Good News, Bad News: a Proposal to Rethink and to Measure Banks' Reputation

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Abstract

Reputation is a special issue for financial institutions due to the great pressure they are facing as a consequence of the recent financial crisis. However, in banking literature more efforts are made to measure the effects rather than to understand the determinants of reputation. This paper proposes an integrate perspective to the analysis of reputation in banking industry, directly focused on stakeholders' opinions. In detail, we refer the analysis to the case of Unicredit, the largest Italian bank considering total assets, and use data from Twitter.

1. Introduction

The literature and the research about reputational risk in banking are growing rapidly (some of these contributions are: Fiordelisi et al., 2012; Gillet et al., 2010; Sturm, 2013), following the evident banking and financial industry responsibilities in the economic crises that have emerged since 2007. In banking studies a lot of attention was paid to reputational damage stemming from operational risk events and losses: as always when debating about risks in banking, more effort was dedicated to *measure* effect than to understand the real determinants of risks and losses, and to offer suggestions about how to *manage* risks and their causes. Having noticed a lack of or insufficient information on reputation and reputational risks in banking industry in the mainstream literature, we try to go *back to basics* and justify, both theoretically and practically, a new approach for measuring reputation which highlights how stakeholders observe and exchange opinions about reputational facts and events connected with decision- making processes and actions inside the banks.

The roots of reputation are to be found precisely in the decisions made and the actions undertaken by banks , facts and events being the consequences, i.e. the reputational objects evaluated by stakeholders. The evaluation may be positive or negative, therefore reputation may be good or negative, to different degrees, and reputational risk is not a pure risk, but a speculative one, as market and credit risks are. Therefore, it may be useful for all stakeholders involved in banking industry to better understand the gains and the losses than can arise from reputation level and volatility, their causes and the role of stakeholders themselves in influencing reputation and the consequent rise of gains and losses.

To explain our theoretical view and to propose a new approach in dealing with and measuring bank's reputation, this paper is structured as follows:

1. presentation of our view of managerial perspective about bank's reputation, strongly linked to the role of banks' responsibility and to stakeholders' salience;
2. analysis of different approaches in measuring reputation;
3. presentation of a methodology to measure reputation in an indirect way, analyzing opinions expressed in social media, and of a pilot study about a large banking group.

2. Stakeholders' Salience on Corporate Reputation: a Managerial View of Reputational Risk in Banking

This part of the paper examines:

a) the reasons why reputation (and reputational risk) in banking must not be limited to the risk management framework;

b) the role of stakeholders – a very popular concept in management that underlines the significance of many actors, besides shareholders, in influencing the management of organizations – in directing the reputation building activities of banks and in giving opinions on reputational objects (facts and events);

c) the need to build new approaches and tools to measure reputation following a stakeholder perspective.

a) The landscape of Corporate Reputation (CR) research is very wide (Barnett, Pollock, 2012) and we can find different theoretical constructs (Rindova, Martins, 2012) and different ways to operationalize and measure CR (Dowling, Gardberg, 2012). There are different reputation models and different measures (Money and Hildebrand, 2006) that help managers to decide what kind of reputation building activities can be adopted towards different stakeholders. There is a clear link between stakeholder management (SM) and CSR (Corporate Social responsibility) on one side and Corporate Reputation (CR) and Reputational Risk (RR) on the other side. In SM and CSR (and, more generally speaking, in management) we find the key elements and drivers of reputation: in fact, stakeholders are among the real determinants of CR. Banks have historically a fundamental role in the economic and social development of society, and so their social responsibility is clear: if they evade it, there can be many negative consequences on the whole economy and society. SM and CSR in banking industry are more and more developing as a reaction against reputation loss and increase of RR.

‘‘*A Corporate Reputation is a perceptual representation of a company’s past actions and future prospects that describe the firm’s overall appeal to all of its key constituents when* *compared with other leading rivals*" (Fombrun, 1996, p. 72). If we compare this definition of CR with a very well known definition that is also widespread in the banking industry and linked to regulation efforts of coping with RR, some interesting similarities emerge, as well as some relevant differences. In the Basel framework RR is the ''*risk arising from negative perception on the part of customers, counterparties, shareholders, investors, debt holders, market analysts, other relevant parties or regulators that can adversely affect a bank's ability to maintain existing, or establish new, business relationships and continued access to sources of funding*'' (Basel Committee on Banking Supervision, 2009, p.19). In both definitions we see that CR is a perceptual concept based on past actions; it can influence the company's (bank's) future; it is rooted in rational and emotional perspectives of analysis followed by stakeholders, filtered through their own experiences, expectations and perceptions with reference to the company (bank); it is fundamental for business continuity and competitive advantage. The main difference with the Basel definition is that only the negative side of reputation is emphasized, as the investments in building reputation were an insurance policy against future losses.

A fall in reputation is likely to have asymmetric effects compared to an increase in reputation, most of all if, as it often happens in the banking and financial world, there are contagion phenomena and a systemic diffusion of reputational effects. It is common wisdom to say that it takes years to build up reputation but that it can be lost in a very short time Our point, however, is that it may be useful for the future of each bank and the whole banking system to develop a risk culture where compliance and reputational risks are defined as the range of possible gains and losses in reputational capital (Fombrun et al., 2000), with measurable effects on economic capital.

With reference to banks, it seems that limiting the field of inquiry to risk management frameworks, risk management and internal control functions, when analyzing CR and RR, can contribute to narrow the effective and strategic view of these topics. Therefore, we must look into *who*, *what* and *how* is relevant when we manage reputation in a company (bank). We cannot ignore – in a managerial perspective - the real determinants of reputation in the eyes of banks' internal and external actors, limiting our efforts to measure degree of correlation between financial data (losses, size, liabilities to assets ratio, and so on) deriving from the banks' past decision and actions. We must expand our theoretical views and adopt wider perspectives, metric and measurement tools, that may be useful to try to prevent losses, to build good reputation and to obtain consequent gains.

b) In the last part of XX century and in the beginning of the new century a widespread attention has been paid to CSR. This can be attributed to a changing culture in the business world due to a large number of scandals and the following demand for more democracy. In the banking world we have observed many events of insider trading, internal fraud, strong speculative orientation in financial intermediation, and – as a reaction - the development of many activist movements and social campaigns,, shareholders' and management turnover, corporate governance reforms, tighter regulations and request for capitalization and better risk management and internal control systems by the authorities. The concept of CSR is older than these recent scandals (Bowen, 1953), as is the concept of responsibility towards people or social groups and interests (i.e. the natural environment, the cultural wealth), attached to business conduct (as to any human conduct). The basic idea is that companies must achieve their goals on a long-term and sustainable basis, without undue conflict with diverse human and social norms. The concept of CSR (or Corporate Responsibility) is vague and must be specified, and so the stakeholder concept emerges, as the stakeholder management approach

(Freeman, 1984). The constituencies affected by the company are its stakeholders: stakeholders have a stake, i.e. something at risk, and therefore something to gain or lose, as a result of company activity (The Clarkson Centre for Business Ethics, 1999). With reference to banks, stakeholders can be classified in many ways (Di Antonio, 2012): internal vs. external; actual vs. potential; explicit (contractual) vs. implicit (not contractual); voluntary vs. involuntary; private vs. public. A focal company and their stakeholders have different engagement and relationships: from a managerial point of view it is fundamental to manage the stakeholders by implementing various practices (identification, classification, priority setting; knowledge; control). To manage CR and RR it is fundamental to prioritize the stakeholders. Carroll (1993) identifies primary stakeholder and secondary ones with reference to company's survival. Primary stakeholders are shareholders and other financing entities, customers, employees (managers and other levels of employees), suppliers. Secondary stakeholders (private and public) are not engaged with the company in a contractual form, but they exert influence on it and/or are influenced by it: i.e. media, communities, lobbies, activists, authorities, natural environment. Mitchell et al. (1997) propose a normative ranking of stakeholders based on their salience. The salience (high, moderate, low) results from power, legitimacy and urgency ("the degree to which stakeholders claims call for immediate attention": this degree has two dimensions, time sensitivity and criticality, linked to the importance of stakeholder's expectations). These classifications can be further developed by segmenting each group or category of stakeholders.

Banks and financial institutions business is deeply grounded on reputation and trust, because of many information asymmetries and moral hazard behaviors. An effective reputation management in a bank must think of stakeholders in very focused ways, identifying experiences with the bank, needs and expectations and the resulting perceptions for each group of stakeholders (or segments within the group). To build effective reputation (and to prevent negative events and facts with regard to reputation) the dialogue with stakeholders is fundamental: not only communication and public relations are useful, or brand image, but also gathering opinions and taking care of them in designing products, services and organizational processes of the bank. Only with a focused stakeholder approach it is possible to identify opinions that have different weight on general reputation judgment and rating, and on the firm-level and systemic effects of corporate reputation and on its volatility. In our opinion, considering the state of the art of CSR and SM in the banking industry, there is large possibility of improvement of CR and RR management practices, at macro (regulatory and control) and micro (firm, strategic) level.

c) Consequently, once the usefulness of CR defined and RR management practices *stakeholders focused*, the question is how to pick up perceptions and opinions on many topics from many different publics in an effective and efficient way? In addition, how many banks or financial institutions can invest money in dialogue channels with different stakeholders groups? Few large and medium-sized banks in the world have developed CRM (Customer Relationship Management) systems, customers and employees satisfaction surveys, focus groups, complaints tracking systems, integrated (internal and external) communication systems and departments, public relations, corporate social media (i.e. newsletter, radio, television, interactive web, intranet, mail boxes for suggestions, communities of practice), departments specialized in managing relationships with society and public authorities, and so on. Nonetheless, some of these testify that RR management "is focused more on customers and products than on other stakeholders" (Xifra and al., 2009).

Therefore, it is our opinion that with regard to CR and RR management, we have to cope with two issues in the banking industry at firm-level and at macro – regulatory level: the prevailing management culture orientation (still not in favour of concrete practices of stakeholder management) and the availability of effective methodology and tools to listen to different kinds of stakeholders.

3. Measuring Reputational Risk

Reputation and trust are the hallmarks of good business, particularly for financial institutions. This has never been truer than today as the banking credit and liquidity crisis, resulting mainly from the collapse of the securitized debt market unfolds globally, , and affects all manner of financial institutions worldwide.

Reputational risk has been the subject of growing attention in both academic literature and the financial press, yet evidence documenting reputational losses in financial firms has been limited. Regardless of this, it is clear that equity markets react to the reputational consequences of some events, including selling decisions by top management.

According to the Price Waterhouse Coopers/Economist Intelligence Unit (2004) survey conducted among financial services institutions, reputational risk was identified as the greatest potential threat to their firm's market value than any other risk class. The sources cited by 25% of the respondents as contributing to reputational risk were perceived as actual failures in corporate transparency and business ethics. A more recent survey, conducted among European financial intermediaries by Musile Tanzi et al. (2008) found that reputational risk is strictly linked to compliance risk. When asked how compliance risk was defined within their function, the respondents declared that the mission of compliance conditions the behaviour of all those who can change the external awareness of the quality of the service offered, namely: (i) Protect the reputation of the Group or of the Bank; (ii) "Avoid any reputational risk"; (iii) "Our reputation is everything".

Reputation management has moved to the top of the agenda for many companies, yet "corporate reputation" remains an elusive concept which is difficult to measure and manage. A common approach is to interpret corporate reputation as "public opinion for corporations" but with multiple "publics", i.e. constituencies, such as customers, employees, investors, regulators and the like. While plausible at first, the approach has limited practical use, both for companies and researchers. Public opinion is usually measured by surveys, a very expensive and inflexible tool, which only the largest companies can afford (see Fortune's Most Admired Companies and Global RepTrack Pulse). Moreover, even when surveys exist, they are not commonly available to researchers. An alternative method relies on an indirect approach. The idea is that constituents' beliefs about a company or product will be significantly shaped by the information and opinion received through the media (both mass and user generated).

Recent laboratory studies (Uhlmann, et al. 2008, Jordan, Diermeier and Galinsky, 2008) have provided empirical support for the impact of reputational issues on customer perception and behavior. Companies' response strategies do have an effect on customer perception and behavior. Responses that focus on showing empathy, transparency, and commitment have all positive effects. Finally, evidence of past virtuous behavior and a moral bank accountalso have a positive effect in the absence of other factors (Uhlmann, et al. 2008).

These findings suggest an indirect approach to measuring reputation. Rather than using surveys or focus on groups to assess the state of mind of constituencies, "inputs" could be measured. The behavioral link between media influence and stakeholder attitudes could be provided by the experimental micro-data on how stakeholder perception is formed. This was done by Uhlmann, et al. (2008) in the case of customers. This leads to the next question on how to measure the “inputs”.

Recent developments in information retrieval, machine learning, and natural language processing technologies provide a promising path in this direction. A standard approach is to rely on annotated opinion corpora to train and test opinion retrieval, classification, and aggregation models. This approach has been used with considerable success in the classification of customer opinions. In these applications, the goal is to correctly classify reviews as “positive” or “negative”. These methods provide a natural approach to classifying corporate sentiment. First, a training set of articles about company X is created. Next, human annotators create a training set by classifying each article as “positive”, “neutral”, and “negative”. Finally, training of classification algorithms on the training set follows and indices based on the classification results are created. While initially plausible, there are at least three potential problems with this approach. The first is known as the domain dependency problem. Opinion classifiers have achieved accuracy levels as high as 88% for product reviews (Dave et al., 2003) and 82% for movie reviews (Pang, Lee and Vaithyanathan 2002). The reason for the domain dependence lies in the importance of expressive adjectives for classification success. This issue is particularly important in the case of corporate reputations which cross various issue domains. The second problem has to do with the way opinions are expressed. While customer opinions are frequently expressed directly, opinions about corporations are frequently expressed indirectly. This is especially true of news articles.

Another problem is practical and consists in the absence of existing text related to corporate reputation that could be used to reliably train classifiers. To investigate these issues Yu, Diermeier and Kaufmann (2009) built a new corporate opinion corpus. The practical goal of the corpus was to facilitate future algorithm development. However,an evaluation of the reliability and validity of human annotation of corporate opinions is also methodologically available. Unless typical subjects can clearly distinguish positive from neutral or negative news about a company, the classification-based approach to reputation metrics becomes problematic. Yu, Diermeier and Kaufmann (2009) collected more than 130,000 news articles which mentioned Wal-Mart in 2006, and sampled from them 1,080 articles based on the distributions of their publication dates, the document lengths, and the reach of the publishers. Three coders were then asked to annotate the polarity (a choice among the three options "positive", "negative", or "neutral") of the 1080 articles at both paragraph and document level. To test if paragraph is an appropriate opinion text unit (without much ambiguity), the fourth category "mixed" was added to the paragraph-level annotation. Cohen's κ, a standard measure in the content analysis literature, was used to measure inter-coder. A minimal $\kappa > 0.60$ customarily indicates an acceptable level of reliability. However, none of the polarity annotation tasks passed this threshold. For example, the average κ at document level is 0.30 and 0.39 at paragraph level. What is the reason for this low level of agreement? First of all, news articles report both "opinions" and "facts". Secondly, Yu, Diermeier and Kaufmann (2009) observe a large grey area at the boundary between "neutral" and polarized ("positive" or "negative") categories at all three levels.

Further marginal distribution analysis results demonstrated that individual coders have unique personal biases toward the polarity category distribution. Even when they annotated different data subsets, the coders exhibited similar marginal category distributions. In other words, some coders are just more positively or negatively inclined than others. This phenomenon poses another challenge to classification methods in that the "ground truth" or "gold standard" is hard to obtain for algorithm training and evaluation purposes.

4. Measuring reputation through networks

Measuring reputation is not a simple task. In recent years, various models of measurement have emerged (Barnett et al., 2006; Fombrun and van Riel, 2004; Schwaiger, 2004; Wartick, 2002; Bromley, 2002; Caruana and Chircop, 2000; Fombrun et al., 2000).

In further detail, there are at least three approaches when facing this problem. First, we can simply interpret the reputation of an entity as its the level of notoriety or knowability. Second, reputation could be considered as the general opinion regarding an entity. The concept of general opinion in itself refers to a multitude of actors or stakeholders. As an example, for a certain company, relevant stakeholders include current or potential customers, employees, investors, regulators, etc.

These two are direct methods, in the sense that they measure the "state of minds" of the actors that are already or only potentially committed with the entity. At an operational level, usual methodologies to measure public opinion are represented by surveys of individuals.

Third, an alternative and more challenging view is based on an indirect approach according to which beliefs about an entity are significantly shaped by the information and opinion received through the media (both mass media and user generated media). This approach implies a behavioural link between media influence and stakeholder attitudes. It could be the case of actors that are both already or potentially committed with the entity.

As an example, a bank's customer can decide to stop his relationship not because of unenthusiastic behaviours of the employees but as a reaction to negative mass media news regarding the financial stability of his bank. Indeed, the same news may have disruptive effect on the reputation of other banks that, in a certain way, are perceived similar to that one (i.e. these characteristics may include nationality, dimension, risk profile, etc.).

This paper proposes an integrate perspective to the measurement of reputation. To this aim we define and systematize the key aspects of reputation measurement:

(i) Who is communicating with reference to a certain entity?

(ii) What are the major influencers?

(iii) What are the areas of the communication? How are the concepts communicated?

We refer the analysis to the case of Unicredit, the largest Italian bank considering total assets, and use data from Twitter[1]. In particular we consider all public tweets containing the term "Unicredit", geo-located in Italy and collected in the following random period: Friday, 14 December 2012 08:17:17 +0000 to Friday, 21 December 2012 11:05:31 +0000. In this period 248 actors generated 517 tweets[2] and 197 retweets[3].

4.1. Who is communicating with reference to a certain entity and what are the major influencers

In order to examine who is communicating with reference to "Unicredit", we use social network analysis methodology (Mitchell 1969; Wasserman, Faust 1994). At this aim, we use data from our sample of tweets.

First, using the information on the senders and the receivers of the 197 retweets we build the network of the interactions among all actors (Figure 1).

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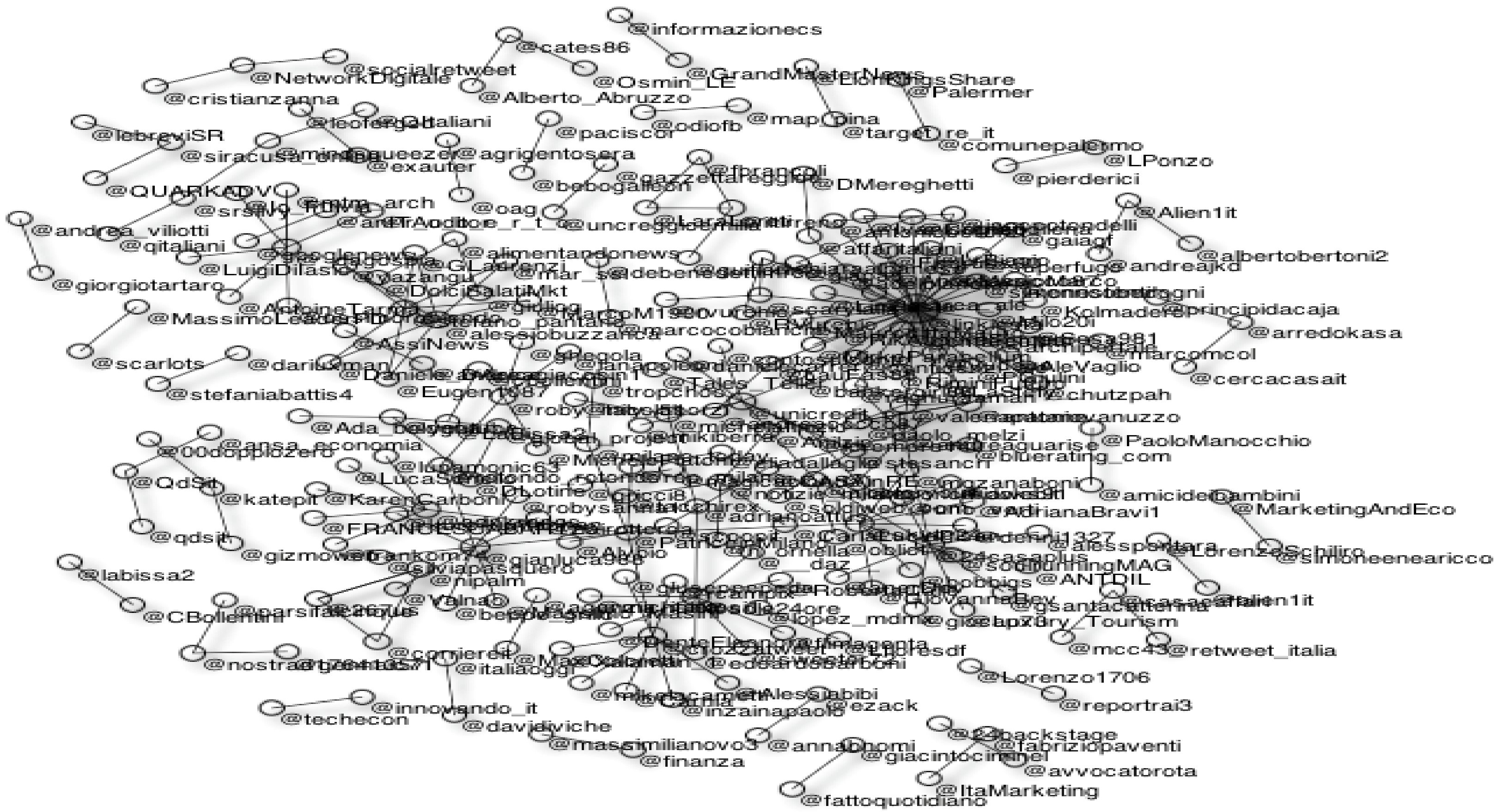
[1] Twitter is an online social networking service and micro-blogging platform. As of 2012, it has over 500 million registered users generating over 340 million tweets daily.

[2] A tweet is a text-based message of up to 140 characters generated by the users of Twitter.

[3] A retweet is simply a reply to a tweet that includes the original message or a tweet that includes a link to a news article or blog post.

Figure 1 - Network of actors built on the basis of the retweets



Second, we measured the centrality of all actors in the network using their betweenness as an indicator of the relative impact. Betweenness centrality for actor i is the sum of the proportions, for all pairs of actors j and k, in which actor i is involved in a pair's geodesic(s)

$$\mathbf{C_B(n_i) = \sum_{j<k} \frac{g_{jk}(n_i)}{g_{jk}}}$$

As with the other centrality standardizations, we normalized the betweenness centrality scores by dividing them by the maximum betweenness possible.

When increasing the value given to the centrality measure,the likelihood that the plaintiff will be able to influence the interaction between the other players also increases. Actors with high betweenness centrality act as gatekeepers between different sources of information.

Moreover, since the importance of a tweet is based on its originator's betweenness centrality, one could obtain a clearer vision of the reputational effect of a certain actor by multiplying the betweenness centrality of the actor with the average sentiment of its communication.

Third, we classified the nature of the most important actors (first ten actors based on betweenness) by distinguishing three types of players using twitter: i) mass media, ii) blogs and iii) others.

Finally, we calculated the average betweenness index for each group of players. Results are reported in the following table (Table 1).

Table 1 – Classification of influencers

Type of actor	*Average betweenness index*
Mass media	0,438350983
Blogs	0,346444781
Others*	0,253295872

* We included the official Unicredit public relations account in this category (betweenness = 0,270153447158).

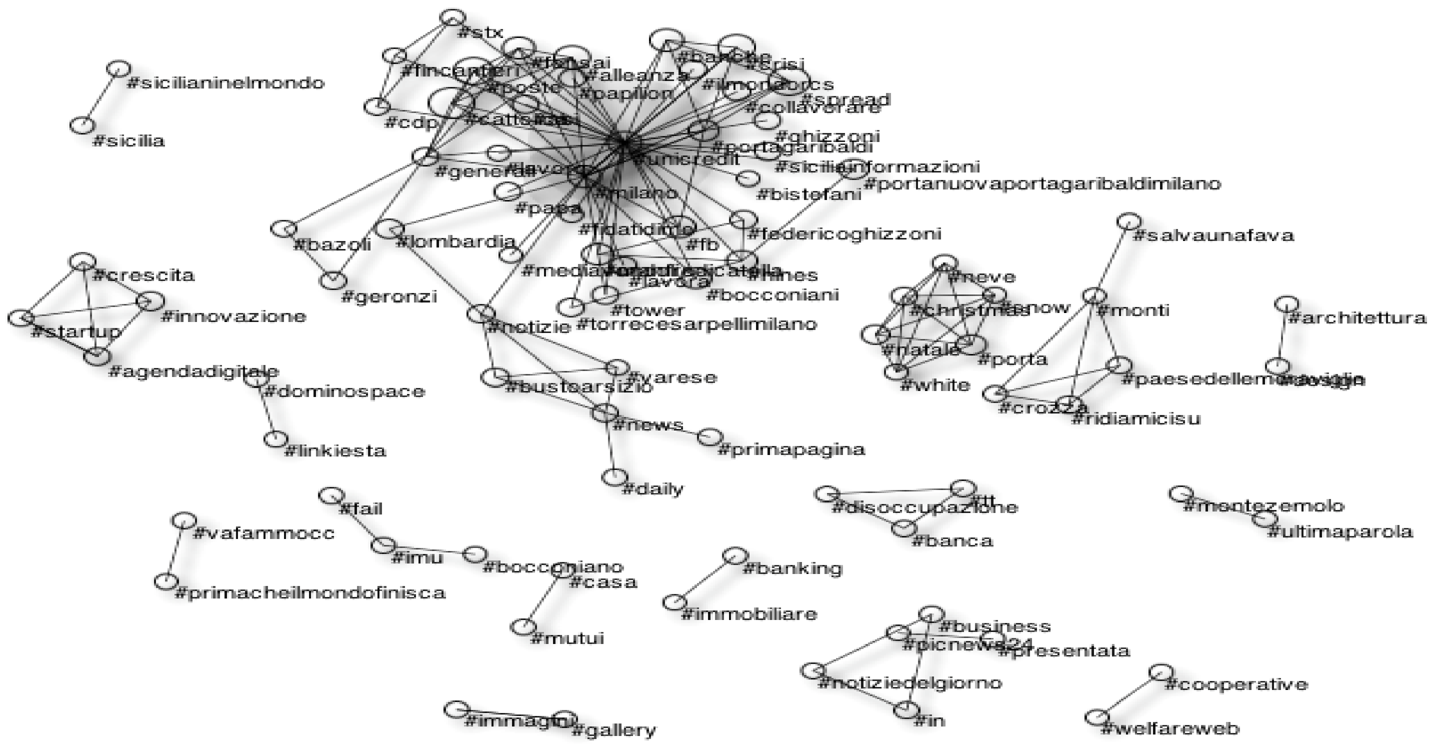
4.2. What are the areas of the communication

In order to analyse the content of the communication regarding Unicredit we use two criteria. The first is made possible using Twitter as a source of data and is based on the analysis of all the hashtags[4] in the tweets mentioning the term "unicredit".

The network in figure 2 is created starting from the joint presence of hashtags in our sample of tweets.

[4] Hashtags are terms identified with the symbol "#" and represent a way of tracking topics on Twitter.

Figure 2 – Network of hashtags



The second criterion is based on latent semantic analysis, a well-established method for extracting relationship information from large collections of text. This technique uses a mathematical procedure, called singular value decomposition, to identify patterns in the relationships between the terms and concepts contained in an unstructured collection of text (in our case the sample of tweets).

Accordingly, words that are used in the same contexts tend to have similar meanings. An important feature of this type of analysis is the ability to extract the conceptual content of our collection of tweets by establishing associations between terms that occur in similar contexts.

In further detail, in our sample of tweets we identified the three most important arguments, making reference respectively to: i) the opening of the new Unicredit's headquarter in Milan, ii) the performance of a gospel choir in the Unicredit's headquarter, iii) a journalistic inquiry on Unicredit.

4.3. How concepts are communicated

At an operational level, the standard measurement approach of reputation is represented by the analysis of the media sentiment regarding a certain entity.

This approach relies on annotated opinion corpora to train and test opinion retrieval, classification and aggregation models. First, a training set of articles about a certain entity is created. Second, a training set is created by classifying each article as "positive", "neutral", and "negative". Third, classification algorithms on the training set are trained. Finally, indices based on the classification results are created.

This method requires the researchers to face with some methodological problems. The first problem, known as the domain dependency problem, refers to the accuracy levels of opinion classifiers (Finn and Kushmerick, 2006). In this respect, news articles report both “opinions” and “facts” and many “facts” may evoke various and ambiguous opinions among coders.

The second problem concerns the way opinions are expressed. In fact, opinions can be expressed directly (“the bank X is very good”) or/and indirectly, i.e. through some form of argument. As an example, some positive or negative events, such as lawsuits, strikes or increasing / decreasing stock price, may actually have the same positive or negative effect on direct expressions of opinion.

In order to avoid these problems and compute the sentiment associate to Unicredit, we used LIWC - Linguistic Inquiry Word Count (Pennebaker, Booth and Francis 2006). LIWC identifies the linguistic structure of a text by counting the number of words associated with a series of predefined dictionaries reflecting individuals’ emotional and cognitive perceptions.

Therefore, we calculated the media sentiment for Unicredit in three steps.

In the first step, we followed the basic “bag-of-words” approach to determine the sentiment of our sample of tweets on the basis of the number of words that are positive (words matching the category 126 ‘posemo’ as defined in LIWC) and those that are negative (words matching the categories 19 ‘negate’, 127 ‘negemo’, 128 ‘anx’, 129 ‘anger’ and 130 ‘sad’ as defined in LIWC) (Table 2).

Table 2 - Composition of positive and negative word sets drawn from LIWC

Category	***Description***	***Examples***
126 – ‘posemo’	Positive emotions	cool, ideal*, smil*
19 – ‘negate’	Negation	can’t, dont, no
127 – ‘negemo’	Negative emotions	asham*, hate
128 – ‘anx’	Anxiety	panic*, shy*, uneas*
129 – ‘anger’	Angry	evil*, terrify, weapon*
130 – ‘sad’	Sad / Unhappy	depriv*, grief, missing

In detail, we can have three situations, depending on the number of positive and negative words in the tweets:

- If the number of positive words is greater than the number of negative words then the score is 1;
- If the number of negative words is greater than the number of positive words then the score is -1;
- If the number of positive and negative words is the same then the score is 0.

Some examples of positive, neutral and negative tweets are reported in the following table (Table 3).

Table 3 - Examples of positive, negative and neutral tweets

Author: alessiakal
Text: @UniCredit_PR Non riesco a fare il login e ad accedere alle info del mio conto. C'è qualche problema?
Date: Mon, 17 Dec 2012 11:05:29 +0000
RT@: NULL
Hashtags: NULL
Language: it
Profile: http://a0.twimg.com/profile_images/1438552969/ale_normal.jpg
Sentiment (-1 negative, 0 neutral, 1 positive): **-1**

Author: CristianoDido
Text: Ecco com'è l'UniCredit Tower inaugurata a Milano http://t.co/8WVc4J6v #speseerisparmi
Date: Tue, 18 Dec 2012 03:17:55 +0000
RT@: NULL
Hashtags: ['#speseerisparmi']
Language: it
Profile: http://a0.twimg.com/profile_images/2325856379/tt3pixnduymroo9n4850_normal.jpeg
Sentiment (-1 negative, 0 neutral, 1 positive): **0**

Author: ImmigrazioneOgg
Text: Accordo tra Unicredit-Wester Union per favorire i trasferimenti monetari. #rimesse http://t.co/Y8x1ABpQ
Date: Fri, 21 Dec 2012 09:06:24 +0000
RT@: NULL
Hashtags: ['#rimesse']
Language: it
Profile: http://a0.twimg.com/profile_images/339274692/h_io_normal.jpg
Sentiment (-1 negative, 0 neutral, 1 positive): **1**

In the second step, we calculated the average score of the sentiment for all tweets in the period with the following formula:

$$Sentiment = (Pos - Neg) / Tot$$

where Pos is the number of positive tweets in the sample, Neg is the number of negative tweets in the sample and Tot is the overall number of tweets of the sample. Therefore we obtained a sentiment score of -0.09 associated to Unicredit, as a result of the presence of 9 positive tweets, 53 negative tweets and 455 neutral tweets.

In the third step, we calculated the betweenness-weighted score of the sentiment by multiplying the betweenness centrality of most influential actors with the average sentiment of its communication:

$$Weighted\ sentiment = \sum_i Sentiment_i * Betweenness_i$$

where Sentiment i is the average sentiment of the communication and Betweenness i is the measure of influence of first ten actors i, based on the betweenness centrality. Finally, we obtained a weighted sentiment score of -0,17.

5. Discussion

In this paper we have shown a practical approach to measure reputation starting from the web. This is a pilot experiment conducted on a restricted time period and only delimited to one industry . In detail, we considered the specific case of financial institutions because of the great pressure they are facing as a consequence of the recent financial crisis. Noticeably, our approach is also extensible to other contexts / industries. Moreover, we used the well-known platform Twitter that, due to the presence of some particular characteristics, could be considered as a mirror of the real world. In fact, it encompasses different categories of media that have an account such as traditional media, blogs, etc. Moreover, although each tweet is limited to only 140 characters, the aggregate of millions of tweets submitted to Twitter at any given time may provide an accurate representation of public opinions regarding a certain entity. Finally, given the possibility to use specific APIs (application programming interfaces)[5] in order to have access to public tweets, data analysis from Twitter feeds may be automatized in order to make a real time reputation evaluation.

There are several exciting future research directions.

First, the development of a context or industry specific dictionary (e.g. using machine learning techniques) could help reducing the biases of similar analyses. Second, a challenging perspective is the examination of social contagion effects and of how the impact of different network structures of relationship among actors may affect the level of heterogeneity of their opinions.

Third, considering the way companies are related on the web, one could analyse the "systemic effect" of reputation. As an example, researchers could study the effects of reputation on co-entities, i.e. other companies that are mentioned in the same sentence fragment as the entity itself, or on the overall entity's sector. This approach could be particularly useful for the so-called systemically important financial institution (SIFI), whose failure could trigger a global financial crisis.

Finally, one can study the reputation changes upon corporate actions using proper game theory methods, in which web users are modelled as "players" with their well defined objective function and opinions are modelled as players' beliefs. In this sense it is possible to predict web users' behaviour based on their past responses to specific corporate actions.

[5] See the website https://dev.twitter.com for more technical details.

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