análisis bibliométrico

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A R T I C L E   I N F O

A B S T R A C T

The International Financial Reporting Standard Foundation issued a new Conceptual Framework for Financial Reporting. According to this document, the general purpose of financial reporting is to provide financial information about the reporting entity which is useful to existing and potential investors, lenders and other creditors in making decisions related to raise resources for the entity. Focused on the Statement of Cash Flow analysis the main objective of this paper is to provide an overview about how academic researchers have evolved about the usefulness of this Statement. Firstly, we sought to find the best database to perform a bibliometric analysis on the sample identified about the Statement of Cash Flow research. Secondly, we analysed the different stages of the research trends and the main topics. As interesting results of the analysis we can highlight that the clusters in the bibliographic network match with the research lines identified and connections between the papers have been increasing further through networks. The research lines mentioned by the accounting regulators, who issued the cash flow standards, have mostly concluded that the Statement of Cash Flow is useful to fulfill those purposes together with the researchers.

Keywords: Statement of Cash Flow (SCF), Bibliometric Analysis, Direct Method (DM), Non-Articulation.

R E S U M E N

La Fundación Internacional de Normas de Información Financiera emitió un nuevo Marco Conceptual para la Información Financiera. Según este documento, el objetivo general de la información financiera es proporcionar información financiera sobre la entidad informante que sea útil para los inversores existentes y potenciales, los prestamistas y otros acreedores en la toma de decisiones relacionadas con la obtención de recursos para la entidad. Centrado en el análisis del Estado de Flujo de Efectivo, el objetivo principal de este trabajo es proporcionar una visión general sobre la evolución de los investigadores académicos acerca de la utilidad de este estado financiero. En primer lugar, se buscó la mejor base de datos para realizar un análisis bibliométrico sobre la muestra identificada respecto a la investigación del Estado de Flujo de Efectivo. En segundo lugar, se analizaron las diferentes etapas de las tendencias de investigación y los principales temas sobre el tema. Como resultados interesantes del análisis se destaca que los clusters de la red bibliográfica coinciden con las líneas de investigación identificadas y que las conexiones entre los trabajos han ido aumentando. Las líneas de investigación mencionadas por los reguladores contables, que emitieron las normas de flujo de caja, han concluido en su mayoría que el Estado de Flujo de Efectivo es útil para cumplir esos propósitos.

Palabras clave: Estado de Flujo de Efectivo (EFE); Análisis Bibliométrico; Método Directo (MD); No Articulación.

1. INTRODUCTION

In November 1987, the FASB issued the Statement of Financial Accounting Standard 95 (SFAS 95), titled the Statement of Cash Flow. SFAS 95 establishes standards for cash flow reporting and requires a SCF as a part of the financial statements for all business enterprises in place of a statement of changes position. Currently, in March 2018 the International Financial Reporting Standard Foundation (IFRSF) issued a new Conceptual Framework for Financial Reporting. According to this document, the objective of general purpose financial reporting is to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions relating to providing resources to the entity.

If financial information is to be useful, it must be relevant and faithfully representative what it purports to represent. The usefulness of financial information is enhanced if it is comparable, verifiable, timely and understandable.

According to cash flow standards issued by the accounting regulators, the benefits of the SCF when is used together with the rest of the financial statements are the following. Firstly, asses the enterprise's ability to generate future cash-flows. Secondly, check the enterprise's ability to meet the financial obligations (liquidity and solvency), to pay dividends, and its needs for external financing. Thirdly, examine the relationship between profitability and net cash flow. The fourth benefit is the increase in comparability because this statement eliminates the effect of using different accounting treatments for the same transactions and events. Finally, another benefit is the possibility to check the accuracy of past assessments of future cash flows. Additionally, it is important to highlight that both standards encourage calculating SCF using Direct Method (DM) but allow the use of Indirect Method (IM). DM provides information which may be useful in estimating future cash flows and which is not available under IM.

The aim of this paper is to provide an analysis about how the academic researchers have evolved about the usefulness of the Statement of Cash Flow (SCF). To identify what is the usefulness of SCF and how this statement has to be calculated, we have analyzed the benefits mentioned by the Financial Accounting Standards Board (FASB) and the IFRSF.

We have done a bibliometric analysis that is the use of statistical methods to examine books, articles and other publications to conduct this research work. Bibliometric and scientometric methods have multiple and varied application realms that go from information science, sociology and history of science to research evaluation and scientific policy. Many research fields use bibliometric methods to explore the impact of their field, the impact of a set of researchers, the impact of a particular paper, or to identify particularly impactful papers within a specific field of research. In this paper we use bibliometric analysis to study several stages of Cash Flow (CF) with more deepness than other bibliographic reviews. Bibliometric analysis will allow detecting the most influential researchers in this area since 1989. So, firstly, we have looked for the best database to perform a bibliometric analysis on the sample identified; secondly, we have studied which are the research trends about SCF which will be divided in stages classified out of the research trend of cites analysed in

the databases; and finally, we have studied the different stages of research trends and the main topics about SCF.

Other bibliometric studies do not address the question of the comparability and stability of statistics obtained from different data source. Many researchers collected the data directly from Social Science Citation Index (SSCI) without providing any explanation or mention that they have applied the same search criteria as in Scopus, obtaining results very similar to SSCI. There are studies which conclude that SSCI performs lower in the area of management administration (Mingers & Lipitakis, 2010) or that Scopus has a greater coverage in terms of journals (Santa & Herrero-Solana, 2010). Therefore, with the emergence of Scopus comes the need to identify which of the two databases perform higher in each area of research knowledge (Sánchez, de la Cruz & García, 2017). Thus, our research questions defined are:

RQ1: Which is the best database to perform a bibliometric analysis on Statement of Cash Flow?

RQ2: Which are the main stages of the research trends about SFC?

In this research work we have demonstrated that the best database to analyse the state of art about the usefulness of SCF is Scopus. We applied bibliometric techniques, identifying five stages linked with how the research lines have evolved and the interest of the researchers due to the economic circumstances around these periods. The clusters we have obtained in the bibliographic network match with the research lines identified and we showed through the networks how the connections between the papers have been increasing.

2. METHODOLOGY

To analyze how research has evolved about the benefits of SCF, we used bibliometric techniques with the most appropriate database to perform this analysis, identifying the papers with linked with this topic.

There are three accredited databases: Web of Science (Wos) published by Thomson Reuters, Scopus by Elsevier and Google Scholar. Due that only the two first databases perform quality review processes to index the journals, we have decided to analyse our research comparing these two databases. Social Science Citation Index (SSCI), accessible online through Thomson Reuters WoS, was the major source of bibliometric data until 2004 when Scopus was launched. The validity of bibliometric analyses for research evaluation lies in large part in the databases' representativeness of the scientific activity studied. One of the main issues with citation indexes like WoS and Scopus is that their coverage mainly focuses on journals and less on other means of scientific knowledge diffusion (e.g., books, proceedings, and reports). A second important issue is the language coverage of citation databases, currently mostly in English. To perform a research about a topic, these two databases raise the question of comparability and stability obtained from these data sources. For those who perform bibliometric analysis, the existence of these two databases raises the important question of the comparability and stability of statistics obtained from different data sources (Archambault, Campbell, Gingras & Larivière, 2009).

We included the terms "cash flow*" or "cash-flow*" in their search bars and obtained 5.429 documents for WoS and 12.930 for Scopus. The number of false positives was high. For this reason, we decided to build a search equation to find a more accurate result. In the title search option, we included the terms "cash flow*" or "cash-flow*", and in the topic search option for WOS and abstract search option for Scopus, we used as keywords the main benefits mentioned by SFAS 95 and IAS 7 (see Table 1), and the two methods to calculate a SCF. We also included the word "ratio" because the majority of the financial analyses are done using ratios. In Table 1 we show that all the keywords used in our search equation linked with the selected criteria. The results of this search equation were 492 documents for WoS and 1.104 for Scopus.

Table 1
Key words used linked with the selected criteria

Search criteria	Key words
To generate positive future net cash flows	"predict*" "estimat*" "forecast*"
To analyse the financial position	"*solven*" "bankrupt*" "distress" "failure" "liquid*" "constrain*"
To enhance comparability	"compara*"
To check the relationship between profitability and net cash flow	"profit*" "earn*" "fraud" "manipulation"
Methods to calculate a SCF	"direct method" "indirect method"
Financial analysis	"ratio*"
Organizations and Accounting Standards	"FASB" "SFAS" "IFRS" "IAS"

Source: own elaboration.

We refined the search to articles written in English included in the following subgroups: "Business Finance", "Economics" or "Business" in WoS and "Business", "Management and Accounting" or "Economics" in Scopus. This yielded 381 papers in WoS and 671 in Scopus. However, some papers use these terms without referring the benefits of the SCF, so we made a detailed analysis of all papers in two independent rounds of review, deleting many articles that had no relationship with the usefulness of the CF as financial information. Therefore, the final sample was a total of 59 articles for WoS and 145 for Scopus.

To analyse the comparability and stability of the data we applied two techniques: the Traditional Overlap (TO) defined as the ratio of the number of journal titles or articles in the intersection of two sources to the number in their union (Gluck, 1990);

and the other technique calculates the percentage of unique documents in each database.

To identify the stages of research trend and the main topic studied about the SCF, we applied two bibliometric methods. Firstly, a Bibliographic Coupling which uses the number of references shared by two papers as a measure of the similarity between them. Meaning that, the more bibliographies of two articles overlap, the stronger their connection. Bibliographic coupling relates the citing papers of a dataset to each other on the basis of their shared references, therefore if two papers are more related or similar the more cited references they share. Since this technique focuses on citing papers, it deals with the research front, that is, the state-of-the-art of a scientific field (Kovács *et al.*, 1995).

Secondly, a co-word analysis which is a content analysis technique that uses the words in documents to establish a relationship and build a conceptual structure of the domain studied. Usually, the output of co-word analysis is a network which represents the conceptual space of a field. We have applied a co-word analysis on the keywords identified in each paper. Co-word analysis finds connections among concepts that co-occur in document titles, keywords or abstracts. The hint underlying the method is that, when words frequently co-occur in documents, it means that the concepts behind those words are closely related. It is the only method that uses the content of the documents to construct a similarity measure, while others connect documents indirectly through citations or co-authorships. The output of co-word analysis is a network of themes and their relations represent the conceptual space of a field. This semantic map helps to understand its cognitive structure (Börner *et al.*, 2003). A series of such maps produced for different time periods can trace the changes in this conceptual space (Coulter *et al.*, 1998). The unit of analysis is a concept, not a document, author or journal. However using abstracts or full texts introduces noise into the data as the algorithms have difficulty distinguishing the importance of words in large corpuses of text. Thus, we will use other techniques.

There is another common third bibliometric technique, the Co-citation analysis, however we have not applied it because does not allow mapping research fronts. Therefore, bibliographic coupling approach is better than co-citation analysis to identify research fronts (Boyack & Klavans, 2010; Zupic & Carter, 2014).

Finally, we used Vosviewer (VOS) to facilitate the bibliometric analysis of scientific literature. This tool is software for creating maps based on network data and for visualizing and exploring maps which is intended primarily for analyzing bibliometric networks (Van Eck & Waltaman, 2010).

To normalize the relation among the research, we applied the association strength measure which determines the relatedness between a pair of main papers by normalizing the co-occurrence frequency of the references they make in the case of bibliographic coupling. Considering that the association strength is a probabilistic measure, it is the best technique to apply in bibliometric research (Van Eck & Waltman, 2009). Furthermore, we applied a normalization of citations to show the size of the papers in the networks. This normalization corrects the fact that older documents have had more time to receive citations than more recent papers.

To create the networks map we used the full counting method which considers a publication co-authored assigning to each researcher a full weight of one. Additionally, in the maps we have only portrayed papers that have been cited a minimum of three times. This restriction is imposed in order to capture only the most important references and not to complicate the interpretation of the maps.

We have identified the clusters using the VOS clustering algorithm, which is based on a weighted version of Newman & Girvans's (2004) modularity function. This algorithm eliminates edges in a network that have the highest betweenness until the modularity function of Newman and Girvan is maximized. We have considered the minimum cluster size of ten papers in order to not to add more complexity in the interpretation analysis.

3. RESULTS AND DISCUSSION

3.1. *Appropriateness of the Database used (RQ1)*

Due to the bibliometric method used to find which is the best database to perform the analysis, answering the research question 1, we show the cumulative evolution of the final sample for the two databases (see Figure 1). As we can see, during the first years (1986-1994), the numbers of articles found in WoS are slightly higher. However, since then, the number of articles has grown exponentially in Scopus due to a larger number of indexed journals that this database has included.
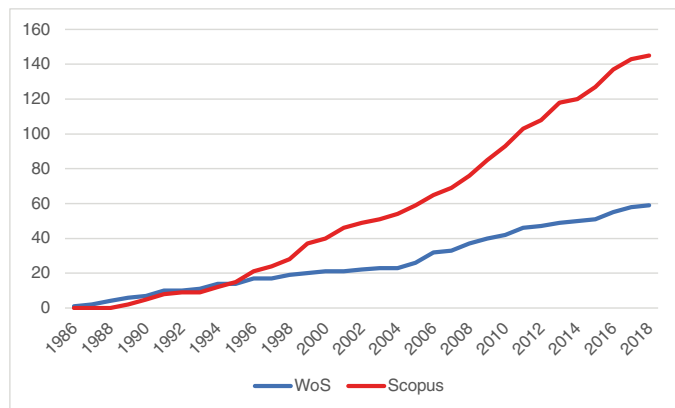

Figure 1
Cumulative evolution of publications related with SCF benefits
Source: Own elaboration.

In Wos 25 journals and 59 articles were identified, compared to 64 and 145 respectively of Scopus. The two databases analyzed provided 164 articles published in 68 journals. Of these, 124 (76%) are unique documents, collected in only one of the databases.

Table 2
Main journals where papers have been published

Journal	Quartile	Nº Papers	Total Nº Papers	%
Accounting and Business Research		7		
Journal of Business Finance & Accounting		7		
Review of Accounting Studies		7		
Journal of Accounting and Public Policy	Q1	5	49	34%
Journal of Accounting and Economics		4		
The Accounting Review		4		
Journal of Accounting Research		3		
Others		12		
Accounting and Finance		5		
The International Journal of Accounting		5		
Accounting Horizons		4		
Management Research Review	Q2	4	34	23%
European Accounting Review		3		
Review of Quantitative Finance and Accounting		3		
Others		10		
Managerial Finance		6		
Journal of Applied Business Research		5		
ABACUS		3		
Advances in Accounting	Q3	3	39	27%
Australian Accounting Review		3		
Journal of Accounting, Auditing & Finance		3		
Others		16		
Corporate Ownership & Control	Q4	3	16	11%
Others		13		
European Journal of Economics, Finance and Administrative Sciences	N/A	3	7	5%
Others		4		

Source: Own elaboration.

The percentage of traditional overlap (TO) for journals:

$$\%TO = 100 * \left(\frac{|\,WoS \cap Scopus\,|}{|\,Wos \cap Scopus\,|} \right)$$

is 39%. This result can be interpreted saying that between WoS and Scopus there is a 39% similarity in relation to the search in both databases. If we calculate the TO for articles, the result decreases to 24%.

Additionally, we have calculated the percentage of unique articles in each database. The results show a greater singularity of Scopus 85% versus 15% WoS.

Based on the prior results, we have considered that the best database to perform a bibliometric analysis to identify the stages of research trends and the main topics studied is Scopus. Therefore, our paper is based on the articles that this database contains.

In Table 2 we have splitted the 145 papers down into the main journals which have published the papers and their quartile according to SCImago Journal Rank in 2017 under the following categories: accounting, finance, business and management. SCImago Journal Rank (SJR indicator) is a measure of scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from. A journal's SJR is a numeric value indicating the average number of weighted citations received during a selected year per document published in that journal during the previous three years. Higher SJR values are meant to indicate greater journal prestige.

Taking into account that the 57% of the Journals are in Q1 and Q2 quartiles, we can consider that this topic has a great relevance.

3.2. *Stages of the research trends in SCF (RQ2)*

Finally, to answer the research question 2 we analyzed the different stages of research trends in the topic, dividing the sample into five periods according to the research lines arise or their relevance due to different circumstances. Our results show that in the Stage 1 (1989-1995), there is no core topic studied; the authors try to check the benefits mentioned by the regulation about SFC. In the Stage 2 (1996-2001), the relation between the stock return and the SCF is the topic substantially more studied. Moreover, the articulation between the Balance Sheet and the Profit and Loss Account with the SCF is questioned, emerging a research line to investigate the financial reporting fraud. In Stage 3 (2002-2007), the gap between the papers which study the relation of the SCF with the stock return with other topics decreases, raising the interest to check the usefulness of SCF. Stage 4 (2008-2013) is influenced by accounting scandals mainly due to earning management. Therefore, the authors investigate if SCF could help to detect a financial fraud and linked with this research line they study about what calculation method provides more accurate information. Finally, the Stage 5 (2014-2018) is characterized by the study of the financial distress of companies motivated by the last financial crisis.

A. STAGE 1. (1989-1995). EMERGENCE PERIOD

As we can see in Figure 2, in this first stage the number of connections between papers is limited. There are only 6 connected papers in the 14 documents included in this stage. During this first stage there is no a main topic studied. The objectives of the authors try to check if the benefits mentioned by the regulation about SCF are real.
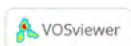

Figure 2
Network of the Stage 1
Source: Own elaboration.

However, Charitou & Ketz (1990; 1991) wrote two papers collaboratively, starting to form a specific research line about the relationship between stock prices and the SCF. However, neither SFAS 95 nor IAS 7, mention directly as a benefit of the SCF the link between the value relevance of the companies in the stock market and the SFC. Nevertheless, according to the IFRS Conceptual Framework the accounting information has to be useful for existing and potential investors. As we will see in the following stages, the relation between the share prices and SCF will be the topic most studied. The conclusion of these two papers are different, in the first article (1990) they conclude that operating cash flows do not have valuation content beyond operating earnings but in the second (1991) they indicate that cash flows from operating, financing and investing activities are associated with security prices. In this third stage three of the five articles which study this relation conclude that earnings are more strongly associated with stock returns.

On the contrary, most of the research about the usefulness of the SCF to detect financial distress or estimate future cash flows consider that cash flow information is valuable (Staubus, 1989; Laitinen, 1994; Arnold *et al.*, 1992; Percy & Stokes, 1992).

In this stage the debate about the usefulness of the cash flow information has passed. Cash flow reports are widely accepted as helpful to those concerned with financial distress of the companies or to understand the firm's activity and management's policies (Staubus, 1989). However, there is still a debate about which provide more useful information, if the earnings based on the role of accounting accrual or cash flow information. At the end of this stage, this debate decreases because researchers demonstrate that both provide useful information and solve different issues.

Another discussion area is the final reporting fraud. Some researchers support that cash flow accounting is not suitable because the opportunities for the manipulation of operating cash flow are substantial. They consider that the opportunities to control cash transaction with suppliers and customers are much greater (Stabus, 1989). On the contrary, other researchers point out that management has some discretion over the recognition of accruals to manipulate earnings (Dechow, 1994; Schellenger & Cross, 1994).

Due to the accounting regulation about the cash flow information was very recent in this stage; researchers think that they can estimate the components of SCF reasonably from data reported in the balance sheet, the income statement and the statement of changes in financial position (Livnat & Zarowin, 1990). Even in this stage, there are doubts about the usefulness of these estimations because these adjustment mechanisms imply a certain degree of information redundancy (Mitchell *et al.*, 1995). Only three papers of this stage have used a sample with cash flow information directly issued according to cash flow regulation. As we will observe in the following stages, some researchers conclude that there is no articulation between the balance sheet and the income statement and additionally, the DM provides better information. Therefore, the conclusions of the papers that have not used accounting information issued under the cash flow regulation should be questioned.

B. STAGE 2. (1996-2001). STOCK RETURN RELATION AND ARTICULATION

The number of connections is much more relevant than the prior stage. Figure 3 shows 36 connected papers in the 43 documents.
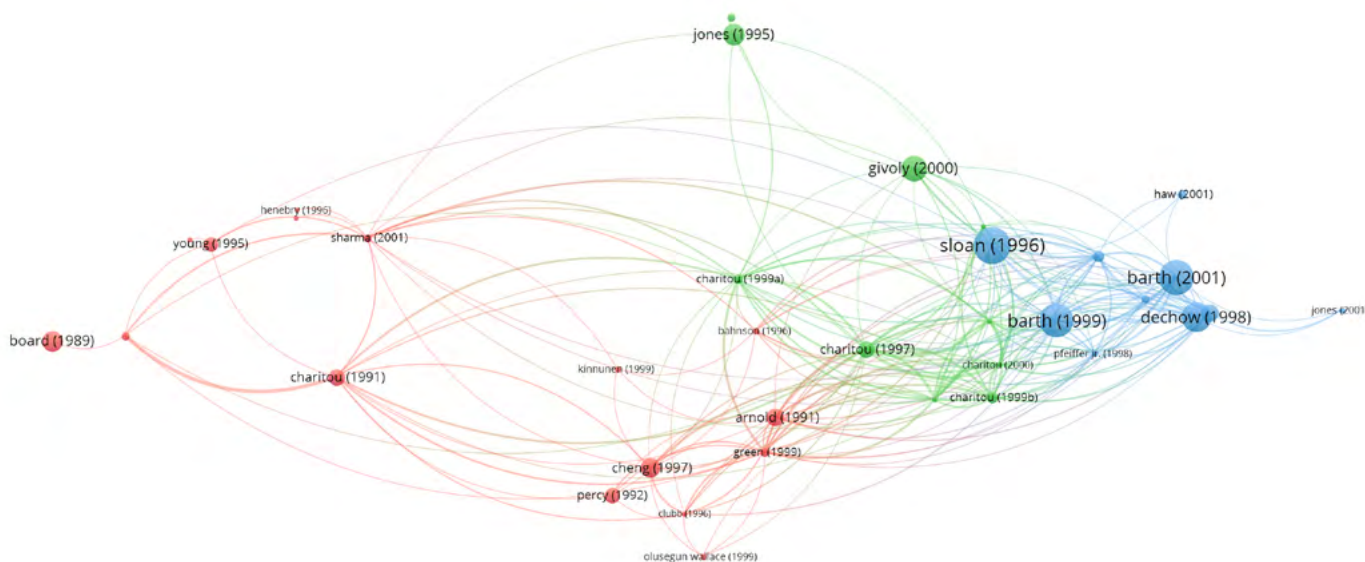

Figure 3
Network of the Stage 2
Source: Own elaboration.

During this stage the relation between SCF and stock returns is the topic more studied. However, the usefulness of SCF to analyse share prices is not clear. Only twelve of the seventeen papers support that SCF provides value-added to better understand the share price evolution. One possible reason of this discrepancy is because also during this stage most of the researches have estimated the SCF instead of taking the information issued according to the accounting regulation. Therefore, the underlying noise of these estimations may impede to see the SCF utility (Cheng *et al.*, 1997). Fourteen of the thirty-one new papers included in this stage have analysed a sample prior to SCF regulation and thus they had to estimate the components of the SCF.

In this stage appears the most cited article of the total sample (Sloan, 1996), this paper examines the nature of the information contained in the accrual and cash flow components of earnings and the extent to which this information is reflected in stock prices. This author is also very well known as the first in analyzing the "accrual anomaly" in accounting research, in this paper concludes that stock price evolution does not show the expected result. The stock price results are inconsistent with the traditional efficient market view that stock prices fully reflect all publicly available information. However, the finding that stock prices do not fully reflect all publicly available information does not necessarily imply investor irrationality or the existence of unexploited profit opportunities. The information acquisition costs and processing costs associated with implementing the strategy outlined in the paper in real time are non-trivial.

Additionally, this paper starts to form a specific research line about earning management and SCF usefulness to detect financial reporting fraud. Lee *et al.* (1999) confirm a significant relation between fraud and the difference between earnings and cash flow. The difference between adjusted net income and operating cash flow is large for fraud firms relative to nonfraud firms. Green (1999) agrees with the UK accounting regulator notion that cash flow disclosures attest to the quality of earnings. Givoly and Hayn (2000) analysed the relation between earnings and cash flow to detect reporting conservatism, finding that the decrease in the reported profitability is not accompanied by a corresponding decline in cash flows. Another article, which does not find a relation between cash flow information and share prices, concludes that the investors underestimate the persistence of cash flow and overestimate the persistence of accruals and doubts about how investors process accrual information, and their ability to undo potential manipulation by management (Beaver & Mcnichols, 2001). Stewart and Sharma (2001) who take as sample Australian companies to study financial reporting fraud, finds positive association with higher free cash flow and earnings management and support the mandate to include a detailed disclosure of reconciliations between cash flows and earnings.

Although, there were two studies about the DM vs IM in the prior stage, the most cited article about this topic appears in this stage (Bahnson *et al.*, 1996) they show that many balance sheets and cash flows statements are not articulated in the sense that changes in the current asset and liability account balances presented on the former are often reported on the latter at significantly different amounts. Many SCF presents adjustment to net income in the operating section that do not coincide with the expectations. The non-articulation is a serious problem in IM because its frequent presence obscures the meaning of the adjustments to net income and this diminishes the usefulness of the information, therefore they require the DM because this produces many benefits for all parties involved. Kinnunen & Koskela (1999) also concludes that the reported cash flows do not always articulate with income statements and balance sheets and that non-articulation can be observed in cash flows from operating, investing and financing activities.

The non-articulation is a serious issue for those studies that analysed the properties and usefulness of cash flow information derived from income statements and balance sheets. For example, the second paper most cited in the sample develops a model to calculate the operating cash flows through the formal accounting process by which those cash flows are converted into accounting earnings (Dechow *et al.*, 1998). They conclude that based in their model and tested in sample which starts in 1963 earnings better predict future operating cash flows than current operating cash flows. This model involves articulation which has been questioned for many studies.

In the first stage we analysed how research discussed about which statement provides more useful information, if the earnings based on the role of the accounting accrual or the cash flow information. However, in this stage some papers start to address the research questions considering that information provides by earnings together with cash flow is superior in conjunction rather than taking only one source of information. Previous research has concentrated on incremental rather than joint information provided by these measures (Ingram & Lee, 1997; Barth *et al.*, 1999).

C. STAGE 3. (2002 - 2007). CONSOLIDATION

As we can see in Figure 4 the links between papers continue increasing. There are 52 connected papers in the 61 documents contented. Although the relation between SCF and stock returns is also the topic more studied where the controversy about the usefulness of SCF still continues. As Sharma & Iselin (2003) mentioned, most of the literature on cash flow versus accrual information is market-based, focuses on "value-relevance" and does not address the needs of other users such as creditors and lenders. Therefore, in this stage studies about the usefulness of the SCF to estimate future cash flows, estimate future earnings or detect financial reporting fraud are also significant.

The most cited paper corresponds to a study about the usefulness of SCF to estimate future cash flows (Barth *et al.*, 2002) which concludes that current and past earnings explain more variations in future cash flows than the current and past ones. Additionally, as surprising, they found that long-term accruals, depreciation of fixed asset and amortization of intangibles, have significant predictive ability for future cash flows. In our sample until this stage there are other seven papers that study the role of SCF to estimate future cash flow and only one, which also supports articulation, is contrary to the relevance of SCF to estimate future cash flows. The authors apply the same model to calculate operating cash flows based on articulation developed by Dechow *et al.* (1998), therefore is reasonable that they get the same conclusion. Nikkinen & Sahlström (2004) who apply a different model to empirically investigate the predictability of cash flows in different countries, conclude that the model performs consistently across all the countries, except in Germany.
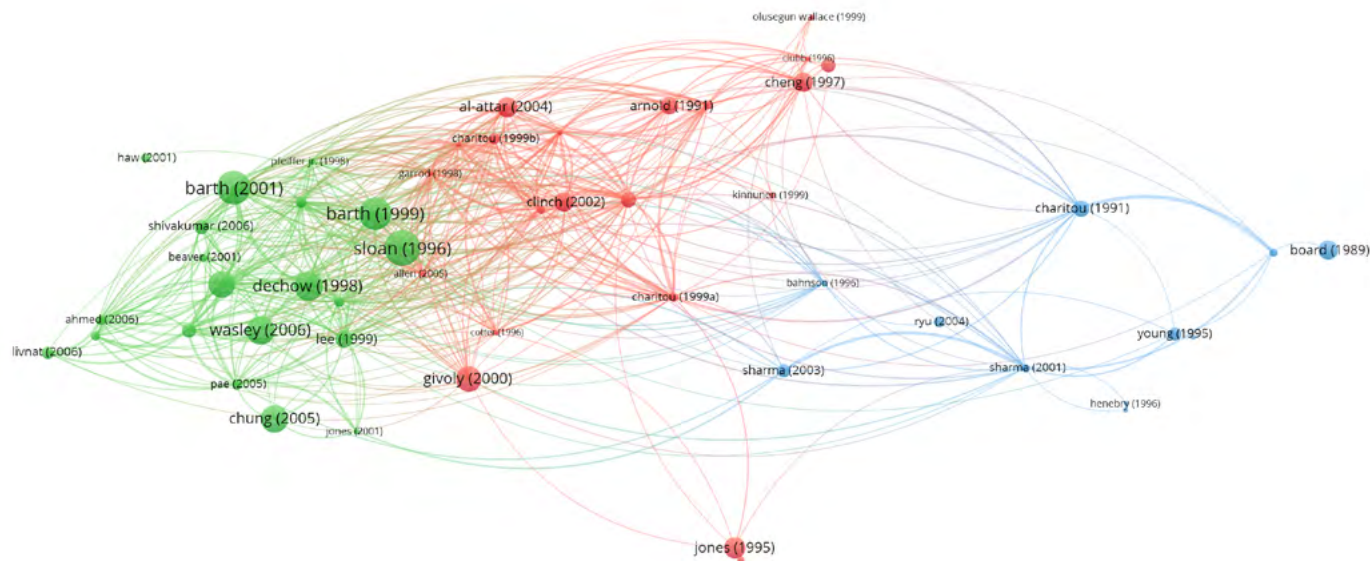
Figure 4
Network of the Stage 3
Source: Own elaboration.

The research line about earning management and SCF usefulness to detect financial reporting fraud continues in this stage with five papers that study this topic. Al-Attar & Hussain (2004) analyse the impact of the transitory component of earnings and the potential impact of earnings manipulation. Chung *et al.* (2005), confirm the hypothesis of a positive relationship between low-growth companies with high free cash flow and the discretionary accruals. Pae (2005) concludes that incorporating the association between accruals and operating cash flows and the association between current and lagged accruals, one can design a more powerful test of earnings management. Wasley & Wu (2006) find that management issues cash flow forecasts to signal good news in cash flow, to meet investor demand for cash flow information, and to recommit to a certain composition of earnings in terms of cash flow versus accruals, thus reducing the degree of freedom in earnings management.

In this stage there are four papers which conclude that cash flow information is relevance to analyse the solvency of the companies. However, the finding of one of them concludes that contrary to their expectations, creditors did not efficiently use the signals provided by operating cash flow in their assessments of short and long-term creditworthiness. They exhibited the same behaviors as investors, relying on the earnings sign as the key predictor (Allen & Cote, 2005).

D. Stage 4. (2008-2013). Accounting scandals

The Figure 5 shows how the connections between articles continue growing. There are 88 connected papers in the 96 documents. The relation between the SCF and stock returns is also the topic more studied, however there is no significant contributions because the authors repeat the models developed in other studies previously

but in different countries (Croatia, Germany, Greece, India, Malaysia, New Zeeland and Palestine) to check if the results are similar.

In this stage, the quality of earnings is examined in depth and how this affects to the financial information. We should consider that in this stage the sample of the research is concentrated in a period with many accounting scandals; "Xexox in 2000, Enron in 2001, Vivendi Universal and Merril Lynch in 2002, Parmalat in 2003 and IAG in 2004". Earnings those are either smoother or more volatile than cash flows may be due to either the neutral application of accounting rules and conventions or proactive discretionary choices, or both. Regardless of the underlying reason for smoother or more volatile earnings, an empirical question arises whether these outcomes either provide or garble information (Jayaraman, 2007). Managers may use accruals to manage earnings opportunistically and thereby adversely affect the quality of reported earnings with regard to conveying information on future cash flows. Even in the absence of deliberate manipulation by managers, large accruals may be associated with a reduced quality of reported earnings due to increased measurement errors in managers' accruals estimates (Al-Attar *et al.*, 2008).

The results about the quality of earnings and the non-articulation are relevant to the discussion of transparency in financial statements and the running debate on the preference of the direct or indirect method for presenting the SCF (Frischmann *et al.*, 2010). All the articles in this stage that have analysed the DM, consider that this method provides better financial information and suggest to the accounting regulator to only require this method to prepare the SCF (Ward *et al.*, 2009; Bradbury, 2011; Hales, 2013; Clacher *et al.*, 2013). Additionally, Orpurt & Zang (2009) defend that substantial articulation errors exist when DM cash flow components are estimated from either indirect method cash flow statements or balance sheets, indicating that the direct method is not redundant.
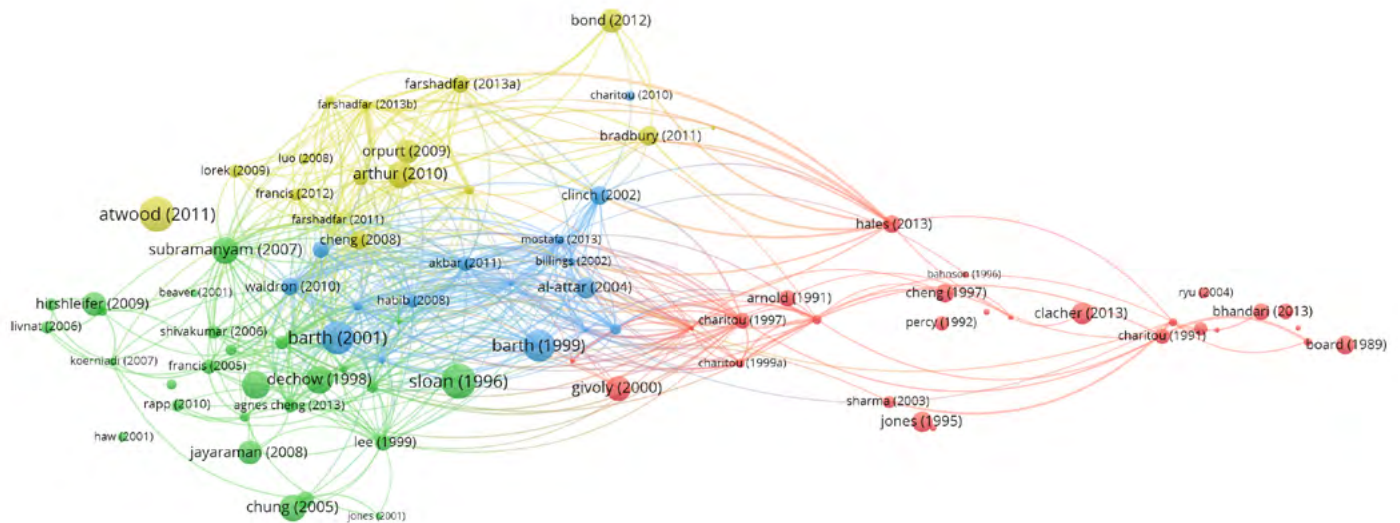
Figure 5
Network of the Stage 4
Source: Own elaboration.

When the cash flow regulation was issued maybe accounting systems were not designed to collect information of the type required by the DM and it would be costly for companies to report information using the gross method. However, this argument would seem to be moot considering advances in accounting information systems since that time (Arthur *et al.*, 2010). Before 2007 in Australia the accounting standards only allowed the DM to calculate the SCF and the companies were able to comply with this regulation. Then the Australian accounting standards were modified to harmonize with IFRS and the IM was also allowed. Nevertheless, very few companies changed the method to calculate the SCF (Bond *et al.*, 2012). Two papers here mentioned, have been very influential in the research line about the direct method statement of cash-flow articulation which are Arthur *et al.* (2010) and Orput & Zang (2009) so they could also be classified in the second stage.

Another significant topic studied in this stage is usefulness of SCF to estimate future cash flows. Most of the papers conclude that SCF provides relevant information to predict future cash flows and attribute the opposite conclusion in some previous research to the estimation of the SCF in the papers which contains substantial errors and thus is a deficient proxy of reported cash flow from operations (Farshadfar *et al.*, 2008).

E. STAGE 5. (2008 - NOWADAYS). FINANCIAL CRISIS AND LAST RESEARCH LINES

As we see in Figure 6 the relation of the research lines still growing. Finally, 95 papers out of the 103 researches are connected creating the networks map.

In this stage, the relation between the SCF and the stock returns is also the topic more studied. Although, as in previous stage, there is no significant contribution in this research line, be-cause the authors apply models developed in previous researches to other countries (Egypt, Indonesia and Iran) or to companies with some particularity. However, is remarkable that all studies, except one, conclude that the SCF has value relevance.

In this period, the most cited article analyses the usefulness of SCF to detect financial distress in the companies, extending the application of the Z-score model, which is a financial model to predict the likelihood of bankruptcy in a company (Almamy *et al.*, 2016). In this stage the researchers can take samples that cover the recent financial crisis. Therefore, it is not a causality, that this is the period where there are more papers analysing this research line. All of these studies conclude that the SCF is highly significant in predicting the health of the companies.

Charitou *et al.* (2015), studied the implication of the IFRS adoption to evaluate the default risk of the firms and conclude that this accounting regulation was beneficial to the market not only because they reduce overall uncertainty regarding the firm but also because they reveal new information to the market that leads to the revision of the market's cash flow expectations.

As a consequence of the U.S. accounting regulators do not require companies to provide complete financial statements in quarterly earnings release, rise a research line which is linked with the topic analysed in this paper. The authors studied the balance between the costs that the companies have to provide the financial information and what is the necessary information to have an efficient market. Since this restriction of financial information, the voluntary disclosure of items from SCF is infrequent, decreasing the market ability to efficiently establish the share prices. Additionally, regulators need to consider not just content but also format presentation when evaluating disclosure requirements because format affect salience and ease of processing and ultimately the efficiency with which the market uses the information (Teoh *et al.*, 2016).
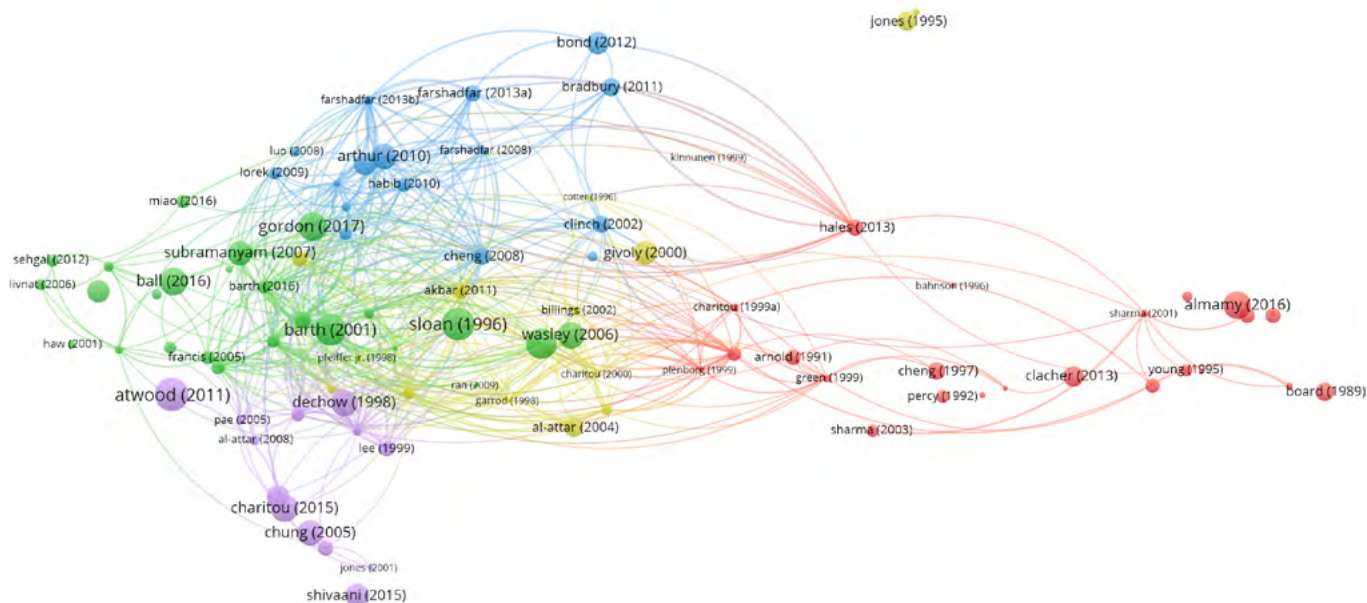
Figure 6
Network of the Stage 5
Source: Own elaboration.

Therefore, not only the calculation method is relevant, the presentation of SCF and the flexibility to report the items is also relevant. IAS 7 allows the companies to classify the interest paid, interest received, and dividends received within operating, investing, or financing activities. However, SFAS 95 requires these items to be classified as operating cash flows. Gordon *et al.* (2017) concluded that cash flow classification flexibility within IFRS creates a non-comparability that is absent under the more rigid requirements of FASB. Flexibility in classification of cash flow items introduces potential noncomparability into measurement of widely used metrics, such as accruals and free cash flow.

The Figure 7 shows the eleven keywords of the analysis. Combining the stages studied previously and this co-word analysis, we can summarized the research line in seven main topics: 1) Articulation and the relationship between earnings and cash flow; 2) How the Cash flow information is reflected in stock prices; 3) SCF can be used to detect financial reporting fraud; 4) What calculation method provided better financial information (DM vs IM); 5) The utility of SCF to estimate future cash flows; 6) The SCF facilities the estimation future earnings; 7) The SCF usefulness to detect the financial distress of the companies.
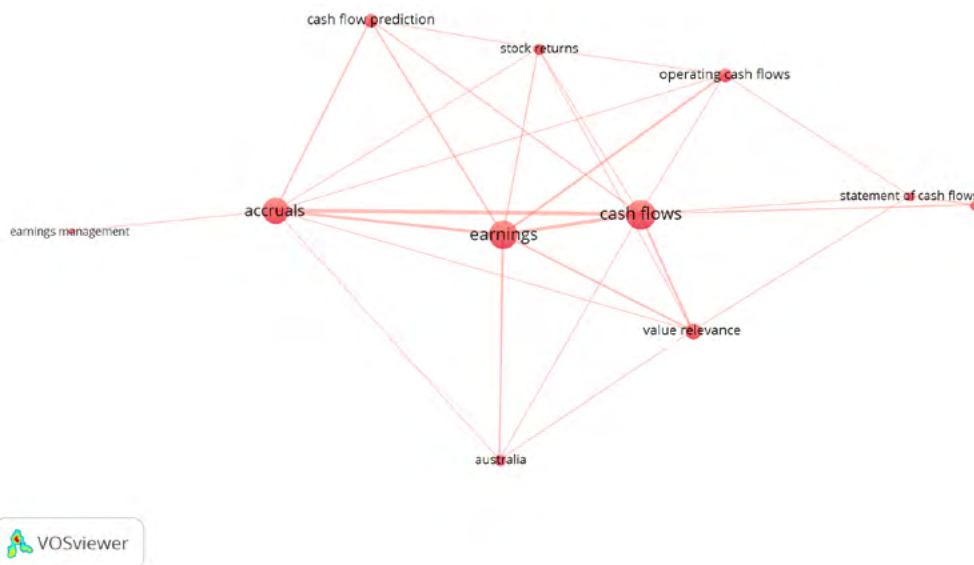

Figure 7
Co-word analysis network
Source: Own elaboration.

Table 3 reflects the relationship between the main research lines and the keywords most mentioned in the papers. While Table 4 shows the number of papers that have studied these research lines in each stage. The total number is higher than the sample of the Scopus database (145) because one article can study more than one topic.

Table 3
Links between the research lines and the most mentioned key words

Research lines	Key words
Articulation and relationship between earnings and cash flow	Earning, Cash Flows and Accruals
Stock returns	Value Relevance, Cash Flow Prediction, Stock returns
Financial reporting fraud	Earnings management
DM vs IM	Australia, DM and Statement of Cash Flow
Estimate future cash flow	Operating Cash Flows and Cash Flow prediction
Estimate future earnings	Earnings and Cash Flow Prediction
Detect financial distress	Cash Flow Prediction

Source: Own elaboration.

As we can see in Table 4, the articulation and relationship between earnings and cash flow were studied in the first two stages. As we have described, in the stage 1 the authors discussed about which provide more useful information, if the earnings based on the role of the accounting accrual or the cash flow information. Over time, this discussion decreases and the authors agreed both measures help to solve different issues and even the results of the models improve when they combine their variables.

Table 4
Number of paper that analyse each research line in the stages

Research lines	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Total
Articulation and relationship between earnings and cash flow	8	8	2	1	1	20
Stock returns	8	16	7	18	12	61
Financial reporting fraud	0	3	4	1	0	8
DM vs IM	2	2	3	9	0	16
Estimate future cash flow	4	3	4	13	4	28
Estimate future earnings	1	3	3	2	1	10
Detect financial distress	5	5	4	2	6	22
Total	28	40	27	46	24	165

Source: Own elaboration.

The non-articulation has been proven; therefore it is a serious issue for those articles which have estimated the SCF taking the data from the balance sheet and the income statement, because their conclusion can be questioned because they have applied models which start from wrong hypothesis. However, it is understandable that the researchers tried to check the new cash flow regulation with these models because they did not have financial information issued according the new accounting legislation.

In addition, the non-articulation is also an issue for the companies that calculate the SCF using the IM. Because it's frequent presence obscures the meaning of the adjustments to net income and this diminishes the usefulness of the information. Therefore, the accounting regulators should at least improve the requirements for presenting the indirect method by mandating that companies fully explain any significant non-articulation (Bahnson *et al.*, 1996). Furthermore, we should also consider that all the papers except two analysed in this research conclude that the DM provide more relevant financial information than the IM.

How the cash flow information is reflected in the share prices is the topic more investigated. However, there is no unified conclusion in this research line, although over the time, the conclusions supporting the SCF to predict stock returns have grown exponentially as we can see in Figure 8.
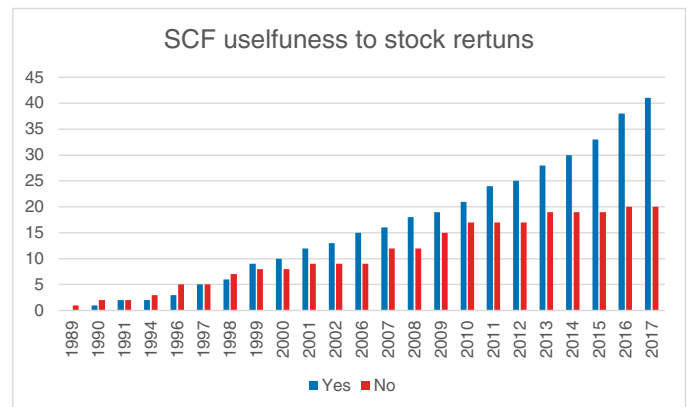

Figure 8
Cumulative evolution of the conclusion about the SCF usefulness to predict stock returns
Source: Own elaboration.

The Figure 9 shows the cluster density of bibliographic coupling network between 1989 and 2018. The greater the size of the fonts of a label, the more often the reference (normalized) is cited by our set of papers. The distance between a pair of cited references represents the likelihood that these references are cited together. The colors indicate the cluster whereby each research belongs. The grouping of a reference into a cluster indicated that this reference is more likely to be cited in combination with other references that are grouped in this cluster than with references that are grouped in other clusters. As we can see there are five clusters clearly identified.

The main topic studied by the papers in cluster 1 analyse the articulation between SCF with the balance sheet and the income statement. The grouped researches in the cluster 2 focus on the relation between the cash flow information and the stock prices.

While the cluster 3 compiles the studies about the calculation of the SCF (DM vs IM). Most of the papers that analysed the relationship between earnings (accruals) and cash flow information are grouped in cluster 4, where additionally are also included the studies about financial reporting fraud. It is logic that the both topics are in the same cluster. Lastly, the cluster 5 mainly reflects the researched about the usefulness of SCF to detect financial distress or estimate future earnings.
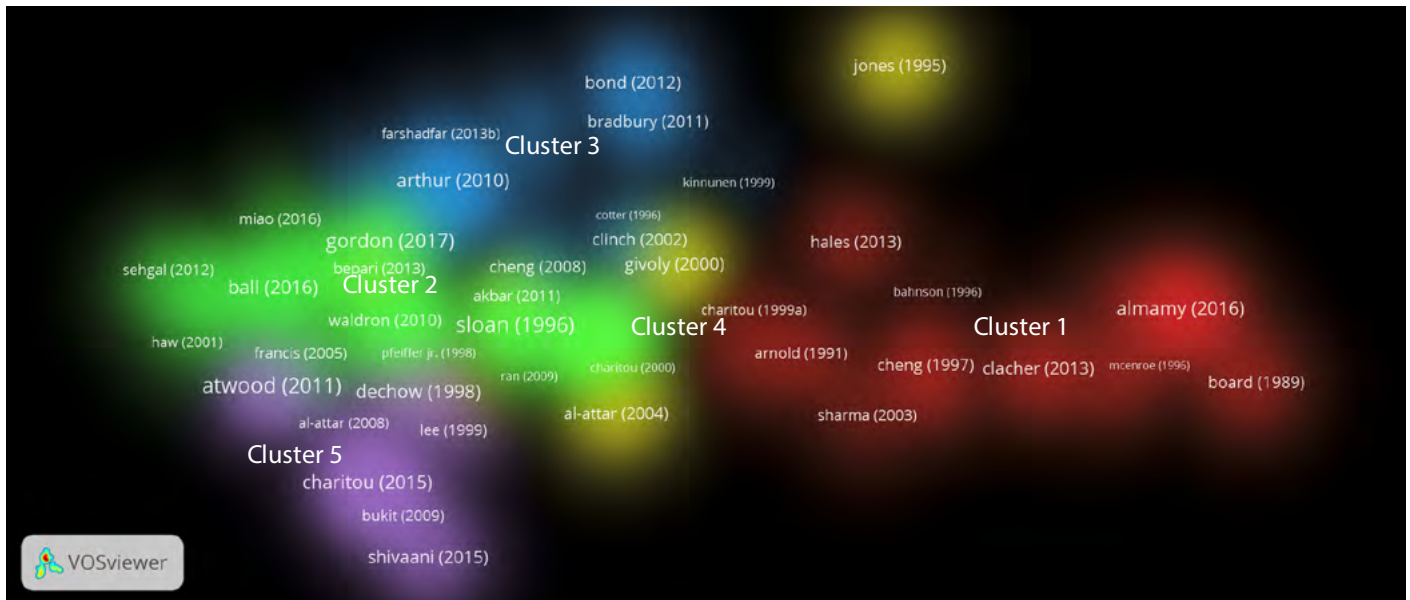

Figure 9
Cluster density
Source: Own elaboration.

Table 5 presents the number of items in each cluster and the most cited paper.

Table 5
Number of items and most cited article in each cluster

Cluster	Items	Authors	Year	Title	Citations
1	25	Bahnson *et al.*	1996	Non-articulation in cash flow statements and implications for education, research and practice.	43
2	25	Sloan	1996	Do stock prices fully reflect information in accruals and cash flows about future earnings.	1.358
3	17	Orput & Zang	2009	Do direct cash flow disclosures help predict future operating cash flows and earnings.	43
4	15	Givoly & Hayn	2000	The changing time-series properties of earnings, cash flow and accruals: Has financial reporting become more conservative?	377
5	13	Dechow *et al.*	1998	The relation between earnings and cash flows.	425

Source: Own elaboration.

4. CONCLUSIONS

To analyse the state of art about the usefulness of SCF, we have applied bibliometric techniques, where we have identified the most influential papers in the CF usefulness research and we classified the research in five stages due to the trend changes observed and the clusters found. Previously we had to identify the most appropriate database to perform this analysis. Taking into account the Traditional Overlap and the percentage of unique documents, Scopus resulted in the best database to perform this study.

We divided the sample in five periods according to how the research lines have arisen or evolved and also identified and explained how the economic circumstances, financial crisis and accounting scandals, have influenced on the researchers' interests. Thus, as the clusters in the bibliographic network match with the research lines identified we showed through the networks how the connections between the papers have been growing.

The research lines, which have been checked with the purposes mentioned by the accounting regulators who issued the cash flow standards, have mostly concluded that the SCF is useful to estimate future cash flows or earnings detect financial distress and increase the comparability.

Although, the relation between the cash flow information and share prices is not directly mentioned by the previous standards, it is the topic most studied. In this case, there is not a unified conclusion about the usefulness of SCF. However, in recent years the papers which support this benefit, have grown exponentially.

The research has also tested the articulation between the SCF, balance sheet and income statement. Most of the papers conclude that there is no articulation. This is a serious issue for those articles that developed models base on this hypothesis because their results can be questioned. However, it is compressible that in the early stages, the authors tried to analyze the purposes of the new accounting regulation, although they did not have financial information issued according to this standard.

Linked to the previous research line, another two research areas emerge. Firstly, the relationship between earnings and cash flows derives from analysing financial reporting fraud. Most of the articles conclude that SCF is useful to detect accounting manipulation. However, we also highlighted that there is research that prove manipulation in the SCF. Secondly, although accounting regulators encourage calculating the SCF using Direct Method, Indirect Method is also allowed. Nevertheless, almost all the papers that study this topic conclude that the DM provides more relevant and useful information. For this reason, we recommend the DM to be the only method allowing the SCF calculation.

As future research lines we will analyse, taking into account the development in accounting software, the reasons why regulators allow the IM and continue with the CF usefulness analysis from an empirical point of view. Additionally authors such as Bradbury (2011) and Hales (2013) suggest other interesting lines for future CF research.

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