

## Web 2.0 and Equity Crowdfunding: A Social Network Analysis

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### Abstract

Thanks to fundraising from small investors, principally through social media and online forums, equity crowdfunding (EC) is emerging as an important new financing mechanism for new ventures. However, the literature about equity crowdfunding and social media is still scarce, and no studies have jointly investigated these topics in Italy. As a result, this study aims at investigating, through an exploratory quantitative research approach based on social network analysis (SNA) methodology, the role that equity crowdfunding platforms have on social media, specifically on Twitter. The results of our study indicate that higher numbers of tweets and users spoke about equity crowdfunding following the introduction of Consob Regulation no. 20264 (17/01/2018) on equity crowdfunding and the growth of the use of this instrument in the first quarter of 2019. The study contributes to the literature on crowdfunding and social networks, shedding light on specific aspects typical of an equity model.

### 1. Introduction

Nowadays, equity crowdfunding (EC) plays a significant role in entrepreneurial finance (Cumming, Vanacker and Zahra, 2019) and is increasingly emerging as an alternative way for entrepreneurs to fund their businesses (Vulkan, Åstebro and Sierra, 2016). In particular, this model of crowdfunding represents a technique of funding from individuals who decide to

invest their money in the capital of a firm by purchasing part of its shares (Battisti *et al.*, 2020). Studies on EC are developing rapidly (Moritz, Block and Lutz, 2015), and some researchers have focused on specific aspects related to this type of financing source (e.g., Lukkarinen *et al.*, 2016; Miglietta *et al.*, 2019). However, quantitative and qualitative research on this model of crowdfunding is still quite scarce (Previati, Galloppo and Salustri, 2015; Hornuf and Schwienbacher, 2018). Specifically, while the actual body of study on EC has linked numerous campaign and firm characteristics to success on equity crowdfunding platforms, this list of success factors is far from complete (Hornuf, Schilling and Schwienbacher, 2019). However, with regards to the topic of social/mass media, the literature on EC is also still limited and focused mainly on crowdfunding in general. Beier and Wagner (2015) developed a new viewpoint on how crowdfunding activities rely on mechanisms from social media and e-commerce with the components of optimisation of conversion rates, traffic generation, and ability to pay. Verschoore and Zuquetto (2016) proposed a framework based on social network analysis for crowdfunding projects. Hekman and Brussee (2013) investigated the relation of the success of Kickstarter projects to social network and media activities. Finally, Nevin *et al.* (2017) applied Social Identity Theory (SIT) to examine equity-based crowdfunding. However, to the best of our knowledge, no studies have jointly examined the equity-based model and social media, especially in Italy. Therefore, the aim of this study is to investigate, through an exploratory quantitative research approach based on Social Network Analysis (SNA), the role that equity crowdfunding platforms have on social media, specifically on Twitter. Here we select tweets based on the hashtag #equitycrowdfunding in the period January 2018–April 2019 to verify the media reaction to the introduction of Consob Regulation no. 20264 (17/01/2018) for equity crowdfunding. This study aimed to verify whether EC platforms are responsible for disseminating information related to the financial instrument and EC campaigns on Twitter. The results of our explorative study indicate that higher numbers of tweets and users spoke about EC following the introduction of Regulation no. 20264 and the growth of the use of this instrument in the first quarter of 2019.

This study contributes to the literature on EC by clarifying some characteristics related to the diffusion of news through Twitter. Specifically, the contribution of this study is manifold. First, we have extended the debate on equity crowdfunding. Second, we have linked the topic of equity crowdfunding to social media. Finally, we have highlighted how equity-based platforms have an influence in social networks.

This paper is organised as follows. Section 2 presents the theoretical background and hypothesis about equity crowdfunding and social media. Section 3 focuses on the methodology and sample. Section 4 highlights the results of the study. Finally, Section 5 includes the conclusions and the implications of the explorative research.

## **2. Theoretical background**

### **2.1. Equity crowdfunding**

Broadly speaking, crowdfunding can be divided into five main categories (Poetz and Schreier, 2012; Belleflamme *et al.*, 2013; Piattelli, 2013; Pais, Peretti and Spinelli, 2014; Agrawal *et al.*, 2015; Scott, 2015; Quaranta, 2017): lending, donation, equity, reward, and royalty. Compared to other types of crowdfunding, the equity model is a relatively new phenomenon (Lukkarinen *et al.*, 2016). In this sense, EC has established itself as an unconventional financing

mechanism compared to traditional equity funding sources and as a popular financing choice for innovative start-up businesses. EC offers a new marketplace for entrepreneurs to draw upon their network of friends, family, and existing shareholders for raising external funds, while also providing a way to raise additional financing from a large pool of individual investors in exchange for an equity stake in the firm (Ralcheva and Roosenboom, 2019).

Regulations around EC vary by country, and Italy was the first country in Europe to introduce a specific discipline of equity-based crowdfunding, through Decree Law 179/2012, converted into law no. 221/2012. Consob Regulations (Commissione Nazionale per le Società e la Borsa [Italian Companies and Exchange Commission]) defined the scope of EC and established the principles and methods of managing a portal and protecting the retail investor. Specifically, the regulation of equity crowdfunding in Italy was implemented through six Consob Regulations: Consob Regulation no. 18592 (26/06/2013), Consob Regulation no. 19520 (24/02/2016), Consob Regulation no. 20204 (29/11/2017), Consob Regulation no. 20264 (17/01/2018), Consob Regulation no. 21110 (10/10/2019), and Consob Regulation no. 21259 (6/02/2020). In particular, Consob resolutions no. 20204 and no. 20264 extended the possibility of using equity crowdfunding to all small and medium-sized Italian companies (not only to start-ups and innovative SMEs) and introduced an internal whistle-blowing procedure to report violations. A direct relevant consequence was an expansion of the number of companies that will be able to finance themselves through online crowdfunding portals. As of April 2019, 32 EC platforms existed in Italy: 30 registered in the ordinary category and two platforms registered in the special category. The ordinary section, that is to say, the focus of this study, is for registered portal managers authorised by Consob pursuant to the authentication of the requirements established by the Consolidated Law on Finance (Testo Unico della Finanza – TUF) and the regulation adopted by Consob by means of resolution no. 18592.; the special section has noted banks and investment companies previously authorised to provide the relative investment services (Vrontis *et al.*, 2020).

## 2.2. Social media and hypothesis

There are different ways of disclosing financial information; word of mouth can be considered a first, traditional type. According to Bansal and Voyer (2000) and Bausch and Han (2006), investors rely heavily on the opinion of family, colleagues, and friends for financial choices following the traditional theory of communication. These studies showed how word-of-mouth information can greatly influence the behaviour of individuals (Cox, 1963; Brown and Reingen, 1987; Money, Gilly and Graham, 1998; Mauri, 2011). Alongside the traditional paradigm of top-down disclosure of information, a mechanism of active participation in the information process has spread through the use of Web 2.0 tools, in particular RSS feeds and microblogging sites (Facebook, Google+, Twitter, etc.). These tools and platforms allow users, through a word-of-mouth process, to comment on and disseminate information and opinions. According to O'Reilly (2007), second-level people collaborate and share information online through telematic solutions. Social networks and other new channels of dissemination on the web are spaces of interaction where information originates. Traditional media often use such tools and channels to disseminate information, demonstrating their importance (Armstrong and Gao, 2010). To link the structure of social networks with user interactions through message exchange, initial quantitative research was conducted using Twitter data, one of the most important microblogs (Huberman, Romero and Wu, 2009). Subsequent researchers studied the

ability and components of social networks to influence users (Cha *et al.*, 2010; Carretta, Farina and Nako, 2013), messages and their content, the tones used (Pak and Paroubek, 2010; Bollen, Mao and Pepe, 2011), and the demographic aspect of users (Mislove *et al.*, 2011). Additionally, Carretta, Farina, and Nako (2013) monitored the flow of tweets on Twitter with the hashtag #spread in the period from May 21, 2012 to May 30, 2012. The authors noted that the influence of traditional media remains important, but blogs, financial blogs in particular, are increasingly important for spreading social news. In particular, Graziano and Vicentini (2018), in analysing social networks, emphasised the role of central actors in spreading news on the Twitter platform from November 2015 to March 2016, in relation to the bail-out (rescue) and other developments of banks in financial difficulties, such as the case of Banca Etruria. The authors concluded that in the #bancaetruria case, central media propagation was represented by traditional media through the use of official accounts, while when it came to the bail-out, financial blogs took a central position in the network.

Following this vision, our research hypothesis is this:

H1: Following the introduction of the Consob regulation, equity crowdfunding platforms have become the central users on Twitter, with the responsibility of disseminating information and news relating to the campaigns and the financial instrument itself.

### 3. Methodology and sample

Social network analysis methodology was used to study the relationship between the nature and influence capacity of information sources (Mitchell, 1969; Wasserman and Faust, 1994; Degenne and Forsé, 2007; Carretta, Farina and Nako, 2013; Signori and Confente, 2014; Lazzeretti and Capone, 2016). This methodology made it possible to distinguish the types of users who had published on some topics identified on the basis of hashtags and to detect the set of relations between the different users and the dissemination of a message within the social network. The analysis of the nature of Twitter users made it possible to distinguish users between mass media (traditional and blogs), sector operators (regarding the topics of crowdfunding, crowdfunding platforms, or financial intermediaries and/or institutions), and individuals. The measurement of the centrality of one actor over another was measured with betweenness. It is often used to find nodes that serve as a bridge from one part of a graph to another. Each node represents a user profile within the social network.

$$Betweenness (n_i) = \sum_{j < k} g_{jk}(n_i) / g_{jk}$$

The betweenness of user *i* is given by the summation of all the partial betweenness calculated for each pair of vertices *g<sub>jk</sub>*, where:

- *g<sub>jk</sub>* represents the number of geodetic links, that is shorter, between vertices *j* and *k*;
- *g<sub>jk</sub>(n<sub>i</sub>)* is the number of times the user *i* is involved.

The idea behind this measure is that the impact that a singular user is able to exert is linked to the number of times it is in the shortest path between two other actors. In other words, this measure is the expression of a user's ability to be an informative relational bridge.

The significance of the differences in the categories was then tested through an ANOVA statistical test.

The data comprise all tweets converging towards the hashtag #equitycrowdfunding around the time horizon of analysis, January 15, 2018 to April 30, 2019, due to the update of the Consob regulation on equity crowdfunding that took place on January 17, 2018.

For the hashtag #equitycrowdfunding there were 86 users who produced 978 tweets and 613 retweets. The analysis of the retweets is important because it allows us to define the networks of interaction between different users and the strength of their relationships.

The users who tweeted about equity crowdfunding were fewer numerically but gave greater coverage to the topic by producing more tweets and retweets that determined more lively networks and stronger relationships among users by virtue of their small number. In the analysed time span, the monthly distribution of the tweets convergent on the hashtag #equitycrowdfunding (Figure 3.1) showed some peaks: January and February of 2018 and March and April of 2019. The peaks in 2018 are explained by the regulatory thrust due to the Consob regulation and its application and interpretation, which ignited debate on the matter. The trend in the first quarter of 2019 year reflects the growth of the Italian equity crowdfunding market, due precisely to the introduction of the new regulation by Consob (Politecnico di Milano, 2019).

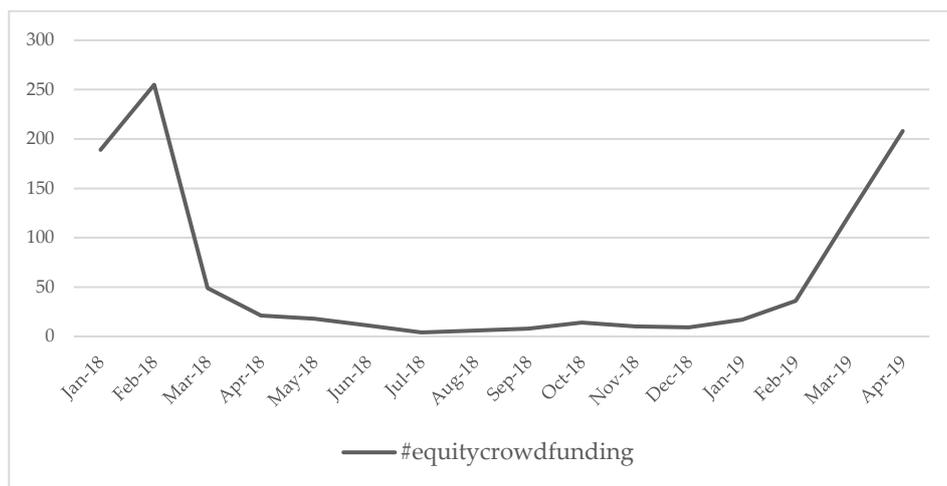


Figure 3.1. Monthly tweets on EC from January 2018 to April 2019 (source: authors' elaboration based on Twitter data).

Using a simple content analysis on tweet production in relation to the two observed peaks, we find that the peaks reflect two completely different situations. The first peak describes the debate on the new regulation, while the second describes the discussion on EC campaigns. The content of the tweets, in fact, has different keywords in the first quarter of 2018 and the first quarter of 2019. In the first case, the most occurrent terms are regulation, Consob, and the Italian market, because the Italian context represents the first example of the specific regulation of the EC instrument. In the first quarter of 2019, the words that occur most change. During this period in the tweets containing the hashtag #equitycrowdfunding, innovation, start-up, and green are the most used words, confirming that the topic of the debate on EC is different

and focused on the characteristics of the campaigns launched in that period and increased thanks to the regulatory innovation that took place at the beginning of 2018 (Table 3.1).

<i>Words</i>	<b>First Quarter 2018</b>
<i>Regulation</i>	485
<i>Consob</i>	355
<i>Italian market</i>	203
<b>First Quarter 2019</b>	
<i>Innovation</i>	247
<i>Start-up</i>	234
<i>Green</i>	196

Table 3.1. Most occurring words in tweets on #equitycrowdfunding in the first quarter 2018 and in the first quarter 2019.

#### 4. Results

The results of the betweenness are shown in Table 4.1, whose statistical significance of the differences between the groups was tested using the ANOVA test (Table 4.2).

	<b>Number of Retweet</b>	<b>Betweenness on Average</b>	<b>Standard Deviation</b>
<b>Crowdfunding Platforms</b>	386	0.4705	0.1613
<b>Media</b>	121	0.3302	0.2128
<b>Individual Users</b>	106	0.2522	0.5916

Table 4.1. Results of Betweenness analysis (source: authors' elaboration).

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sign</b>
<b>Between Group</b>	84.31	2	0.2522	18.634	.000
<b>Within Group</b>	104.73	27	0.4705		
<b>Total</b>	189.04	29			

Table 4.2. Results of ANOVA Test (source: authors' elaboration).

The results of the betweenness analysis confirm our research hypothesis: during this period, crowdfunding platforms were the central users on Twitter, responsible for news dissemination related to the EC topic. Through their official Twitter accounts, the EC platforms produced

and shared new content or shared tweets produced by other users by bridging their diffusion. For this reason, they assumed centrality in the network on #equitycrowdfunding, followed by mass media distinguished by general or traditional (e.g., @ilcorrieredellasera, @ilmessaggero, @larepubblica, @lastampa) and specialised media (e.g., @ilsole24ore, @MilanoFinanza) and finally by general users, who were individual users with personal profiles.

The crowdfunding platforms held a central position in the network on #equitycrowdfunding regardless of shared content; in fact, they remained hubs in the network throughout the time horizon of the analysis, remaining responsible for sharing information relating to the debate on the new Consob regulation (at the beginning of 2018) and also when the content of the tweets mostly concerned the characteristics of the launched campaigns (in the first quarter of 2019).

Based on the analysis, Figure 4.1 shows the interaction networks among users on the basis of the retweets produced by tweets containing the #equitycrowdfunding hashtag.

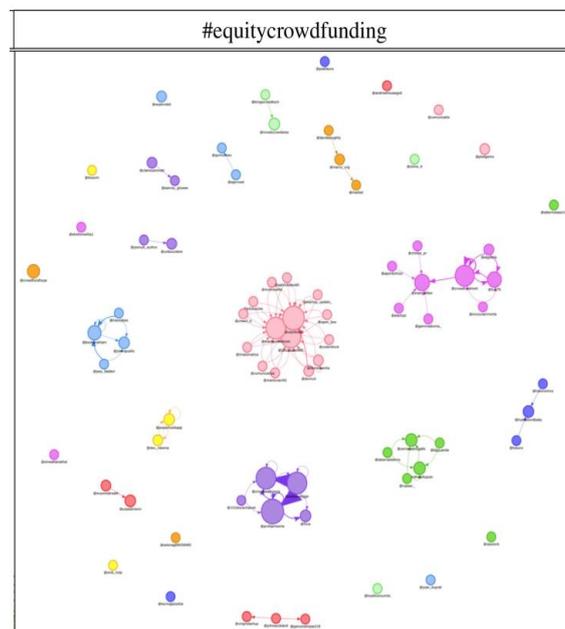


Figure 4.1. Network generated by retweets containing the hashtag #equitycrowdfunding (source: authors' elaboration).

Observation of the cloud generated by the selection of retweets confirms first of all that the network related to #equitycrowdfunding is composed of few but very concentrated users: the interactions between users are very intense, although different networks are identified with fewer users exchanging tweets and retweets on the topic. This cloud highlights three networks where the relations are stronger because there is more production and exchange of tweets. The configuration of the clouds is typical of the topics by public propagation led by experts in the subject as well as by traditional and innovative media operators and individuals interested in various capacities (Cha *et al.*, 2010; Carretta, Farina and Nako, 2013; Hekman and Brussee, 2013; Graziano and Vicentini, 2018). Equity crowdfunding is among the niche topics that grabbed the attention of experts, academics, professionals, and operators who in various capacities expressed themselves on the topic.

## 5. Conclusions and implications

This work is the first research study in the Italian market to be conducted on the equity crowdfunding model and on Web 2.0. This study contributes to the literature on equity crowdfunding and clarifies certain aspects related to the dissemination of news through social networks (Twitter). In particular, we aimed to identify who are the subjects responsible on Twitter for the production and dissemination of equity crowdfunding news, and we generated a cloud representation of the disseminated retweets.

The changes in Italian regulations on equity crowdfunding together with the update of Consob regulations in early 2018 have renewed the debate on crowdfunding by focusing on equity crowdfunding. In particular, the fact of allowing small and medium-sized companies to reach certain criteria for access to equity crowdfunding, introduced by Consob Resolution no. 20264 of 17/01/2018, represented an opportunity for the media, especially for social networks such as Twitter, to initiate debate on the subject. We aimed to clarify how the news was spread and who were the main responsible parties.

By selecting tweets based on the hashtag #equitycrowdfunding between January 2018 and April 2019, we conducted an analysis to verify the media reaction to the events. The result was an increase in tweets related to the topic: users talked about equity crowdfunding in relation to the introduction of the new Consob regulation on equity crowdfunding at the beginning of 2018 and in relation to the growth of its use, according to data from the Osservatorio Crowdinvesting (Politecnico di Milano, 2019) in the first quarter of 2019. News on standards and the interest aroused make the issue of equity crowdfunding relevant to the media: the retweets related to #equitycrowdfunding showed fewer users but more retweets, with four distinct networks in which stronger relationships were established.

Industry experts can deduce the central role of the network from #equitycrowdfunding hashtag analysis, with a focus on crowdfunding platforms and then traditional and specialised media.

The results show that at the request of the supervisory authorities, operators could use powerful social media, such as Twitter. Having a central position in the network on several occasions (e.g., the debate on the new regulation and the characteristics of the campaigns launched), the platforms can influence potential investors. Clarity in the use of social networks by the crowdfunding platforms could have a positive impact on investors' knowledge and awareness.

In addition, careful use of hashtags shows better results in terms of information disclosure, because the EC platforms can precisely categorise the tweets produced on the basis of the hashtag used in order to convey the news to the interlocutors suitable for the purpose of the information. Choosing a specific hashtag generates a retweet cloud with an information dissemination network among the most influential users. By following a managerial point of view, the supervision of social networks by staff with specific professional skills can be a successful engine for industry players, not only to protect their reputation, but also to stimulate the process of co-creation of essential value in the crowdfunding market.

The current study provides input on the importance of equity crowdfunding, as it shows increasing popularity and therefore the attraction of more potential investors and capital: if companies use Twitter for the purpose of sponsoring and advertising their campaigns, the

probability of reaching a greater number of investors increases with the consequent growth of the capital raised.

Social networks, according to social network theory applied to entrepreneurial finance, help to reduce uncertainty and attract the attention of users who, in the case of equity crowdfunding, could invest in projects.

In particular, the results of this study suggest how project promoters can help in understanding the influence of social media on crowdfunding success. For this reason, already during the project presentation phase, promoters should include social media to capture the attention of potential investors.

In addition, project updates through social media would give promoters an important measure of the success of fundraising on crowdfunding equity platforms.

To ascertain whether an increased number of connections between different network users contributes to the success of a campaign, we aim to analyse the success of crowdfunding projects in the light of SNA results.

### Keywords:

FinTech; equity crowdfunding; social media; social network analysis; Web 2.0

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