Edited by
Paola De Vincentiis · Francesca Culasso · Stefano A. Cerrato

The Future of Risk Management, Volume II

Perspectives on Financial and Corporate Strategies

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Preface

Risk and uncertainty affect all human activities, bear on all decisions and shape our everyday experience. In the managerial field, the attention devoted to risks of all types and to risk management has been increasing steadily ever since the seventies due to the heightened volatility of the macroeconomic and financial environment, the enhanced speed of transactions and the deep systemic interconnectedness of national economies. Both practitioners and academic researchers devote significant time and effort on improving their knowledge, skills and understanding of risk evaluation and management.

Following the wave of this strenuous effort, in these two volumes we collected a selection of research papers presented during the Second International Conference on Risk Management organized at the University of Torino on the 25–26 October 2018. The ambition of the event was to bring together many different perspectives on risk management, without confining the scope to a particular sector, activity or issue. The result of this opening was brilliant. Plenty of contributions were selected by the Conference organizers and rich discussions developed in numerous parallel sessions. The best papers—chosen on the basis of a blind peer-review process—were invited to take part in this publication which is subdivided into two volumes.

This first volume has a public management focus, whereas the second is more related to issues faced by companies, intermediaries and investors in the private sector. More in particular, the second volume is divided into two Parts. The first one presents research contributions on financial

risk management in a broad sense, coming across different fields and exploring different perspectives. The second Part deals with corporate strategies for managing uncertainty. The papers reflect the debate on how risk management is changing organizational and management control practices, how risk experts interact with managers, how it increases the value of the firm, and how it is related to accountability and responsibility processes.

As Gary Cohn, former President of Goldman Sachs, said in 2011: "*If you don't invest in risk management, it doesn't matter what business you are in, it is a risky business*". We hope to contribute to risk management investment with these two volumes and we wish you all a pleasant reading.

Turin, Italy

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PART I

Financial Risk Management

Introduction

This part is devoted to present research contributions on financial risk management in a broad sense, coming across different fields and exploring different perspectives. For the sake of the reader, the papers can be ideally referred to three different research fields, on the basis of the type of risks they analyse: (i) credit lending, (ii) accounting and finance, (iii) international finance.

The first section on credit explores the new forms of **alternative lending**, such as crowdfunding and peer-to-peer lending, that combine bank disintermediation and technological innovation. This is a growing phenomenon: the alternative lending volume has been scaled as the crisis led banks to reduce credit, especially to small business and consumer. On this topic Damilano et al., Chapter 1, propose a structured methodology for evaluating P2P lending platforms in terms of risk management-related information and tools, and apply their scoring system to a sample of online marketplaces from different parts of the world. Moreover, Miglietta et al., Chapter 2, provide an overview of potential threats and risks associated with crowdfunding platforms.

The second section goes into the **financial accounting** field and aims at assessing the effectiveness and usefulness of some accounting principles and financial regulations. In particular, Palea et al., Chapter 3, focus on the appraisal of private equity fair value under the IFRS 13 Fair Value Measurement assumptions. They argue that fair value defined in this way does not provide a constantly reliable measure of the actual value of a

company, potentially increasing market volatility and intrinsic evaluation risks. Rizzato et al., Chapter 4, determine whether and to what extent companies are compliant with the Directive 2014/95/EU on non-financial information and risk disclosures. They find that companies unanimously identify potential risks but rarely disclose their potential dangers and impacts on business activities.

The third and last section on **international finance** deals with different issues on markets risks that could arise in international capital markets. Alihodzic, Chapter 5, studies the degree of correlation between capital markets of developing countries, such as the Federation of Bosnia and Herzegovina, and the ones of EU countries in order to understand the predictive ability of market indexes. Baldi et al., Chapter 6, look at trade finance and investigate the characteristics of exporting firms that buy export finance products from banks to alleviate counterparty risk in doing business internationally. They shed new light on this topic that traditionally suffers from dearth of data and business practice opacity. Rainero et al., Chapter 7, use a behavioral approach to provide a new taxonomy of patient, i.e. long-term, investors. Schiesari et al., Chapter 8, propose a non-traditional method to measure the probability of default, known as the Support Vector Machine (SVM), and test it on and an Italian firms' dataset. Their empirical results consistently show that a rating model based on SVM significantly outperforms the traditional linear parametric logit model in predicting default probabilities.

CHAPTER 1

Risk Management Instruments Offered by P2P Lending Platforms. A Cross-Country Empirical Analysis Based on a Scoring System

Marina Damilano, Paola De Vincentiis, Eleonora Isaia, Patrizia Pia and Cristina Rovera

1 Introduction

The development of FinTech (i.e. financial technology) is opening up a wide range of unexplored possibilities for borrowers, investors and intermediaries. In particular, peer-to-peer crowdfunding broadens the scope of direct fund transfers inside the financial system. Small investors can independently evaluate, select and finance small companies or other private individuals. Borrowers who would not otherwise have been able to

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access the equity or bond markets are now potentially able to exploit new channels for fundraising.

This development sounds democratic and fascinating. The idea of bypassing traditional banking systems, allowing a direct flow between those who have an excess of funds and those who need financing, looks appealing to many stakeholders. However, nobody could deny that peer-to-peer crowdfunding also poses potential threats and presents various critical aspects. In particular, one of the open questions is whether small investors and small borrowers accessing an online platform have enough instruments to gauge and manage financial risks. Our work focuses on this question and proposes a structured assessment of the strengths and weaknesses of a sample of peer-to-peer lending platforms from this point of view. By looking at a predefined set of features, we calculate a score based on the wealth of instruments offered by each platform to its participants to facilitate effective risk assessment and management.

2 Literature Review and Conceptual Framework

The development of peer-to-peer crowdfunding has attracted considerable scholarly attention over the last decade. In general, three major lines of research can be identified.

First, various public authorities and private associations publish surveys aimed at describing the features of emerging P2P platforms and tracking the growth of the phenomenon. Among the various aspects explored in these market surveys, the most common ones are listed below:

- Types of loan granted (Business, Consumer, Property, Invoice Discounting);
- Restrictions applied to the perimeter of borrowers and lenders admitted to the marketplace (by sector, by geographical location, by level of creditworthiness);
- Information disclosed to the platform's users;
- Role of the online platform (mere service provider or direct lender);
- Existence of any credit risk mitigating device for lenders (guarantee funds or other types of compulsory collateral);
- Methodology for loan pricing (auction or fixed rate);
- Mechanism for investor fund allocation (manual or based on an automatic algorithm);
- Workout procedure in case of default by borrowers;
- Business continuity plan in case of default by the platform.

In particular, a number of works compare different and competing business models in this sector, along with their development in different areas of the world (OICV-IOSCO 2014; Caratelli et al. 2016; FSB 2017).

Many of these surveys also try to gauge the potential effect of P2P crowdfunding development on traditional banking systems. Most studies conclude that the new channel is more complementary than disruptive. They also claim that the potential cooperation between commercial banks and online platforms could be mutually beneficial and fruitful in the medium term (Milne and Parboteeah 2016; Bofondi 2017). The 2016 survey of the US Department of the Treasury highlights the very mixed situation in terms of transparency and disclosure towards investors as a severe weakness of P2P platforms, along with poor liquidity of the secondary market.

The second line of research focuses on borrowers and explores the factors affecting the probability of a loan application being successful. Cai et al. (2016) present three different models, assessing the likelihood of successful funding for first-time borrowers and repeat borrowers with or without a lending history. They find that the level of interest rate and the credit rating are significant in all cases, whereas the loan duration is never relevant. The loan amount is significant for first-time borrowers only. Unsuccessful prior loan applications have a significant negative effect on the probability of being funded for repeat borrowers. Dorfleitner et al. (2016) analyse the relationship between the features of the descriptive text presenting the project or the borrower and the probability of obtaining funding. They analyse two German P2P lending platforms. They find that the presence of spelling mistakes lowers the probability of success, whereas the length of the text displays a reverse U-shaped effect. In addition, the occurrence of emotion-provoking keywords in the text increases the chances of achieving funding. However, all these features matter if the platform does not perform an ex-ante screening of the borrowers (Auxmoney), whereas they are quite irrelevant if the platform has stricter entry criteria (Smava). The authors also find that—conditional to being funded—the features of the descriptive text are not related to the probability of default. A few more papers explore the effect of other types of soft information included in the loan applications uploaded onto the platforms, such as the presence of a photograph or the physical beauty of the borrower or his/her trustworthy appearance (Iyer et al. 2009; Pope and Sydnor 2011; Ravina 2018; Duarte et al. 2012; Gonzalez and Loureiro 2014). Freedman and Jin

(2017) find that borrowers with larger online social networks are more successful in obtaining loans with lower interest rates, even if they do not actually perform better afterwards. Yum et al. (2012) analyse how the decision-making model of lenders shifts from soft to hard information along with the lengthening of the borrower's credit history. This evidence seems to indicate that soft information is a second-best choice for investors when compared to hard or "traditional" financial information.

The third line of research focuses on the investment side and on the performance of P2P lending. Emekter et al. (2015) analyse the profitability and the default rates of a Lending Club loan portfolio. They find that the interest rate charged to high-risk borrowers is not enough to compensate for their higher default probability. Their conclusion is that Lending Club lenders should either extend credit only to highest-grade borrowers or find creative ways to lower the default rate among current borrowers. Mild et al. (2015) and Serrano-Cinca and Gutierrez-Nieto (2016) reach similar conclusions and find that the interest rate charged does not adequately reflect the borrower's default risk. Gao and Feng (2014) maintain that traditional rating systems are not appropriate in P2P lending because they are not granular enough. They propose an alternative decision-making tool, which is better suited to these emerging platforms, and test its effectiveness empirically on a dataset of loans granted through Prosper and Lending Clubs.

Our work belongs to the first line of research, but the approach we propose is more structured and less descriptive compared to the existing literature. Our final aim is to assign a score to each online P2P platform based on the set of risk management tools offered to potential borrowers and lenders. To this end, three main areas of interest are identified:

a. Opportunities for effective capital allocation and diversification;
b. Presence of instruments aimed at managing or mitigating credit and liquidity risk;
c. Quantity and quality of information available.

For each of these areas of interest, we identify a subset of elements that may affect the operating possibilities of borrowers and lenders. We look for information on these elements, analyse the websites of the platforms and scrutinise all the documents publicly available for download. Limiting the analysis to the information publicly available, without registering with the platform, is coherent with the alleged accessibility and

transparency of these online markets, whose potential users should be able to understand and compare their features in an easy and direct way.

The variables included in each of the three analytical areas mentioned above are expressed as dummies. We identify whether or not a certain element or instrument is provided by the platform, assigning a value equal to 1 if the answer is positive. Consequently, the platforms obtaining a higher score will be richer in terms of facilities or information provided to their users.

The identification of the specific set of variables to be included in each subsection of the analysis is judgemental, as it is based both on expert evaluation by the research team members and on the relevant literature.

Starting with the **opportunities for effective capital allocation and diversification**, five relevant variables are selected. First, we refer to the mainstream literature on the topic (Sharpe 1992; Black and Litterman 1991; Fama 1991) and grade positively all factors that allow for a reduction in the covariance of returns. In particular, we consider the possibility for the investor to select loans belonging to **different sectors** and to **different geographical areas**. Then, considering that a higher degree of diversification may be reached by increasing granularity (Rossi et al. 2009), we grade positively any mechanism provided by the platform that may facilitate, incentivise or impose a reduction in portfolio concentration. In particular, we consider the **presence of automatic engines for allocating investors' capital** into multiple loans and any **mandatory or suggested limit over the maximum dimension of single loans**. Finally, shifting the focus to borrowers, we grade positively the possibility to reach **internationally diversified investors** through the platform, as a way to extend funding opportunities and enhance borrowers' reputation.

As regards the evaluation of **risk management tools** offered by the platforms, we select again five variables that we deem relevant to assess this aspect. First, we consider the presence of **structured collateral schemes or other security mechanisms**—such as mutual guarantee systems (MGSs) or guarantee funds—aimed at reducing the loss given default. Credit risk is also graded positively if **the platform directly participates in the lending activity** as this can be seen as evidence of borrowers' creditworthiness and seriousness of the pre-screening operated. Furthermore, we consider the presence of any structured **mechanism to protect the adherents in case of platform's default** and ensure business continuity. As for liquidity management, we consider the presence of an **organised secondary market** for the loans granted that may allow

for and facilitate an exit before the final maturity from the lenders' perspective. From the opposite viewpoint, i.e. that of borrowers, we investigate the possibility of **early repayment without charges**.

Finally, we analyse the **quality and quantity of information available** to P2P platforms users. In this case, the number of variables taken into consideration is much wider and draws on the literature about information asymmetry (Akerlof 1978; Levin 2001). We consider three broad areas: information **useful to the lender** in order to gauge the reliability of borrowers and the risk/return profile of loans; information **useful to the borrower**; information related to the **platform's reputation**. In this latter area, some variables may have a negative sign, being signals of missing or opaque information.

After grading each of the three analytical areas, based on a variable number of items, we normalise the third sub-score to 5 in order not to overweight the information-related aspects over the others. Then we add the subgrades together to achieve a final comprehensive score expressing the richness of tools offered by a platform to its stakeholders. We then analyse this final score in relation to different drivers, such as the geographical location of the platform, the types of loan granted (Business vs. Consumer vs. Property) and the organisational model adopted.

The analytical method illustrated above was applied to a sample of 63 online P2P lending platforms. The selection of the sample was not an easy task. In fact, the phenomenon under investigation is quite new and still lacks specific regulations in many jurisdictions. An official registry of these platforms does not exist at both international and national level. Many published surveys cover just one country or a limited geographical area. The spontaneous forms of associations normally include just a limited subset of platforms. To overcome these obstacles, the method we adopted was to compose our sample as a sort of "puzzle": it was put together by collecting and crosschecking many different sources, some official and some less so. In order to obtain our final sample, we applied a few filters to the initial rough list, thus excluding platforms:

- Focused exclusively on invoice discounting;
- Not providing information in a major international language;
- Not accepting individual lenders;
- With operations formally blocked or in liquidation.

The next sections of the chapter are organised as follows. In section three, we provide an overview of the P2P lending sector, commenting on a few organisational features of our sample entities. In section four, we analyse the main items relating to capital allocation and diversification opportunities for borrowers and lenders. In Sect. 5, we describe the main instruments for managing credit and liquidity risks. In Sect. 6, we analyse the quality and quantity of information supplied by the platforms to their users. In the last section, the distribution of total scores are analysed by geographical area, sector and organisational model of the platform, and our conclusions are discussed.

3 Overview and Organisational Features of Our Sample

Our sample consists of 63 peer-to-peer lending platforms of different nationalities: 27 belong to the Euro area, 25 are from the UK, 3 are from the United States and 8 come from other countries (Australia, Bulgaria, Israel, New Zealand, Sweden and Switzerland) which have been grouped into the residual Rest of the World (RoW) category.

As can be observed in Fig. 1, the sample coverage by geographical area changes radically depending on whether the mere number of platforms or the market shares in terms of stock of loans granted are taken into account. In this respect, the 3 US platforms represent 72% of our sample, while the 27 Euro area platforms currently account for just 2%.

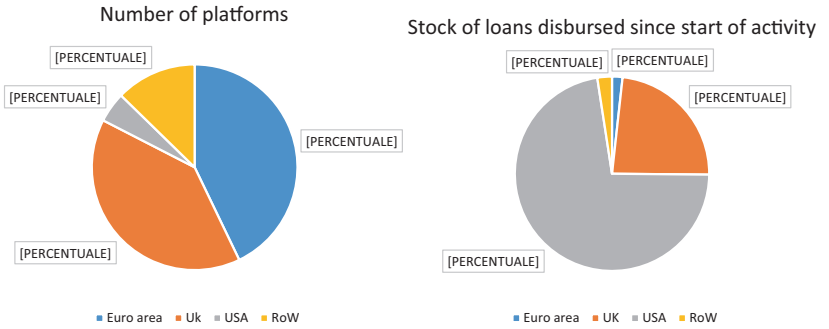

Fig. 1 Sample coverage by geographical areas: number of platforms and market shares (data at 31 March 2018)

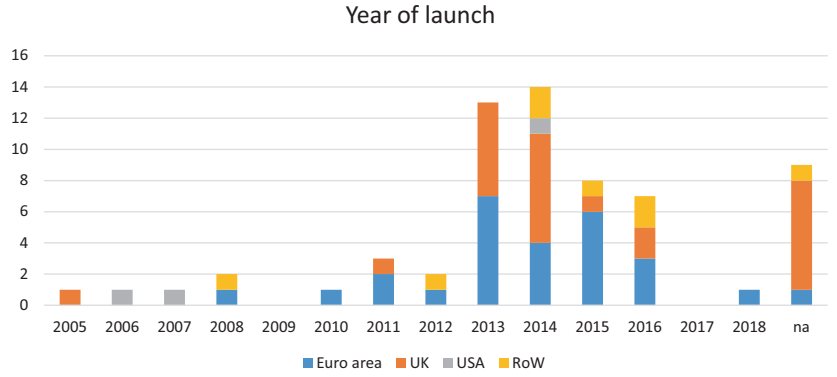

Fig. 2 Distribution of P2P platforms by geographical area by year of launch

In fact, as shown in Fig. 2, peer-to-peer lending developed first in the Anglo-Saxon countries and only more recently in the Euro area and the RoW.

Almost all platforms in the sample (94%) have a specific authorisation to carry out their activities. Among those not authorised, all of them belonging to the Euro area, it is worth mentioning the presence of a German platform which is the only one to disburse loans not only in euros and dollars, but also in bitcoins.

Looking at the sample in terms of business models (Table 1) it is possible to highlight that the UK platforms have opted, in 96% of cases, for the traditional model (the so-called client segregated account model), followed by 85% of those in the Euro area. On the other hand, all US platforms prefer non-traditional models (notary model rather than balance sheet model).[1]

[1] Four different business models have been identified in the literature:

a. Client segregated account model (or traditional model);
b. Notary model;
c. Guaranteed return model;
d. Balance sheet model.

The distinctive features of these four models can be summarised as follows: "In a pure matching model [traditional model], investors directly select prospective loans based on a range of credit information, such as general loan purpose (or specific projects being funded), borrower industry, loan term, borrower income and other credit quality indicators. Loans are only originated if the borrower's funding target is met within a predefined time frame. […] In the notary model, the platform also offers a matching service, but the

Table 1 Business models

Business	*Euro area*	*UK*	*USA*	*RoW*	*Sample*	*Euro area*	*UK*	*USA*	*RoW*	*Sample*
	Number					*%*				
Traditional	23	24	0	6	53	85.19	96.00	0.00	75.00	84.00
Non-traditional	4	1	3	2	10	14.81	4.00	100.00	25.00	15.87
Total	27	25	3	8	63	100.00	100.00	100.00	100.00	100.00

The American peculiarity is also confirmed by the data in Table 2 where we analyse the specialisation by business area: Business (BL), Consumer (CL) or Property (PL). It is worth mentioning that 43 out of the 63 platforms analysed have chosen operational specialisation, i.e. they concentrate on a single area, with a propensity towards the Business area (42%) and the Consumer area (38%). In terms of geographical areas, the platforms that offer loan opportunities only to businesses belong mainly to the Euro area, while those that specialise in consumer loans are in the United States and the RoW. The property specialisation has been chosen in about 21% of the platforms in our sample and it is more widespread among the UK platforms. The remaining 20 platforms are multi-business (MB).

Delving deeper into the analysis of operational characteristics, let us look at the possibility for different kinds of investors to have direct access to the platforms. Table 3 shows that about half of the platforms under consideration raise funds not only from individuals but also from institutional investors. These include mainly RoW, US and UK entities (75, 67 and 56%, respectively). On the other hand, openness to institutional investors in the Euro area platforms falls to 37%. Cross-matching the data with those relating to specialisation by business areas, the presence of institutional investors—as can be expected—is greater on platforms with a Business and Property vocation rather than on Consumer platforms.

We then consider another organisational aspect, which is particularly important but equally difficult to define and assess, i.e. the cost of the P2P lending service. Table 4 displays the fee structure that platforms apply to their users, be they borrowers or lenders. The analysis highlights the existence of a rather varied situation.

From a geographical point of view, we can distinguish two different scenarios. On the one hand, the majority of US and RoW platforms charge fees both to borrowers (an upfront fee) and to lenders. On the other hand, the Euro area and the UK platforms present a greater variety

loan is originated by a partnering bank. […] In the guaranteed return model, the platform operator guarantees the creditors' principal and/or interest in loans. […] Balance sheet lending platforms originate and retain loans on their own balance sheet" (BIS 2017, pp. 11–15).

Note that no platform under analysis has chosen the guaranteed return model. This model is typical of Chinese companies, which were not included in our sample.

Table 2 Specialisation by business areas

Area	*Euro area*	*UK*	*USA*	*RoW*	*Sample*	*Euro area*	*UK*	*USA*	*RoW*	*Sample*
	Number					*%*				
Business (BL)	11	7	0	0	18	55.00	41.18	0.00	0.00	41.86
Consumer (CL)	8	2	2	4	16	40.00	11.76	100.00	100.00	37.21
Property (PL)	1	8	0	0	9	5.00	47.06	0.00	0.00	20.93
Total	20	17	2	4	43	100.00	100.00	100.00	100.00	100.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Table 3 Presence of institutional investors

Institutional investors	*Sample*		*Geographical area (%)*				*Business Area[a] (%)*		
	No.	*%*	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*
Yes	32	50.79	37.04	56.00	66.67	75.00	55.56	43.75	66.67
No	24	38.10	51.85	28.00	33.33	25.00	38.89	50.00	11.11
n/a	7	11.11	11.11	16.00	0.00	0.00	5.56	6.25	22.22
Total	63	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[a]Data from 43 specialised P2P platforms
Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *RoW* Rest of the World

Table 4 Pricing structure

Pricing structure	*Geographical area (%)*				*Business area (%)*			
	Euro area	*UK*	*USA*	*RoW*	*CL*	*BL*	*PL*	*MB*
Borrower pays (1 fee)	29.63	30.43	33.33	25.00	18.75	27.78	14.29	45.00
Borrower pays (2 fees)	29.63	43.48	0.00	0.00	6.25	27.78	71.43	35.00
Lender and borrower pay (1 fee)	29.63	17.39	66.67	75.00	56.25	33.33	14.29	20.00
Lender and borrower pay (2 fees)	11.11	8.70	0.00	0.00	18.75	11.11	0.00	0.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

of fee structures. Some of these platforms apply an upfront fee to borrowers only; others charge to borrowers two different fees, one upfront and a recurring one, which is applied to the residual debt; a few platforms even charge both borrowers and lenders.

The analysis of pricing broken down by business areas highlights that property platforms and MB platforms tend not to charge fees to lenders. More specifically, while property specialists tend to charge two types of fee to borrowers, MB platforms only charge an upfront fee. Platforms specialising in the consumer sector charge fees to both borrowers (upfront only) and lenders in 56% of cases. Lastly, business lending platforms show a greater variety of solutions adopted.

Finally, in Table 5 we analyse the phenomenon of bank disintermediation following the development of P2P lending platforms and the extent to which this alternative financing channel is actually digitised.

Considering the data reported in Table 5, about 94% of the platforms in the sample belong to the FinTech industry; only the remaining 6% are of banking origin. All US platforms are purely FinTech, confirming the peculiarity of the American case. The banking platforms are British (2), Belgian (1) and Australian (1). The US platforms, like the majority of

Table 5 Bank disintermediation and P2P lending digitisation

Info	*Sample*		*Geographical area (%)*				*Business area*[a] *(%)*		
	No.	*%*	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*
FinTech									
Yes	59	93.65	96.30	92.00	100.00	87.50	94.44	93.75	100.00
Non-banking origin	4	6.35	3.70	8.00	0.00	12.50	5.56	6.25	0.00
Total	63	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
FinTech in collaboration with financial intermediaries									
Yes	34	53.97	69.23	30.43	100.00	28.57	47.06	73.33	33.33
No	29	46.03	30.77	69.57	0.00	71.43	52.94	26.67	66.67
Total	63	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Digital application									
Yes	31	49.21	55.56	40.00	66.67	50.00	33.33	75.00	44.44
No	18	28.57	25.93	36.00	0.00	25.00	50.00	6.25	22.22
n/a	14	22.22	18.52	24.00	33.33	25.00	16.67	18.75	33.33
Total	63	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[a]Data from 43 specialised P2P platforms
Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *RoW* Rest of the World

those in the Euro area, have signed agreements with financial intermediaries however, unlike the majority of the platforms in the UK and the RoW, which are completely independent from the traditional financial system.

With regard to the possibility of using the platform services in an entirely remote way, the data tell us that nearly half of the sample (49%) guarantee digital application: 29% require direct contact (through visits or phone calls) while 22% of the sites analysed does not provide details on this option.

To conclude, the frequent lack of relevant information on the websites of the P2P lending platforms under investigation should be highlighted. The "not available" observations (n/a) have a considerable impact on several aspects of informative transparency and online accessibility by potentially interested investors or borrowers (see Sects. 5 and 6).

4 Diversification Opportunities and Capital Allocation Tools

As mentioned earlier in Sect. 2, a first subset of the analysis concerns the diversification opportunities and capital allocation tools offered by P2P lending platforms. This analysis is performed by grading five variables:

1. Sector diversification;
2. Geographical diversification of borrowers;
3. Presence of a maximum limit that can be invested in each project;
4. Resource allocation method;
5. Geographical diversification of investors.

Table 6 is about the first variable, i.e. **sector diversification**, and shows the number of platforms (grouped into geographical areas) operating in one or multiple business areas. The vast majority of the platforms, 43 out of 63 (68%), opted for operational specialisation, i.e. they concentrate their activities on a single business area, as described in the previous section. On the other hand, the remaining 20 platforms are MB, with 14 (equal to about 2/3 of the subsample) focused on the combination of just two business areas, typically Business and Consumer, although there are also cases of more varied offers. Just one platform (of Swiss nationality and therefore belonging to the RoW category) displays maximum diversification, as it operates not only in the Business, Consumer and Property segments but also in the Invoicing sector.

According to the grading method utilised in this sub-score, each of the four business areas is worth 0.25 points. Therefore, the P2P

Table 6 Sector diversification

Info	*1 area*	*2 areas*	*3 areas*	*4 areas*	*1 area*	*2 areas*	*3 areas*	*4 areas*
	Number				*%*			
Euro area	20	5	2	0	46.51	35.71	40.00	0.00
UK	17	6	2	0	39.53	42.86	40.00	0.00
USA	2	1	0	0	4.65	7.14	0.00	0.00
RoW	4	2	1	1	9.30	14.29	20.00	100.00
Total	43	14	5	1	100.00	100.00	100.00	100.00

Table 7 Geographical diversification of borrowers (%)

Info	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*	*MB*
Domestic borrowers only	59.26	92.00	100.00	62.50	77.78	81.25	88.89	60.00
Extended number with limitations	37.04	4.00	0.00	37.50	22.22	18.75	0.00	25.00
n/a	3.70	4.00	0.00	0.00	0.00	0.00	11.11	15.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

platforms featuring the highest degree of diversification (i.e. those active in all the four business areas) were awarded the maximum grade, i.e. 1 point.

The second variable analysed is the **geographical diversification of borrowers** by geographical location and business areas (Table 7). The aim is to verify whether a platform offers the possibility to diversify investments by geographical area, to understand whether this opportunity is more common in P2P lending to individuals, businesses or mortgage loans, and whether there are similarities or differences between the various countries in our sample. As can be seen from the data in the table, the picture is rather heterogeneous: the UK and the United States essentially operate only at domestic level, whereas the Euro area platforms include 37% of borrowers from other countries. Geographical diversification is here referred to the individual country of origin and not to the Euro area as a whole. Moreover, statistical data aside, the European diversification is limited to a few countries, such as Estonia, Slovakia, Switzerland and Finland. When comparing the business areas, we notice that the platforms prefer to finance domestic borrowers and rarely extend the possibility of adhesion to foreign subjects. The phenomenon is more marked in the Property sector for obvious reasons, owing to the need to know the domestic property market and its legislation. When the pool of potential borrowers is extended across borders, it often embraces a few neighbouring countries that share the culture and the language of the platform's home country.

Table 8 Maximum investment limit per borrower

Info	*No. of observations (% of total)*
Presence of a maximum limit per borrower	26 (41.00%)
Absence of a maximum limit per borrower	37 (59.00%)
% max per borrower_average value	12.00
% max per borrower_min value	0.00
% max per borrower_max value	50.00

In grading this variable, a score of 0 was assigned in the absence of geographical diversification, i.e. whenever only domestic borrowers have access to the platform, whereas a score of 1 was assigned in the presence of a broader, albeit limited, group of eligible nationalities of potential borrowers.

The third variable under investigation is the **presence or absence of a maximum limit to the investment per transaction**, expressed in percentage value or in absolute terms, which is a very useful tool to encourage a more correct allocation of resources and diversify risk. Table 8 shows that only 41% of the sample suggest or impose a maximum investment limit per entrepreneur, while the remaining 59% give no indication. From the analyses carried out, although not reported in the table, no significant difference emerges when the sample is segmented by geographical areas or business activities.

When the limit is expressed in percentage terms (over the total amount invested), on average this value amounts to 12%, although there is a wide variation between the minimum and the maximum values (0–50%).

In order to grade this variable, which can be seen as an additional tool made available by the platforms to promote investment diversification, a score of 0 or 1 was assigned in the absence or presence, respectively, of a suggestion/imposition of a ceiling on the investment per transaction.

Let us now consider the **resource allocation methods**. These may consist of manual or automatic selection of the projects to be financed. Figure 3 shows that 35% of the platforms offer manual mode only, leaving it up to the investor to decide how to allocate their capital among one or more projects. On the other hand, 13% allow automatic allocation only, thus splitting the investment and diversifying risk, but completely depriving the investor of the freedom to make his/her own

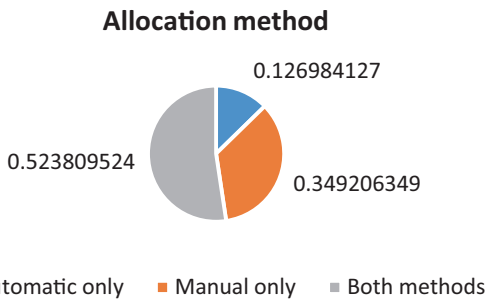

Fig. 3 Resource allocation method

decisions. Just over half of the sample, 53%, offer both solutions, at the customer's discretion. Considering that subjects who operate online usually want to decide independently, without the help or interference of a financial intermediary, but at the same time do not always have the necessary skills to make conscious and informed financial decisions, we have positively evaluated the more structured platforms that offer both modes. In grading this variable, the availability of a single mode, whether manual or automatic, was assigned a score of 0.5, whereas the combined offer of manual and automatic allocation was assigned the maximum score of 1.

The last variable taken into consideration is the **geographical diversification of investors**, consisting in opening up the platform to wider and more heterogeneous funding, thus accepting non-domestic investors. This kind of funding diversification may be advantageous for borrowers. In fact, they could potentially benefit from a wider and less volatile availability of capital, partially releasing themselves from the macroeconomic and financial constraints of their country. Table 9 shows a clear differentiation between geographical areas and a certain homogeneity between sectors. Looking at the comparison between geographical areas, the American platforms operate exclusively in domestic mode. On the other hand, the geographical diversification of investors is greater in the Euro area, where 63% of the platforms also open their doors to investors from other countries, and in the UK, where, nevertheless, only 24% widen the circle of investors.

It is interesting to point out that, unlike the geographical diversification of borrowers that tended to embrace just a few neighbouring countries, in this case the scope of action extends more easily and frequently

Table 9 Geographical diversification of investors (%)

Info	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*	*MB*
Domestic lenders only	33.33	68.00	100.00	37.50	44.44	50.00	55.56	55.00
Extended number with limitations	62.96	24.00	0.00	62.50	55.56	43.75	22.22	45.00
n/a	3.70	8.00	0.00	0.00	0.00	6.25	22.22	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

to all the countries of the Euro area for EU countries or to the whole world. Naturally, owing to the availability of a single currency and of a common, albeit still fragile, basis of legislative standards, greater integration is favoured between EU countries, whereas a strong barrier with the United States arises.

Looking at the sector distribution, a completely different picture emerges. The P2P lending platforms of our sample accept non-domestic investors in half of the cases. The Property sector shows a slightly higher adherence to domestic territoriality than the other areas.

This last variable has also been converted into a sub-score, assigning 0-1, depending on whether the investors are exclusively domestic or of extended nationality.

To conclude this part of the analysis, Table 10 presents the overall results of the sub-score concerning the availability of diversification and capital allocation tools. This sub-score will be subsequently integrated with the sub-scores of the other two dimensions of risk management tools (risk management and informative transparency). The sub-scores in Table 10 are quite varied, going from a minimum score of 0.75 to a maximum score of 4.25. In terms of range of dispersion, the coefficient of variation reported in the table measures the extent of variability in relation to the mean of the sample. Generally, it stands halfway in all our geographical and sectorial specifications, except for the US area where it is particularly low, and the PL sector where it exhibits higher variability.

Table 10 Sub-score of diversification and resource allocation tools

Info	*Sample*	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*	*MB*
Average score	2.11	2.68	1.55	1.08	2.44	2.22	2.19	1.42	2.30
Min score	0.75	1.25	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Max score	4.25	4.25	2.75	1.25	3.25	3.75	4.25	3.25	4.25
Coeff. of variation	0.47	0.37	0.44	0.27	0.34	0.46	0.52	0.58	0.37

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Some interesting preliminary results emerge from this first sub-score. On a geographical basis, European P2P lending initiatives clearly outperform their UK and US competitors, which scored half as high as their European peers. With reference to business areas, on the other hand, differentiations are slighter: platforms operating in the Business and Consumer sectors, as well as multi-businesses, record intermediate scores, while those specialising in Property have much lower average scores. If we then look at the minimum and maximum values, the top score can be found in the platforms that operate in the consumer credit market.

5 Risk Mitigation Tools

A second subset of the analysis aims to evaluate the risk management tools offered by P2P lending platforms. The analysis is performed by grading five variables:

a. Direct participation of the platform in the lending activity;
b. Mutual Guarantee Systems, Guarantee Funds or other compulsory guarantees, such as real/personal guarantees or insurance policies;
c. Protection against the risk of failure of the platform;
d. Organised secondary market;
e. Possibility of early repayment without costs.

These tools can reduce risk for lenders (Sect. 5.1) or for borrowers (Sect. 5.2).

5.1 Lender Risk Mitigation

Starting with the lender's perspective, we shall take into consideration the first four variables, which are related to credit risk (points a, b, c) and liquidity risk (point d) valuation and management.

Table 11 shows the LGD mitigating devices (credit risk). In several cases, i.e. 35 cases out of 63 (56%), no collateral or guarantee scheme is present. Many platforms, which do not protect the lender, recommend self-care by means of good diversification. On the other hand, 39% of the platforms use one of the devices mentioned above, while 11 platforms (17% of the sample) use more than one form of protection.

Looking at the first variable, only seven platforms participate directly in the lending, sharing the risk with the subjects offering their money. Fifty-seven per cent of these belong to the Euro area and 75% are specialised in the business sector. Three platforms also indicate the participation percentages, with average values ranging from 3.71% (minimum) to 5.71% (maximum).

As regards the second variable, two platforms offer MGSs, which encompass private or public institutions aimed at facilitating access to credit for smaller firms. Should the borrower be unable to repay the capital, the repayment will be made by the MGSs. The two platforms in question are from the Euro area (Italy and Spain) and operate in the Business sector. The other forms of risk protection, i.e. Guarantee Fund and/or personal or real guarantee are more common: 25% of the platforms have a Guarantee Fund, which can be considered a kind of protection to be used by the platform to reimburse non-performing loans, while 46% use other instruments such as personal/real guarantees or insurance policies.

Table 12 reports some data on the use of Guarantee Funds and Other Guarantees. It is interesting to notice that US platforms are not in the table, in that they are notary platforms. In this case, the loan is granted by the bank, so the platform does not need to protect the lender. Comparing the other three geographical areas, more than 60% of the platforms located in the UK offer both the guarantee fund and the other kinds of guarantees, while the percentage falls to around 25–28% in the Euro area and to 10–12% in the RoW. In terms of business areas, the evidence is less clear-cut: in general, real/personal guarantees and insurance policies prevail in platforms belonging to the Business and Property

Table 11 Credit risk

Info	*Platform participation*	*%*	*Mutual Guarantee System*	*%*	*Guarantee Fund*	*%*	*Other Guarantees*	*%*	*Platform failure*	*%*
Yes	7	11.00	2	3.00	16	25.00	29	46.00	28	44.00
No	56	89.00	61	97.00	47	75.00	34	54.00	35	56.00
Total	63	100.00	63	100.00	63	100.00	63	100.00	63	100.00

Table 12 Use of Guarantee Funds and Other Guarantees (%)

Info	*Euro area*	*UK*	*RoW*	*BL*	*CL*	*PL*	*MB*
Guarantee Fund	25.00	63.00	12.00	13.00	31.00	19.00	37.00
Other Guarantees	28.00	62.00	10.00	21.00	14.00	31.00	34.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Table 13 Contribution to the Guarantee Fund

Info			*Contribution by the lender (%)*			
Who	*Number*	*%*	*Area/Sector*			*CL*
Lender	4	25.00	Euro area			7.41
Borrower	8	50.00	UK			4.00
n/a	4	25.00	RoW			12.50
Total	16	100.00	*Contribution by the borrower (%)*			
			Area/Sector	BL	CL	MB
			Euro area	3.70	3.70	0.00
			UK	4.00	4.00	12.00
			RoW	0.00	12.50	0.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

sectors, while the creation of a guarantee fund is more common in the Consumer market.

Table 13 focuses on the Guarantee Fund to ascertain whether the contribution is applied to the lender or to the borrower. The left side of Table 13 shows that in half of the cases (8 out of 16) the contribution is paid by the borrower, while it is paid by the lender in 4 cases out 16 (25%). For the remaining 4 cases no information is provided by the platforms.

When the cost is charged to the lender, this applies to 12.50% of RoW platforms operating in the Consumer sector. On the other hand, when the cost is charged to the borrower, it is requested again by RoW platforms operating in Consumer Lending (12.50%), followed by UK platforms operating in more than one sector (12%).

The third variable concerns the last risk mitigation tool under analysis, i.e. the protection of the adherents in case of platforms' default.

Table 14 Liquidity risk

Liquidity risk			*Secondary market—geographical area (%)*			
Info	**N°**	%	Euro area	UK	USA	RoW
			40.74	72.00	100.00	50.00
Yes	36	57.14	*Secondary market—operational area (%)*			
No	27	42.86	BL	CL	PL	MB
Total	63	100.00	50.00	62.50	44.44	65.00
Selling costs			*Detail of costs—geographical area (%)*			
Info	N°	%	Euro area	UK	USA	RoW
Yes	21	58.33	81.82	66.67	33.33	50.00
No	11	30.56	Detail of costs—operational area (%)			
n/a	4	11.11	BL	CL	PL	MB
Total	36	100.00	44.44	50.00	75.00	69.23

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Unfortunately, very little information is provided on the platforms' websites: 35% of our sample (22 out of the 63 platforms) do not even mention the words "platform's failure". As we consider this information to be of the utmost importance, we chose not to indicate the data as "not available", but as "not offering protection".

Overall, 35 platforms do not offer protection whereas 28 platforms do. The possible solution against failure is the intervention of a designated administrator or the supervisory authority. 85.71% of the platforms (24 out of 28) provide a designated administrator. Most of them are from the UK (70.83%) and MB (33.33%). Only four platforms fall under the public authority control. They are all European (Spain), operating in the Business (16.67%) and Consumer (6.25%) segments.

To conclude the lender risk analysis, we consider the possibility to reduce the liquidity risk by selling the credit on a secondary market (point d). As reported in Table 14, this opportunity is offered by 36 platforms, mostly located in the United States (100%) and working in the MB (65%) sector. This phenomenon is probably due to the fact that the United States is one of the most well-developed P2P markets, with a loan volume of 38 billion euro. Obviously, the secondary market is less developed in the Property P2P lending (44.44%).

More specifically, looking at the existence of selling costs, 58% of the platforms (21 out of 36) charge a cost to the lender. These platforms are predominantly in the Euro area (81.82%) and in the UK (66.67%), and in the MB (69.23%) sector.

5.2 Borrower Risk Mitigation

Borrowers risk can be reduced with the possibility of advance repayment without costs (point e). Table 15 shows that this opportunity is offered by 54% of the platforms, mostly in the United States (66.67%) and in the Euro area (55.56%), operating in the Consumer (68.75%) and Business (61.11%) sectors.

5.3 The Risk Mitigation Sub-score

In the last part of this chapter section we compute the sub-score of the risk mitigation tools. All the variables described above are considered, summing up those of both the lender (credit and liquidity risk) and the borrower:

1. Platform participation in the loan;
2. Guarantee Fund/Mutual Guarantee Systems/Other Guarantees;
3. Protection against platform failure;
4. Existence of a secondary market;
5. Advance repayment without costs.

We give each item a 0-1 score, depending on the absence or presence of each risk management tool. The minimum sub-score is zero. The maximum sub-score is five.

Table 16 reports the average, the minimum and the maximum sub-scores along with the coefficient of variation. The average sub-score of the sample is 2.29. We observe almost the same average score in all our

Table 15 Advance repayment at zero cost

Sample			*Geographical area (%)*			
Info	*No.*	*%*	*Euro area*	*UK*	*USA*	*RoW*
Yes	34	53.97	55.56	52.00	66.67	50.00
No	17	26.98	*Operational area (%)*			
n/a	12	19.05	BL	CL	PL	MB
Total	63	100.00	61.11	68.75	22.22	50.00

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Table 16 The risk mitigation sub-score

Info	*Sample*	*Euro area*	*UK*	*USA*	*RoW*	*BL*	*CL*	*PL*	*MB*
Average score	2.29	1.89	2.84	1.67	2.13	2.27	2.25	2.44	2.25
Min score	0	0	1	1	0	0	0	1	0
Max score	5	4	4	2	5	4	5	3	4
Coeff. of variation	0.51	0.60	0.32	0.28	0.71	0.52	0.60	0.28	0.52

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

geographical and sectorial specifications, even if the coefficient of variation suggests a higher dispersion of the scores in the Euro area and in the RoW with respect to the UK and the United States, and in Consumer Lending compared to the other business sectors.

Only one platform—which accounts for 2% of the sample—reaches the maximum score (5). This platform is from Bulgaria (RoW) and operates in the Consumer segment. On the other hand, four platforms offer no protection instrument, neither to the lender nor to the borrower (6%). Three of them are in the Euro area and one is from Australia (RoW). One is specialised in Business Lending, one in Consumer Lending and two in more than one sector. The lack of protection tools is justifiable only for the Australian platform: it is notary and focused on professional investors (it does not accept the retail ones).

Finally, most of the platforms are in the average score area, with a final score ranging from 1 to 4. In detail, these are distributed as follows:

- 8 platforms are in second place (score = 4), most of which (75%) located in the UK and operating in more than one sector (50%);
- 21 platforms rank in third place (score = 3), 57% of which in the UK, 33% in the Euro area and 10% in the RoW. Most of them operate in Business Lending (42% of the UK platforms), in Consumer Lending (43% of the Euro area platforms) or in more than one sector;
- 29 platforms are in fourth/fifth place (score = 1-2), 52% of which are in the Euro area and operate in the Business field.

6 Quality and Quantity of Information Available to Platform Users

In order to evaluate the completeness and clarity of information freely available to general users, a set of relevant indicators can be identified. These include twenty positive, equally weighted indicators and four negative indicators, increasing or reducing the score achieved by each platform respectively. The first eight indicators, listed in Table 17, concern information provided to potential borrowers to enhance their risk awareness. The following eight indicators consider information for better understanding the risk involved in lending, while the last four positive and four negative items are a proxy for the platform's reputation.

We measured the level of informative transparency for the borrower by first checking whether a **loan simulator** is available. This tool provides an approximate idea of the amount to be repaid, including interests, as the amount applied for and the duration of the loan vary. It gives the borrower an idea of the commitment s/he would be required to make should s/he decide to apply for a loan. Looking at Table 18, we find that the provision of a loan simulator is not particularly extensive, with 46% of the sample lacking this tool. While all the P2P lending platforms included in the RoW subsample offer this tool, only 59% of the Euro area and 32% of UK operators make it available. Looking at the breakdown of our sample in relation to the types of loan offered, we can see that the simulator is used mainly by platforms that grant consumer loans (75%) and by organisations that perform a combination of two or more activities (65%). The same tool is available for 44% of platforms specialised in business loans and for just one dealing with property loans. Lenders may also benefit from a tool immediately showing the expected investment return for a given period. However, we noticed that only 27% of the operators in our sample offer this tool to lenders, with the majority belonging to the Business Lending category (39%).

The second item concerns the information on the average time necessary for the platform to complete the preliminary phase and how much time is needed (minimum and maximum) so that the borrower, deemed eligible for financing, can obtain the requested funds (Table 19). Most platforms (88%) emphasise the speed of the preliminary phase, declaring times between 1 and 72 hours. In particular, the average time indicated by operators specialised in consumer loans is just over one day. Those specialised in business loans indicate an average time span of two days,

Table 17 Risk management information items

Information for the borrower	*Weight*
Loan simulator tool	1
Timing for preliminary credit assessment and funds availability	1
Minimum criteria for loan application submission	1
Warnings about excessive indebtedness	1
APR	1
Explanation of the rating criteria adopted by the platform	1
Transparency of costs charged by the platform	1
Disclosure of credit recovery procedure	1
Information for the lender	
Investment return simulator tool	1
Average time for full capital deployment	1
Warnings on investment risks	1
Projects to be financed are visible/demo of the platform operation	1
Basic information about the projects	1
Additional information about the projects	1
Investment return (minimum or maximum or average)	1
Historical default rate	1
Reputation of the platform	
Statistics on loans granted	1
Updated statistics	1
FAQs section	1
FAQs completeness (more than 25)	1
Information not updated	−1
Inconsistent information	−1
Broken web links	−1
Technical problems	−1

while the platforms aimed at property financing quantify the time needed to formulate a response in more than six working days. The actual availability of funds depends on the number of lenders active on a specific platform, as well as on their risk appetite. As a result, a platform is not able to determine precisely the time for project fundraising, but it can take useful measures to reduce waiting times, trying to attract as many investors as possible, including institutional investors. It should be noted that our assessment does not reward those platforms merely claiming to guarantee the shortest processing times, but those that offer an estimate on this aspect. Information on the time needed to obtain the required funds is less frequent, and approximately one-third of the sample do not

Table 18 Simulator tools (%)

Info	*n/a*	*Euro area*	*UK*	*USA*	*RoW*	*CL*	*BL*	*PL*	*MB*
Simulator for borrower (%)	46.0	59.3	32.0	66.7	100.0	75.0	44.4	11.1	65.0
Simulator for investor (%)	73.0	33.3	16.0	66.7	25.0	31.2	38.9	0.0	25.0
N. Observations	63	27	25	3	8	16	18	9	20

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Table 19 Information on the time needed to obtain funding

	CL	*BL*	*PL*	*MB*	*Euro area*	*UK*	*USA*	*RoW*	*n/a (%)*
Credit assessment (days)	1.04	2.02	6.67	1.17	1.47	3.16	0.04	1.62	22.2
Availability of funds min (days)	3.4	5.08	10	4.78	4.65	5.65	4.33	3.2	50.8
Availability of funds max (days)	9.14	18.76	18.33	17.71	20.87	11	3	14.5	52.4
n/a (%)	18.8	11.1	66.7	45.0	29.6	44.0	0.0	12.5	31.7

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

provide any estimate. There is a lack of information, particularly on the UK platforms (44%) and on those operating in the property loans sector (66.7%). When a minimum period of time is declared (49%), on average this is equal to 3.4 days for consumer loans, 5 days for business loans and 10 days for property loans. On the other hand, 48% of the sample declare a maximum time between almost 21 days (Euro area operators) and just 3 days (US platforms). Considering the same information from the point of view of the lender, we found that only three platforms provide an estimate of the time needed to invest a certain amount. The majority of the platforms do not address the issue or claim that the timing depends on the individual investor's appetite for risk.

Four platforms do not specify the minimum criteria for obtaining a loan. Those offering consumer credit usually mention a positive credit history (86%), and only 27% set a minimum amount of annual income (Table 20). The platforms offering credit to companies select applicants on the basis of seniority (73%), credit history (70%), balance sheet preparation (57%), and turnover size (43%).

We also checked whether the platforms warn borrowers about the risk of over-indebtedness (Table 21). This warning is only present in 22% of our sample and is most common in the RoW subsample (37.5%) and in the Business Loans subsample (27.8%). Analysing the warnings addressed to investors, the UK platforms and those belonging to the

Table 20 Minimum criteria for loans application

Info	*Income*	*Credit history*	*n/a*		
Consumer loans (%)	26.67	86.67	10.0		
Info	*Seniority*	*Turnover*	*Balance sheet*	*Credit history*	*n/a*
Business loans (%)	72.97	43.24	56.76	70.27	13.5

Table 21 Further risk management information (%)

Info	*Sample*	*Euro area (%)*	*UK (%)*	*USA (%)*	*RoW (%)*	*CL (%)*	*BL (%)*	*PL (%)*	*MB (%)*
Warnings for the borrower	14.8%	24.0	33.3	37.5	22.2	18.8	27.8	22.2	20.0
Warnings for the lender	92.6%	100.0	66.7	100.0	95.2	93.75	94.44	100.0	95.0
APR	33.3%	40.0	100.0	62.5	42.9	81.3	16.7	22.2	45.0
Rating model	0.741	68.0	100.0	75.0	73.0	87.5	66.7	66.7	70.0
Cost transparency	0.63	44.0	66.7	87.5	58.7	75.0	72.2	33.3	45.0
Credit recovery	0.741	76.0	66.7	75.0	74.6	68.8	94.4	77.8	60.0

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

RoW (100%) exhibit the same behaviour. The absence of this report by a United States operator is justified by the fact that the platform only accepts professional investors, for whom the warning on investment risk is not necessary. Among the Euro area platforms that do not explicitly refer to investment risk, one of them declares that the capital is protected by a dedicated fund and the other one operates in bitcoin.

Even the practice of expressing the loan costs in terms of annual percentage rate is not so frequent: just 43% of the sample indicate it. The

APR is disclosed mainly by the consumer platforms (81.3%) and the three US platforms, while it is recorded by only a third of the Euro area operators.

Seventy-three per cent of our sample describe the criteria used to assess borrowers' credit risk and their rating. The most transparent platforms in this sense are those in the United States (100%) and those for Consumer Lending (87.5%).

There is certain opacity in the information about the remuneration required by the platforms for their service: 41% of the subjects under scrutiny adopt a pricing structure that is unclear or not explained on their website. The most transparent operators in this sense are those in the RoW subsample (87.5%) and the Consumer subsample (75%). Conversely, those that either adopt a complex commission structure or do not disclose it publicly operate in the property loans sector (67%) and in the UK (56%).

Lastly, almost 75% of the sample explain the methods used to monitor late payments and recover overdue receivables. In this case, the operators specialised in business loans are the most virtuous in issuing this type of information (94%).

With regard to the level of disclosure for the investor, in addition to the three indicators illustrated above, we also checked whether there is information about the average expected return on the sums invested and whether the average default rate recorded for loans financed through the platform is declared (Table 22). As expected, the indication of the return (minimum, medium or maximum) is generally present: all operators from the RoW and 95% of MB operators advertise the performance levels of their customers. Certainly, this information is very attractive to potential investors and according to our surveys (Table 23) MB platforms are those that boast the highest returns, followed by operators specialised in property loans. It is worth pointing out that these performances are purely indicative, both because they are not always net of fees and credit losses, and because they assume complete and immediate investment of the planned sum. As already noted, given that operators do not indicate the average time it takes to use the capital, it could be assumed that many months may pass before the entire amount is allocated and start generating interest, with obvious consequences on the expected return, unless the lender is willing to loosen the selection criteria or agrees to finance higher-risk applicants.

Table 22 Return and rate default information (%)

Info	*Euro area*	*UK*	*USA*	*RoW*	*CL*	*BL*	*PL*	*MB*	*n/a*
Return	88.90	84.00	66.70	100.00	87.50	83.30	77.80	95.00	12.70
Rate of default	51.80	64.00	66.70	50.00	37.50	77.80	55.60	55.00	42.90

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Table 23 Minimum, maximum and average expected return (%)

Investment	*CL (%)*	*BL (%)*	*PL (%)*	*MB (%)*
Minimum return	4.33	4.14	5.00	5.41
Maximum return	10.28	9.80	9.56	11.66
Average return	6.66	6.97	9.25	9.23

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business

Information about the average default rate recorded on loans granted is useful to understand to what extent credit risk could affect the return on investment. The figure, if compared over the years, implicitly indicates the quality of the work carried out by the platform in selecting borrowers and in carrying out any bad debt recovery actions. Unfortunately, this information is only issued by just over half of the platforms under investigation. The most diligent operators are from the UK and United States, 66.7 and 64% respectively, and those engaged in business loans (78%).

Another important factor for future lenders is the possibility to analyse the projects to be financed currently on offer on the platform marketplace and to understand the wealth of data with which each project is presented (Table 24). The marketplace is visible, without needing to register, for 55.6% of the sample and is particularly widespread in the Euro area (81.5%) and among the platforms specialised in business loans (67%). All operators granting access to the marketplace offer a set of information concerning the purpose, maturity and interest rate of the loan application. The rating assigned to the loan application and the indication of the percentage of funds raised for each individual project are also quite widespread, with some exceptions represented by the

Table 24 Marketplace and project information (%)

Info	*Euro area (%)*	*UK (%)*	*USA (%)*	*RoW (%)*	*CL (%)*	*BL (%)*	*PL (%)*	*MB (%)*
Marketplace	81.5	32.0	33.3	50.0	56.3	66.7	55.6	45.0
Rating	77.3	37.5	100.0	100.0	100.0	66.7	20.0	77.8
Loan guarantee	45.5	87.5	0.0	75.0	55.6	41.7	80.0	66.7
% of fundraising	90.9	100.0	100.0	75.0	77.8	91.7	100.0	100.0
Single offers	31.8	25.0	0.0	0.0	11.1	33.3	0.0	44.4

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

Property (20%) and the UK (37.5%) platforms. The practice of indicating whether the project has a specific guarantee is less widespread. Even more rare is the opportunity to observe the individual bids received on each project. This opportunity is offered by 32% of the Euro area platforms and 44% of the MB platforms.

Lastly, we considered information that, if present, can improve the reputation of the platform and other information that, on the contrary, can worsen it (Table 25). In the first case, we checked whether data on the loans financed through the platform, together with analyses of the quality of the loans granted, are published on the website and whether the analyses are up to date. The constant updating of data increases their significance and signals the vitality of the exchanges that flow into the platform. Seventy-six per cent of our sample feature a section dedicated to loan statistics; this type of information is offered by all the US platforms and is prevalent among those that are MB oriented (80%). The platforms belonging to the RoW are less willing to publish data (62.5%) but pay more attention to updating them (100%). The "oldest" statistics were found among the Property platforms (77%). Another important item for both the borrower and the lender is the frequently asked questions (FAQs) section, which was found on all but one of the websites. Considering that FAQs help to dispel any doubts and avoid misunderstandings, we positively evaluated those platforms that present numerous questions, as these reflect real difficulties in comprehension highlighted by customers. In particular, the platforms that present more

Table 25 Reputation of the platforms (%)

Info	*Sample (%)*	*Euro area (%)*	*UK (%)*	*USA (%)*	*RoW (%)*	*CL (%)*	*BL (%)*	*PL (%)*	*MB (%)*
Statistics	77.8	76.0	100.0	62.5	76.2	75.0	77.8	66.7	80.0
Updated statistics	71.4	63.2	66.7	100.0	70.8	66.7	78.6	33.3	81.3
Numerous FAQs	66.7	75.0	100.0	50.0	68.3	75.0	66.7	88.9	60.0
Inconsistent information	51.9	52.0	33.3	25.0	47.6	37.5	55.6	44.4	50.0

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

than 25 FAQs are all US platforms and 89% of those dedicated to property loans. On the other hand, the same section is less informative for half of the platforms in the RoW subsample and for 40% of the MB operators. Finally, among the negative indicators, it should be noted that almost 48% of the websites under analysis present conflicting information between what is described on the main page and what is included in other sections or responses in the FAQs section. The greatest problems were encountered in 52% of the UK and Euro area platforms, above all for business operators (55.6%). In addition, 20% of the operators display information that is clearly out of date with respect to the regulations and 27% of the platforms have broken web links or technical problems.

Having completed the analysis of the indicators that measure the completeness and transparency of the information necessary for an informed assessment of the financial transactions offered by the platforms, the results of this sub-score are presented in Table 26. We would like to point out that, in order to compare the results of the analysis carried out in this section with the previous two sections, the final sub-score has been normalised to five.

Looking at the whole sample, we can see that no platform achieves the full score, while the lowest result is 0.25, assigned to a very "confidential" UK platform operating in the Property segment. The data in the RoW subsample undoubtedly appear interesting: the operators, belonging to countries governed by very different regulations and cultures, present themselves as the most homogeneous group, with the

Table 26 Risk management information sub-score

Info	*Sample*	*Euro area*	*UK*	*USA*	*RoW*	*CL*	*BL*	*PL*	*MB*
Average score	2.80	2.99	2.45	3.25	3.06	2.98	2.93	2.25	2.71
Min score	0.25	1.00	0.25	2.00	2.75	1.00	1.75	0.25	1.25
Max score	4.50	4.25	4.00	4.50	3.75	4.50	4.25	3.50	3.75
Coeff. of variation	0.28	0.22	0.35	0.38	0.12	0.25	0.24	0.45	0.27

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

lowest variability of results (0.12) and with the highest minimum score. The United States area achieves the highest average score but also has the highest variability in terms of results (0.38). According to the breakdown of the sample by area of activity, the business loan area appears more homogeneous, while the consumer loan area achieves better average and maximum scores.

7 Conclusions

The possibility for individuals to lend directly to other individuals or small companies, without any intermediation, could offer interesting returns for investors and lower financing costs for borrowers. Nevertheless, this new channel for funds transfer also raises critical issues. In particular, one of these concerns the availability of enough information and risk management tools for both lenders and borrowers.

In this chapter, we proposed a structured methodology for the evaluation of P2P loan platforms in terms of risk management-related information and tools and we applied a scoring system to analyse and compare a sample of online marketplaces.

We divided risk management tools into three macro-categories: investment diversification and resource allocation tools; risk management tools related to investments/loans; completeness and clearness of risk management information necessary for an informed assessment of the financial operations offered. Each category was assigned a sub-score based on a number of variables. The sum of each sub-score provided an overall evaluation of the P2P platforms in our sample (Fig. 4).

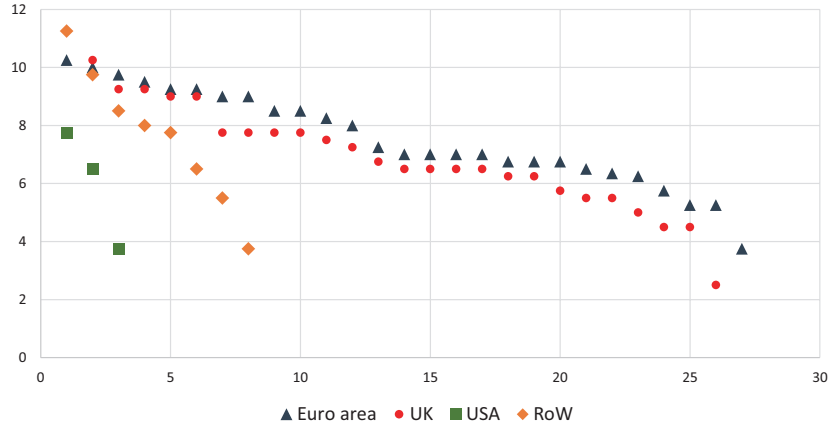

Fig. 4 Total score breakdown by geographical area

No platform achieves the maximum score, equal to 15, but overall the Euro area operators are more equipped with risk management tools than all the others, including those in the UK. The best platform, according to our analysis, belongs to the RoW subsample.

The analysis by quartiles (Table 27) shows that only 18.5% of Euro area operators offer limited or insufficient risk management tools, against 36% of those in the UK and 25% of the RoW platforms. Although about 30% of Euro area platforms are ranked in the highest quartile, 62.5% of the RoW subsample belong to the third and fourth quartiles. Even if these platforms belong to nations characterised by very different regulations and cultures, the provision of risk management tools appears to be adequate overall.

Looking at the score distribution by areas of activity, the ranking shows a certain lack of homogeneity (Fig. 5). Although the best-positioned platforms operate in consumer credit, about a third of them rank at the lower levels of the ranking (Table 27, first quartile). On the other hand, 61% of the platforms operating in the business sector fall into the third and fourth quartiles and only 11% offer limited risk management tools. The Property platforms are the least equipped, almost 78% of them fall into the first and second quartiles.

Table 27 Analysis by quartiles (%)

Data	*Euro area (%)*	*UK (%)*	*USA (%)*	*RoW (%)*	*CL (%)*	*BL (%)*	*PL (%)*	*MB (%)*
1 quartile	18.5	36.0	33.3	25.0	31.2	11.1	55.56	25.0
2 quartile	33.3	20.0	33.3	12.5	18.7	27.8	22.22	30.0
3 quartile	18.5	24.0	33.3	37.5	12.5	44.4	11.11	20.0
4 quartile	29.6	20.0	0.0	25.0	37.5	16.7	11.11	25.0

Legend *BL* Business Lending; *CL* Consumer Lending; *PL* Property Lending; *MB* Multi-business; *RoW* Rest of the World

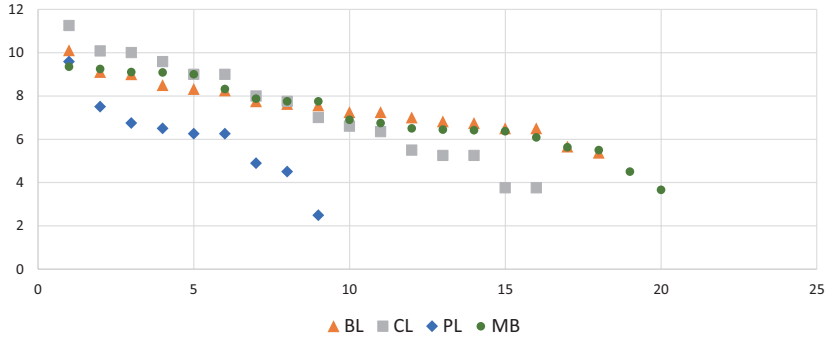

Fig. 5 Total score breakdown by activity

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CHAPTER 2

Equity Crowdfunding and Risk Management: The Attitude of Italian Platforms

Nicola Miglietta, Enrico Battisti and Elvira Anna Graziano

1 Introduction

In the FinTech[1] era (e.g., Freedman 2006; Ferrari 2017; Hyun-Sun 2018), crowdfunding has lately emerged as an innovative method of financing new ventures (Lee and Kim 2015; Renwick and Mossialos

[1] FinTech means the digitalization of financial services.

Although this contribution is the result of an equal joint effort by the three Authors, their primary individual contributions are reflected in the following sections of the chapter: Nicola Miglietta "Introduction", "Fundamental Principles of Crowdfunding", Enrico Battisti, "Defining Equity Crowdfunding", "Equity Crowdfunding Risks", "Conclusions, Implications, and Future Lines of Research" and Elvira Anna Graziano "Risk management theory", "Italian regulation", "Crowdfunding Risks". "Risk Management Approaches in Crowdfunding Platforms" was developed jointly by all the Authors.

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2017), allowing individual founders of for-profit, social, or cultural projects to request funding from several people (Mollick 2014), that draws inspiration from concepts like crowdsourcing (Kleeman et al. 2008; Poetz and Schreier 2012; Belleflamme et al. 2013, 2015) and microfinance (Morduch 1999). This phenomenon has grown remarkably during the last ten years, starting from the United States, and has spread its reputation to other countries. Crowdfunding is a different channel for financing a project that uses an online platform to ask for contributions, usually small, from several participants. People who are looking for financing present their ideas on privately managed online platforms, which act as mediators between the individual and the crowd (Belleflamme et al. 2010, 2014; Turan 2015).

Due to the special pace at which crowdfunding is developing and the consequential number of large-scale initiatives realized in numerous countries, researchers have lately begun studying the multifaceted nature of this phenomenon (Roma et al. 2017). If the present literature has focused on understanding the benefits of crowdfunding (Macht and Weatherston 2014; Bade 2018) or on drawbacks (Valanciene and Jegeleviciute 2013), limited consideration has been dedicated to the intriguing relationship between the crowdfunding phenomenon and risk management theory. However, crowdfunding is used in initial funding or early-stage financing, and both involve a high level of risk. Platforms implement several systems to minimize risks, though approaches are established on general risk management theory and risk management technique (Yuan 2015). However, risks may influence an investor's decision-making process in crowdfunding (Chen et al. 2018). In this sense, the purpose of this paper is to investigate the relation between crowdfunding platforms and risk management in order to assess the impact for participants, focused on a model with possible financial return: equity-based crowdfunding.

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The contribution of this exploratory research is manifold. First of all, from the theoretical point of view, the authors wish to propose a declination of the specific risks of equity-based crowdfunding, with respect both to the definition of the financial instrument in general and to the management and control perspective of the same. Second, from a managerial point of view, the new proposed classification of specific risks of equity-based crowdfunding can help platform providers and investors by identifying potential threats and improving the possible impact on their returns. Although the types of risks in crowdfunding are very diversified, and specifically in equity-based crowdfunding, none of them are under the control of funders. In this sense, platforms play significant roles in offering protection to crowdfunding participants, in particular for funders. Finally, from a policy point of view, this research can be useful to regulators and supervisory institutions in order to draw up regulation that can identify specific risks for each type of crowdfunding, in order to increase the degree of protection of investors in a logic of transparency and awareness of investment, continuing the path undertaken by CONSOB (Italian Security Exchange Commission).

The remainder of this paper is organized as follows. Section 2 proposes the theoretical backbone of the paper regarding the fundamental principles of crowdfunding, with particular attention to equity crowdfunding and the concept of risk management in finance. Section 3 explains, in its first part, regulation in equity crowdfunding's Italian market and, in its second part, the main risks generally associated to crowdfunding and, specifically, to equity-based crowdfunding. Section 4 describes risk management approaches in crowdfunding platforms, and, finally, the last section presents a concluding discussion identifying implications for theory, practice, and policy and future lines of research.

2 Theoretical Backbone

2.1 Fundamental Principles of Crowdfunding

As previously introduced, crowdfunding as a method of financing has grown very quickly during the last ten years (Yu et al. 2017). For this reason, the concept of crowdfunding is in a state of continuous evolutionary flux that makes complete definitions arbitrarily limited. A generally widespread definition is that of Schwienbacher and Larralde (2010) and Belleflamme et al. (2014), who define it as "an open call, mostly

through the Internet, for the provision of financial resources either in the form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes". Also, at the European level, the European Crowdfunding Network (2012) define crowdfunding as "a collective effort of many individuals who network and pool their resources to support efforts initiated by other people or organizations", and the European Commission (2018) highlight that "the basic function of crowdfunding can be described as an open call via the Internet for the provision of funds by the public at large to support specific initiatives by typically small fundraisers. The investors/lenders can provide the means as a pure donation (intangible reward) or in exchange for some form of reward in order to compensate for the financial risk taken (tangible reward)".

Generally, a crowdfunding transaction involves three main actors (Renwick and Mossialos 2017): the project initiators-owners-creators (who—individuals or investors—are seeking the funding), the funders (who—individuals—are offering the financial sources), and the platform providers (who are connecting the project initiator with funders by an online forum and play a role as organizational coordinator).

Five standard funding models typically characterize crowdfunding (e.g., Poetz and Schreier 2012; Belleflamme et al. 2013; Agrawal et al. 2015; Scott 2015; Piattelli 2013; Pais et al. 2014; Rossi 2014): donation-based crowdfunding, equity-based crowdfunding, reward-based crowdfunding, royalty-based crowdfunding, and lending-based crowdfunding. These types of crowdfunding can also be called, simply, donation, equity, reward, royalty, and lending. In general, equity-based, reward-based, and social lending models are more compliant with business activity, while donation-based lends itself more to nonprofit organizations. As for the private sector, however, they are not allowed to resort to equity crowdfunding except through a company; on the other hand, reward-based projects (especially in the preselling mode) and peer-to-peer loans are very widespread at the international level.[2]

- Donation-based crowdfunding is a platform where individuals offer money through the platform for a mutual collaborative aim without awaiting anything in return. Limited donation-based crowdfunding

[2] Sometimes royalty-based crowdfunding is considered as a sub-model of equity, but given its widespread use, the authors prefer to consider it as an independent model.

platforms may also offer some products, benefits, or rewards as a form of thanksgiving for the donation.

- Equity-based crowdfunding is a method that is developing in the world of start-ups, where a crowd of investors can fund start-ups or small businesses in return for a share in equity. Essentially, it is similar to other kinds of investments in shares for a firm, the main difference being that it can be done online. If the enterprise makes revenues, the value of its shares increases, in that way facilitating the investors' gain of return on their investment.
- Reward-based crowdfunding is a system where individuals finance a project in order to gain rewards or benefits for their pledge to the project. In reward-based fundraising, a group of people (who collectively form the "crowd") sustain a particular idea proposed by a project creator through pledges. In particular, in contrast to the equity crowdfunding system, the project initiator holds total ownership of the business funded through this type of crowdfunding.
- Royalty-based crowdfunding is a model where the backers of a given initiative, in relation to their investment, will receive royalties—such as, for example, intellectual property rights—in the form of a percentage of future profits that will eventually be generated in the future from the funded project.
- Lending-based crowdfunding permits entrepreneurs to obtain resources in the form of loans that they will pay back to the lenders over a predefined timeline, with a set interest rate. Lending campaigns work well for businessmen who don't want to give up equity in their start-up.

2.2 Defining Equity Crowdfunding

Equity-based crowdfunding has become an important option for early-stage financing of unlisted companies; it concerns raising money from small public investors principally through social media and online forums.

Equity-based campaigns are used to launch a start-up or to provide capital for a new business venture for an existing firm. In exchange for comparatively small amounts of money, investors acquire a proportionate share of equity in a business venture. In this sense, Bradford (2012) defines equity crowdfunding as a "model in which funders receive an interest in the form of equity or equity-like arrangements (e.g., profit

sharing) in the ventures they fund". Belleflamme et al. (2014) highlight that the main difference between traditional fundraising and this type of crowdfunding is the funding process itself. In the equity crowdfunding mechanism, entrepreneurs make an open call for funding on a crowdfunding platform, and investors make their choices based on the information provided therein (Ahlers et al. 2015). A shareholder has partial ownership of a company and obtains a profit should the firm do well, but if the company fails, investors can lose their investment.

This type of funding source is a crowdfunding model for firms that want to shape their future growth and their development in a community of investors, who feel they form part of the business idea and are willing to share their relationship network, their own capital, and its resources. The use of equity crowdfunding requires a series of evaluations for companies that choose this type of financing. In particular, it is important (De Luca 2015) that the company:

- carefully define the terms of the transaction, clearly indicating the share of capital offered to the public and the relative price;
- identify what the costs of the transaction may be (they are usually linked to the commissions of the chosen platform, to the legal and administrative costs for the implementation of the campaign, and to any external consultancy for the operation);
- prepare a business plan and related financial projections;
- indicate the rights of investors, as, based on the investor's economic contribution, these may vary; it is important that the company carefully define the types of shares that it will offer to the public and the associated control participation it will retain for itself.

2.3 Risk Management Theory

Risk management is a process to identify all relevant risks, to assess and rank those risks, to address the risks in order of priority, and to monitor risks and report on their management.

Black and Scholes's model is undoubtedly the most popular of early models in risk management theory. But it has been only with the birth and development of the derivatives market that there is a need to manage the risks deriving from them. The new types of risks identified require new models and management tools. Subsequent studies are in fact introducing new risk measures in relation to the diffusion of new instruments

(Cummins and Freifelder 1978; Smith et al. 1990; Miller 1992; Stulz 1996; Jorion 2000, 2001; Field 2003; Harrington and Niehaus 2003; Scaillet 2003; Stulz 2003) and the adoption of new regulations (e.g., Basel I and Basel II; Crouhy et al. 2000; Cummins and Weiss 2009; Dionne 2009, 2013; Dionne et al. 2010).

The goal of corporate risk management is to create a reference framework that will allow companies to handle risk and uncertainty. Risks are present in nearly all of the firms' financial and economic activities. The risk identification, assessment, and management process is part of companies' strategic development; it must be designed and planned at the highest level, namely, the board of directors. An integrated risk management approach must evaluate, control, and monitor all risks and their dependences to which the company is exposed. The International Risk Management Standard AS/NZS ISO 31000:2009 (revised in 2018) provides the principles and guidelines for risk management. According to this standard, "the success of risk management will depend on the effectiveness of the management framework providing the foundations and arrangements that will embed it throughout the organisation at all levels". Within the International Risk Management Standard, the expressions "risk management" and "managing risks" are both used with the following meanings:

- Risk management refers collectively to the principles, framework, and process for managing risks effectively, and
- Managing risks refers to the application of these principles, framework, and process to particular risks.

A risk management approach should be applied in any situation where there exists a possibility of loss, or of opportunities, at the strategic or operational level.

3 Risk and Regulation in Crowdfunding Platform: Focus on Equity Crowdfunding

3.1 Italian Regulation

Equity-based crowdfunding has been identified as a model to raise financing and help a company to succeed in executing certain projects.

The primary regulation on equity crowdfunding is contained in articles 50-quinquies and 100-ter of Legislative Decree n. 58 of 24 February 1998 ("Italian Consolidated Financial Act"), which respectively defines and regulates the activity of online portal operators, namely, those that carry out, on a professional basis, the management of online portals for the collection of capital, enrolled in the special Register (the so-called register of the entities' managing platform) held by CONSOB (Italian Security Exchange Commission). According to these articles, the public offers conducted exclusively via one or more online portals may only concern the subscription of financial instruments issued by certain types of companies identified by CONSOB, by issuing a specific regulation. The management of a platform for the collection of capital for innovative start-ups must be conducted by investment companies and banks that are authorized. These platforms must transmit the orders regarding the underwriting and trading of financial instruments representing capital exclusively to banks and investment companies. The entity managing the platform will not have the right to collect the money from investors, unless it is authorized to act as a financial institution.

As a general rule, the manager of a crowdfunding platform does not raise capital from investors itself. Therefore, the operator of the crowdfunding platform should not constitute an alternative investment fund (AIF).

Italy has regulated this financing method for the first time pursuant to Legislative Decree n. 179 of 18 October 2012, converted by Law 221/2012 (so-called Decreto Crescita 2.0), which permits the raising of money online to support the development of "innovative start-up companies", which meet requirements specified under the same law. With this discipline, Italy became the first country in Europe to have a specific regulation on crowdfunding. This category includes companies, founded no more than sixty months ago, that have as their single or preexisting corporate purpose the development, production and marketing of innovative high-tech products or services. The restriction of equity crowdfunding to innovative start-ups, although motivated by the incentive to create new businesses linked to technological innovation, led to unsatisfactory results in terms of funding provided through this alternative form of financing.

The regulation up to now had limits on the access reserve to the instrument. The authors wish to highlight the missed opportunity to open equity-based crowdfunding up to any start-up, and not only to

those defined as innovative or those with a social utility purpose. Indeed, during a time of crisis such as that which society is currently experiencing, equity crowdfunding could have been a tool for any type of start-up to raise financing from the market.

For this reason, it was necessary to make a first corrective action of the matter, and this was done with D.Lgs n. 3 of 24 January 2015, then converted to Law n. 33 on 24 March 2015 (so-called "Investment Compact Decree"), which also underlines the importance of technological and innovative new companies. The scope of subjective application of equity crowdfunding is extended to innovative SMEs. These particular SMEs are defined as those companies whose shares are not listed on a regulated market and which: (i) have the same innovative requirements as for innovative start-ups, and (ii) have certain dimensional requirements set out in Recommendation 2003/361/EC.

The new regulatory framework introduced by the "2017 Legge di Stabilità", recognizing the potential of equity crowdfunding as an alternative financing channel that can support the development of small and medium-sized Italian enterprises as such, has extended to all SMEs the possibility to adopt the equity crowdfunding tool, regardless of the corporate object.

Resolution n. 20204 of CONSOB, entered into force on 3 January 2018, updates the regulation that introduced equity crowdfunding in Italy. This new regulation states that in addition to innovative start-ups and innovative SMEs being eligible, all small and medium-sized enterprises (SMEs) now have access to equity crowdfunding platforms.

The new regulation leads to an increase in access to equity-based crowdfunding, no longer reserved only for innovative start-ups, but available to all SMEs that are characterized as an innovative business. This important opening allows a reduction in the risks inherent in investments in start-ups: The start-up phase of a company is in fact a critical phase, as it is uncertain about its success. Allowing investors to invest in existing SMEs as well as start-ups means that the risk of their portfolios is reduced because the degree of diversification increases. Moreover, over time, this regulatory intervention could lead to an increase in investors' interest in taking part in the corporate life of companies with particular characteristics with a risk in line with the profitability of the investment itself.

A particular case is constituted by foreign equity crowdfunding platforms that are looking for investors in Italy (ECN 2017). In accordance

to the applicable Italian laws, foreign equity crowdfunding platforms cannot directly operate in the Italian market without having obtained relevant authorization by CONSOB, unless the platform has been granted a MIFID EU license allowing the performance of the activity in Italy through the establishment of a local branch, or directly without any establishment of a local branch, or through an agent established in Italy. The abovementioned authorization can be granted only if the relevant provisions of TUF and of the CONSOB regulation are respected. The abovementioned rules are also applicable with regard to foreign projects published in foreign crowdfunding platforms, due to the fact that such platforms are, as reported above, not allowed to address their activity toward Italian investors.

In accordance to Italian laws, Italian equity crowdfunding platforms that have obtained the relevant authorization by CONSOB cannot directly perform their activity in other countries. Such activities, in fact, are not subject to the principle of mutual recognition. Italian companies are, in theory, allowed to publish a project in an EU equity crowdfunding platform, in accordance with the relevant EU country applicable laws and regulations (ECN 2017).

The expansion of the crowdfunding context required a strengthening of measures to protect investors. In this sense, the legislator deemed it necessary to increase CONSOB's control over the activity of the portals. The Authority has been granted the power to call the directors, statutory auditors, and employees of the portals registered in the appropriate register (Article 50-quinquies, paragraph 6, of the TUF). In line with this requirement, CONSOB also amended the sanctions regime provided for in Regulation n. 18592 of 2013, in order to make it more flexible. The hypotheses in which the Authority may provisionally suspend the suspension of the manager's activities have been revised and extended. The investors' protection, according to CONSOB's resolution, provide: (i) the obligation for equity crowdfunding portals to participate in a compensation scheme to protect investors or to take out professional liability insurance that guarantees investors an equivalent level of protection (Article 50-quinquies, co. 3, of the TUF); (ii) the obligation, for the same portals, to elaborate a more rigorous and detailed policy on conflicts of interest; and (iii) the delegation to CONSOB for the adoption of implementing provisions on internal whistleblowing (or specific procedures for reporting to the internal staff, by deeds or facts that may constitute violations of the regulations governing the performed activity).

3.2 Crowdfunding Risks

As previously analyzed, crowdfunding allows founders of for-profit, cultural, and artistic ventures to fund their ideas by drawing on small contributions from a relatively huge number of people, without using traditional financial intermediaries (Mollick 2014). In particular, it is used in initial funding or early-stage financing, and both implicate high risks.

In general, referring to the risk in crowdfunding, three main types of risks are identified (Yuan 2015):

- Credit risk,
- Liquidity risk, and
- Reputation risk.

Credit risk is principally associated with the lending crowdfunding model. Despite the application of credit evaluation instruments, the existence of false information or inauthenticity of initial data affect the quality of the valuation and, consequently, information asymmetry may still exist. Liquidity risk denotes the possibility of potential loss generated by the lack of capacity to trade, and it is principally connected with equity crowdfunding. This type of risk can be mitigated by reducing the amount of the investment. Reputation risk is a risk for organizations, and it is directly linked to the firm's market value. Crowdfunding platforms always have to face this type of risk. Some platforms assert a high expected return to attract interest without a mechanism for managing connected risks.

Specifically, risks that can occur in crowdfunding platforms are (Stack et al. 2017):

- Money laundering,
- Intellectual property theft,
- Fraud, and
- "failure by success".

The first type of risk, money laundering, appears when there are an ill-intentioned investor and an ill-intentioned fund seeker. Ill-intentioned users could utilize the site as a cover to transfer illegally acquired money.

Table 1 Risks in crowdfunding

Risks in crowdfunding
Credit risk
Liquidity risk
Reputation risk
Money laundering
Intellectual property theft
Fraud
Failure by success

Source Authors' elaboration from Yuan (2015) and Stack et al. (2017)

The second type of risk highlights, from the project initiator's point of view, that intellectual property (IP) is critical to the business and must be managed appropriately. In particular, when a well-intentioned entrepreneur and ill-intentioned investors clash, the risk of IP abuse or theft rises.

In crowdfunding, all the information is connected to Internet technology, and the authenticity of the information cannot be guaranteed. In this sense, the third type of risk—fraud—is that the project is simply a scam where a subject tries to obtain a return from well-intentioned investors.

The combination of well-intentioned investors and well-intentioned entrepreneurs could create very successful results, but it can also end with a failure, a circumstance that characterizes the last type of risk, "failure by success". Earlier studies show that a successful plan can be transformed by delays, due to overly ambitious stretch aims and strategic deviations.

Table 1 summarizes the risks in crowdfunding.

3.3 Equity Crowdfunding Risks

Like any type of investment, there are several rewards (advantages) of equity crowdfunding (e.g., potential for high returns, greater business and job creation, occasion to invest like accredited investors, regulations for investor protection) but also some potential risks.

On the one hand, equity crowdfunding presents a new, attractive investment model, with a market in continuous expansion; on the other hand, complete data and discussions on risks are not yet available.

Table 2 Risks of equity crowdfunding

Risks of equity crowdfunding
High risk of loss
Locked-in investment (lack of liquidity)
Possibility of dilution
Fraud
Unlikely or infrequent dividends
Lack of adequate information
Less protections
No investment advice

Source Authors' elaboration

In particular, in the literature, contributions that have detailed in-depth the risks related to equity crowdfunding are still scarce, and only specialized websites deal, in part, with the topic (e.g., https://www.investopedia.com/, https://www.getsmarteraboutmoney.ca/, https://il.trucrowd.com/, https://help.crowdcube.com/). However, an interesting study is the one by Lin (2017), which shows, in the Chinese context, how equity crowdfunding platforms are not neutral intermediaries in connecting investment opportunities with sources of capital. The author highlights that private ordering alone will not address the information and agency asymmetry problems characteristic in equity crowdfunding platforms. In particular, certain risks related to equity crowdfunding are linked to the typical risks of an investment, while others are characteristic of this new fundraising method. The risks that this paper has identified are summarized in Table 2.

With regard to the high risk of loss, as previously analyzed, companies that try financing through crowdfunding are start-ups or early-stage firms, but most of these fail. The risk of losing all the money is higher, but it is also a typical characteristic of investment in equity. With regard to locked-in investments (lack of liquidity), the investment in crowdfunding assets should be considered a long-term and illiquid investment. If an investor decides to sell, there is a good possibility that he won't be able to resell the shares in the companies that he has invested in until there is a change in the firm, and this may never happen. Without a public market to discover a buyer for shares, it may be more problematic to sell them. With regard to the possibility of dilution, investments made through this type of crowdfunding may be subject to

future dilution. Some companies looking for investments through these campaigns offer "seed shares", which may contain preemption rights that defend an investor from dilution. In this situation, the company must give shareholders with seed shares the chance to buy extra shares during a subsequent fundraising round in order to maintain or preserve their shareholding. With regard to fraud, despite checks made by funding portals, people with ill intentions may not be completely prevented from offering shares by means of crowdfunding. With regard to unlikely or infrequent dividends, most of the firms seeking financing via equity crowdfunding rarely pay dividends to their investors since they are start-ups or early-stage companies; profits are normally reinvested into the business to fuel development and build shareholder value (e.g., Damilano et al. 2018; Miglietta et al. 2017, 2018). With regard to lack of adequate information, investors receive some data and information, such as, for example, an offering document, financial statements, and annual updates about how money is being spent, but they do not receive the same information that public organizations make available. With regard to fewer protections, this type of investment is not reviewed or approved by a securities regulator. Investors do not have the same legal rights that they could obtain through a stock exchange. With regard to no investment advice, unless a crowdfunding portal is managed by a registered investment dealer or exempt market dealer, it is difficult for the investor to get information about whether the investment is suitable, based on the degree of risk propensity.

As of November 2018, 30 equity crowdfunding platforms exist in Italy: 28 registered in the ordinary category and two platforms registered in the special category (unicaseed.it of Unica SIM and tifosy.com of Tifosy Limited).

Table 3 summarizes some characteristics of those platforms in the ordinary category, in order to highlight whether, in general, at least one of the risks previously introduced is or is not explained in each crowdfunding platform.

With reference to the authorization date, one was authorized in 2013, nine in 2014, four in 2015, one in 2016, five in 2017, and eight in 2018 (in November). Thirteen were founded in Lombardia, four in Lazio and Toscana, three in Marche, and one in each of Puglia, Liguria, Trentino Alto Adige, and Piemonte.

The table also shows that 19 out of 28 equity crowdfunding platforms show the concept of risk directly or indirectly on their websites. Eight of

Table 3 Italian equity crowdfunding platforms registered in the ordinary category

Website	*Controlling company*	*Classif. of economic activity*	*Date of authorization*	*Region*	*Risk explained*	*Risk not explained*
Starsup.it	Starsup Srl	63.12.00	10/18/2013	Toscana	X	
Actioncrowd.it	Action Crowd Srl	63.12.00	02/26/2014	Lombardia		X
200crowd.com	The Ing Project Srl	63.12.00	06/18/2014	Lombardia		X
Nextequity.it	Next Equity Crowdfunding Marche Srl	63.12.00	07/16/2014	Marche	X	
Crowdfundme.it	Crowdfundme SpA	70.22.09	07/30/2014	Lombardia	X	
Muumlab.com	Muum Lab Srl	63.12.00	08/06/2014	Puglia	X	
Mamacrowd.com	Siamosoci Srl	70.22.09	08/06/2014	Lombardia	X	
Fundera.it	Fundera Srl	63.12.00	09/10/2014	Lombardia	X	
Ecomill.it	Ecomill Srl	72.19.09	10/29/2014	Lombardia		X
Wearestarting.it	Wearestarting Srl	63.12.00	12/16/2014	Lombardia	X	
Backtowork24.com	Backtowork24 Srl	82.99.99	01/14/2015	Lombardia	X	
Investi-re.it	Baldi Finance SpA	70.22.09	01/28/2015	Lombardia	X	
Crowd4capital.it	Roma Venture Consulting Srl	63.12.00	10/08/2015	Lazio	Not evaluable	Not evaluable
Opstart.it	Opstart Srl	63.12.00	11/11/2015	Lombardia	X	
Cofyp.com	Cofyp Srl	63.12.00	04/14/2016	Marche	X	
Clubdealonline.com	Clubdeal Srl	63.12.00	03/08/2017	Lombardia	X	
Walliance.eu	Walliance Srl	63.12.00	03/30/2017	Trentino Alto Adige	X	
Europacrowd.it	Europa HD Srl	70.22.09	06/07/2017	Lazio	X	
Italyfunding.com	Italyfunding Srl	63.12.00	09/06/2017	Marche	X	
Ideacrowdfunding.it	Idea Crowdfunding Srl	64.99.60	11/29/2017	Lazio		X
Thebestequity.com	Gamga Srl	70.22.09	03/14/2018	Lombardia	X	

(continued)

Table 3 (continued)

Website	*Controlling company*	*Classif. of economic activity*	*Date of authorization*	*Region*	*Risk explained*	*Risk not explained*
Leonardoequity.com	Management Capital Partner Srl	70.22.09	04/17/2018	Toscana		X
Concreteinvesting.com	Concrete Srl	70.22.09	04/24/2018	Lombardia		X
It.lita.co	1001Pact Italy Srl	63.12.00	05/31/2018	Piemonte		X
Lifeseeder.com	Lifeseeder SpA	63.12.00	06/28/2018	Lazio	X	
Extrafunding.it	Extrafin Srl	47.91.10	07/05/2018	Toscana		X
Crowdinvestitalia.it	Crowdinvest Srl	63.12.00	07/10/2018	Toscana	X	
House4crowd.com	4Crowd SpA	63.12.00	07/17/2018	Lombardia	X	

Source Authors' elaboration

the 28 do not explain it, while for one case it was not possible to analyze the concept because the site is not active.

4 Risk Management Approaches in Crowdfunding Platforms

Several risk management methods for the context of IT systems have been proposed in the past. Also, crowdfunding platforms (CFPs) have taken measures to deal with the potential risk caused by business factors.

In general, platforms implement several methods to minimize risks, although approaches are founded on the general risk management theory and the risk management technique. These include, for example, minimizing information asymmetry between owners and funders, and assisting participants with the identification, measurement, and pricing of risks. Diversification also represents an important method to manage credit risk, for example, setting limits to the maximum amount to invest in a single project. Finally, the implementation of an adequate internal control system for crowdfunding platforms enables the reduction of some types of risks (Yuan 2015).

More specifically, a risk management approach is different in relation to the step of the investment decision-making process (Chen et al. 2018). Corresponding to the project selection, the risk management activity of the CFP consists in checking all the applied crowdfunding projects and rejecting high-risk projects to guarantee a high success ratio of the crowdfunding projects. Before the pledging project is established, funders are required to provide personal credit information and a valid introduction about the pledging project.

Risk management during pledging concerns financing rules. When the project is established, the CFP will control the overall risk of the project by applying the financing systems. There are two systems: All or Nothing (AoN) and Keep it All (KiA). According to the AoN system, money is collected from contributors if a predetermined target has been achieved. If the goal is not met, no money is collected. Under KiA system, all of the money is collected without return regardless of whether the pledging goal is achieved or not.

After pledging, the risk management activities of the CFP concern information disclosure. If a project has pledged enough money, funders are required to update the project's latest information and post the information in conspicuous places to capture backers' attention. A funder can

also pass the latest information, texts, pictures, and video clips to the backers on an SNS, in the project's community, or by other interaction channels.

Each platform may decide to adopt a strategy to manage risk. The main strategies include:

- Risk avoidance,
- Risk sharing,
- Risk diversification, and
- Risk retention.

Risk avoidance is a risk-adverse strategy of CFPs. According to this strategy, after diligent research and analysis of the business and market context, CFPs prevent risk through careful selection, rejecting risky applications and tightening the financing amount. According to the risk-sharing strategy, CFPs adopt a common strategy of risk hedging, in which risk is transferred to a third party or other parties through different means, for example, through the stipulation of insurance; taking a position in derivatives such as credit default swaps, options, or futures; and/or buying securities or guarantees of third parties. CFPs can decide to manage the concentration of risk by adopting a diversification strategy. This strategy is suitable to reduce non-systematic risks by expanding business lines, investing synergistically, and distinguishing investments among various projects, markets, and financial instruments. Adopting a risk retention strategy instead, a CFP's managers can decide whether or not to take risks. According to this strategy, they take risks consciously and voluntary.

Adopting the strategy or mix of strategies best suited to each CFP is essential because CFPs are normally companies that have a huge social influence, based on their form of social network, their financial activities, and the quantity of funders involved. Similar to intermediaries in the financial sector, by protecting investors with a good risk management strategy, CFPs gain in terms of both reputation and financial performance.

5 Conclusions, Implications, and Future Lines of Research

Emerging trends in financial innovation pose major challenges for banks and financial intermediaries. In consequence, the need arises for a strategic approach that takes into account new opportunities and new risks toward the objectives of incentive competition and overall systemic stability.

In this sense, technological innovation, above all, is not a new component of the financial system, but rather it represents an element inherent in the financial industry itself, by its constantly evolving nature, toward the development of new products and services to offer. It is no coincidence that according to the logic of FinTech, the present authors propose technologically innovative financial solutions in line with the change of social drivers, in the face of economic needs that keep common denominators constant over time.

Within this evolutionary dialectic of the financial system, new themes such as crowdfunding arise from operational options inspired by regulatory or technological innovations, as well as from institutional and market perspectives.

The aim of this paper was to investigate the relationship between crowdfunding platforms and risk management in order to evaluate the impact for participants, focusing on a model with possible financial return: equity-based crowdfunding. Unlike institutional investors, generally crowdfunding funders don't have specific knowledge in risk management, and they are much more addicted on platforms and their services. Based on the level of knowledge of inexpert funders, the risk management of platforms directly influences investment performance. In this sense, the identification of the different types of risk that crowdfunding platform managers can incur is essential for developing risk management methods and practices specific to this particular financing instrument.

This paper's exploratory research offers some interesting implications for theory, practice, and policy.

Concerning the theoretical implications, this paper tries to define the specific risks of equity crowdfunding, both from the point of view of the financial instrument in general and from a management and control perspective.

Regarding practical implications, this research suggests a new classification of equity crowdfunding risk, proposing a specific definition for each identified risk category that can be useful for platform providers and investors.

Although the types of risks in crowdfunding are quite diversified, and specifically in equity crowdfunding, none of them is subject to control by the funder. In this sense, platforms play significant roles in offering protection to crowdfunding participants, in particular funders.

Finally, concerning policy implications, this study can be useful to regulators in order to draw up a common regulation that can identify specific risks for each type of crowdfunding, in order to increase the degree of protection for investors in a logic of transparency and awareness of investment, following the regulatory logic proposed by CONSOB.

Future developments of this work may concern two specific aspects, relating to theoretical and empirical perspectives.

On one hand, in order to improve the existing literature, future work may focus on the extension of the proposed classification of the risks typical of equity-based crowdfunding to other types of crowdfunding (e.g., to debt-based crowdfunding, which is another model with financial return) or in other countries (e.g., the United States, France, the United Kingdom, Germany), as well as the analysis of whether and how Italian equity crowdfunding platforms manage risk (e.g., different risk management practices).

On the other hand, future work may provide an empirical analysis based on interviews with providers' platforms in order to confirm the proposed classification of specific risks of equity-based crowdfunding or to identify possible distinctions between the risks identified in the present research and the risks perceived by the manager of the platforms.

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CHAPTER 3

Fair Value Measurement Under Level 2 Inputs: Do Market and Transaction Multiples Catch Firm-Specific Risk Factors?

Vera Palea, Christian Rainero and Alessandro Migliavacca

1 Introduction

The present work focuses on the appraisal of private equity fair value under the IFRS 13 Fair Value Measurement assumptions, building upon the previous findings of Palea and Maino (2013). Based on the assumption that, under market efficiency hypothesis, the fair value is well represented by market capitalization, Palea and Maino observe that inconsistencies arise when estimating the enterprise value of a listed company with market and transaction multiples. In particular, they assert that their "*statistical analysis supports the claim that market and transaction multiples cannot provide a faithful representation of the real-world*

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economic phenomena they purport to represent. Consistently with Kim and Ritter (1999), market and transaction multiples perform very poorly".

Market multiples and transaction multiples appraisal of the enterprise value are categorized by IFRS 13 in "Level 2" of the fair value estimation techniques hierarchy. As the two methodologies are both based on market-wide and peer analyses, the value that arises from calculation using one of the two is expected to closely approximate the real fair value of a company. The purpose of this contribution is to test if this actually holds in practice. Our research question can therefore be formulated as follows: Are market and transaction multiples capable of estimating correctly the real fair value of a company, catching firm-specific risk factors?

In order to resolve this research question, extending Palea and Maino (2013) in terms of years and number of firms included in the analysis, we set up an empirical test to compare the market capitalization and the enterprise value calculated by market and transaction multiples on a larger dataset. Specifically, we compare the fair value estimated by market and transaction multiples with the effective market capitalization over 15 years (2003–2017).

We argue that fair value as defined by IFRS 13, and evaluated by market and transaction multiples approaches, does not provide a reliable measure of the real value of a company, the difference between evaluated and real fair value varying depending upon portfolios and periods of time.

The results are significant because in the case of observable Level 2 fair value indicators, such as market multiples, the fair value is not consistent with the real market value of the equity. This raises issues regarding private equity evaluation, where Level 2 indicators are not easily observable, nonviable for catching firm-specific risk factors and potentially increasing volatility and intrinsic evaluation risk.

2 Quality of Information, Fair Value Measurement and Firm Value

From an investor's perspective, the quality of financial statement information is crucial for the investment decision making process. In particular, any estimation error that occurs in accounting information increases the information-processing costs for the users, the estimation risk premium and the investors' adverse selection. Any reduction in the quality of information of financial statements increases the cost of capital to the

company (Baiman and Verrecchia 1996; Diamond and Verrecchia 1991). This, in turn, leads to a reduction in the firm's assets because of the uncertainty the investors perceive in the accounting information.

This is particularly true in the case of subjectivity of accounting information, such as in the case of estimates. In these cases, managers tend to exert their decisional power and abuse discretion, which leads to biases in their estimations (Aboody et al. 2006; Bartov et al. 2007).

When the biases are foreseeable, investors tend to predict and consider them in the firm's value estimation; when the biases are unexpected and unpredictable, the accounting information quality deteriorates, the firm's value decreases and the investors are less capable of monitoring managerial decisions and behaviors (Bens and Monahan 2004; Biddle and Hilary 2006; Bushman and Smith 2001; Hope and Thomas 2008; Kanodia et al. 2004; Lombardo and Pagano 2002). This creates a vicious circle where unreliable information gradually reduces the firm's value in the mid- and long-term.

In order to reduce the information asymmetry that could arise in those cases and to improve the quality of information, the prevalent opinion held by both the standard setters and prevalent academic literature is that the best and most relevant information for financial statement users is provided by the fair value (Barth et al. 2001).

The fair value of any asset, as defined by both IFRS and SFAS accounting principles, is the price that would be received for the sale of that asset in an orderly transaction between market participants at the measurement date.

In 2011 the IASB issued IFRS 13 "*Fair value measurement*", which came into effect on January 1st, 2013 (International Accounting Standards Board 2013). The standard describes a framework for fair value measurement by outlining methodology. As pointed out by IFRS 13, the fair value must be determined on a market-based and not entity-specific measurement. Thus, fair value represents an exit price and its measurement relies on the usage of evaluation approaches capable of observing the fair value from a market perspective.

IFRS 13 establishes a hierarchy that classifies the inputs for fair value measurement in three categories:

1. Level 1 inputs: this level represents the most reliable and the most observable of the inputs for fair value measurement. At the first level, thus at the highest priority, it indicates the unadjusted

quoted prices of the common shares. Generally, these are represented by market capitalization. The quoted prices of identical assets on the market are considered in this level.

2. Level 2 inputs: this level equates fair value to:
   (a) quoted prices for similar assets in active markets;
   (b) quoted prices for identical or similar assets in markets that are not active;
   (c) inputs other than quoted prices that are observable for the assets, such as interest rates and yield curves observable at commonly quoted intervals, volatilities, prepayment speeds, loss severities, credit risks and default rates;
   (d) and inputs that are derived principally from, or corroborated by, observable market data by correlation or other means.
3. Level 3 inputs: unobservable inputs, for which market data are not available. Usually those are made up of the best information available at the moment, and bring up information asymmetries between preparers of financial statements (managers) and users (investors); usually, Discounted Cash Flow and other income methods are included in this level, as they are based on internal data, projections, forecasts and estimates that are not directly observable on the market.

The extant literature highlights how the users of a financial statement prefer estimations conducted through higher input levels. In particular, investors tend to prefer cases where the fair value is estimated via Level 1 inputs rather than Level 2 inputs (Goh et al. 2015; Kolev 2009). The same is not true between Level 2 and Level 3, where investors tend to value the two typologies of inputs similarly, in particular during market and liquidity crises (Song et al. 2010).

Assuming that for private equity, in most cases, it is not possible to obtain Level 1 data, from an IFRS 13 perspective the Level 2 data should be preferred. This means that the company's value has to be determined on the basis of market data.

As is clear, though, private equity performance is quite different from that of public companies. Generally, private equities show lower average levels of economic returns (Moskowitz and Vissing-Jørgensen 2002; Quigley and Woodward 2002). Moreover, the distribution of the economic returns shows a great asymmetry, presenting a long right tail of good and excellent economic returns (Cochrane 2005). Determining an

average value for the "peers" of the company would thus result in the introduction of a bias, given the presence of rare-breed outliers.

This has also been pointed out by Kim and Ritter (1999) who, by testing the performance of the price-to-earnings, price-to-sales, enterprise-value-to-sales and enterprise-value-to-operating cash flow ratios, discover that the market multiples perform badly, especially when using historical data as input for the evaluation. The unreliability of these multiples has also been tested by Lie and Lie (2002) in a more general study. They find that the most commonly used market multiples (Price-to-Earnings (P/E), Enterprise Value-to-Sales, Enterprise Value-to-EBIT(DA)) tend to bias the estimations by introducing valuation errors, that are not influenced by the cash levels of the company, but are greatly conditioned by the size of the company, its profitability and the extent of the intangible value.

Along the same lines, Palea and Maino (2013) compared the "real" fair value of a company (the market capitalization, that is the price paid on the market for that precise asset at the measurement moment) with the fair value determined on "Level 2" inputs, namely the market and transaction EBITDA multiples. By analyzing both the "stock" normalized differences and the return yield, they point out that the use of market and transaction multiples introduces arbitrary and unrestrained estimation errors, and in particular overestimations. Their analysis suggests market and transaction multiples do not catch risk-specific firm factors, thus introducing implicit measurement risk in the assessment of fair value. Nonetheless, practitioners and academic researchers tend to make frequent use of market and transaction multiples to assess the fair value of a company, although concurring analyses over a large time period confirms that there is no agreement on which multiple performs best. The research that follows attempts to expand Palea and Maino (2013) analysis on a larger dataset and time period in order to provide further evidence of the reliability of Level 2 inputs.

3 Research Design, Methodology and Data Collection

As pointed out in literature, any evaluation method produces approximations and inherent errors. In the case of financial statements, the introduction of such errors in determining asset fair values increases volatility

and reduces the quality of the information, which can trigger a vicious circle that reduces the value of the firm in the medium and long term.

As mentioned above, this paper tests the reliability of the market and transaction multiples methods of fair value measurement of private equities. Specifically, we investigate whether, even if the multiples are determined on the basis of reliable and unbiased market data, their use in the evaluation process for private equity fair value introduces great errors in the estimates.

To test the extent of the errors introduced by the market and transaction multiples in measuring fair values, we consider a sample of public companies, which we treat as if they were private. We therefore assess their fair value by using Level 2 inputs. We use market capitalization as the real fair value, which is consistent with the market efficiency hypothesis (Malkiel and Fama 1970). We then compare values based on transaction and market multiples with market capitalization to test for estimation errors.

In our test, we follow the best practices implemented by practitioners in private equity fair value estimation.

First of all, we extract data for 1678 companies for the fiscal years 2003–2017 from the EIKON/DataStream database (Thomson Reuters). The companies are selected applying the following proxies: Active Public Companies; with Headquarters located in Germany, France, Italy or Spain; operating in all economic sectors, excluding financial. The analysis therefore covers all the population of nonfinancial firms in the four countries included in the analysis. We exclude financial firms because of their specificities, which do not allow comparison with industrial firms.

The choice of country headquarters is based on the assumption that those are the most representative of the EU economy, with a long record of listed companies and relevant information made transparently available. Also, almost all of them issue their financial statement in Euro. For each company and each fiscal year, we extract the income statement and balance sheet variables indicated in Appendix A.

We created consistent portfolios of listed companies for several economic sectors, in order to evaluate the market multiples for all of the different sectors. We use the same classification considered by the FitchRatings "European Leveraged Finance Multiple EV-aluator" Special Report (Svantner et al. 2016).

The portfolios are the following (Table 1):

Table 1 Portfolios considered for the analysis

Portfolio	*# of companies*
Aerospace and defense	19
Auto and related	55
Chemicals	46
Consumer products	107
Diversified manufacturing	171
Diversified services	113
Energy	54
Food, beverage and tobacco	83
Gaming, lodging and leisure	84
Healthcare	178
Homebuilding, building materials and construction	106
Media and entertainment	113
Natural resources	36
Retail	70
Technology	297
Telecom and cable	35
Transportation	47
Utilities	64

Source Our processing based on Svantner et al. (2016)

Consistent with the methodology applied by Fitch, we calculate the market multiples for each year and each portfolio. The multiples are calculated as the median for each of the following variables:

- Price/Earnings per Share (MKT_PE) and Forward Price/Earnings per Share (MKT_PE_FWD), considering all of the companies with positive earnings;
- Enterprise Value to Sales (MKT_EV_SALES) and Forward Enterprise Value to Sales (MKT_EV_SALES_FWD);
- Enterprise Value to EBITDA (MKT_EV_EBITDA) and Forward Enterprise Value to EBITDA (MKT_EV_EBITDA_FWD), considering all of the companies with a positive EBITDA;
- Enterprise Value to EBIT (MKT_EV_EBIT) and Forward Enterprise Value to EBIT (MKT_EV_EBIT_FWD), considering all of the companies with a positive EBIT.

In the case of the multiples related to EBIT and EBITDA, we proceed to subtract the net debt from—or to add the net cash and cash equivalent to—the calculated fair value.

Appendix B reports values for each multiple grouped by portfolios and sorted by fiscal year.

As mentioned above, transaction multiples are extracted from the Fitch special report for each portfolio. The Fitch report covers the years from 2007 to 2016 and in some cases it has null values for specific sectors in specific years where data is missing. In order to increase the significance of the data and consistent with the best practices, we assign transaction multiples to each company for each year as the mean of the measurement of the year and the previous year (where available).

We then apply a discount factor in order to determine the fair value of the minority interest. Fair values computed under the transaction multiples include a control premium, whereas we are comparing multiples with stock prices of single shares. We therefore assume an average control premium of 35%, large yet realistic, since it is consistent with past empirical evidence (Hanouna et al. 2013). Consequently, all of the transaction-multiples-based fair values are rather conservative. We also assume different control premiums up to 50% as a robustness check, which provide the same qualitative results.[1]

We compare the results for the estimated fair value for the different multiples with the market capitalization value. The analysis is performed both on a yearly and five-year basis. The latter is particularly interesting as it includes three different "economic cycles": a pre-crisis/moderate growth period (2003–2007), a crisis/regressive period (2008–2012) and a post-crisis/recovery period (2013–2017).

Appendix C reports the descriptive statistics for each variable and for each year/period. All the variables are correlated to the market capitalization at a statistical significance level of $p < 0.01$.

Furthermore, our analysis is conducted using two different perspectives. The first perspective focuses on the difference between market and transaction multiples, on the one hand, and the market capitalization, on the other hand. This analysis is conducted at a "portfolio level", this being the value that an investor should put in its own financial statements if they held the all equities included in the sample. It allows the

[1] As the difference is not significant, the robustness check is not tabled.

determination of whether the market multiples under- or over-estimate the fair value. It also allows the determination of the ripple effect that the under or overestimation generates in the following years' profits or losses in the portfolio evaluation.

The second perspective considers the ratio between the market and transaction multiples on the one hand, and the market capitalization on the other. This allows analysis of the statistical distribution of the ratios. If the ratio is lower than 1, this indicates that the company's fair value is underestimated by the multiples in comparison with the market capitalization. If the ratio is greater than 1, this indicates that the company's fair value is overestimated by market multiples when compared to market capitalization.

We determine the moments of the distribution, and in particular quartiles, median, skewness and kurtosis, which allows testing of the level of accuracy of the market and transaction multiples method of evaluation at a single-company level.

4 Data Analysis and Discussion of Findings

4.1 Analysis of the Portfolio Fair Values: Estimation of the Biases Introduced by Market and Transaction Multiples and Their Effect on Asset Values and Balance Sheet

As mentioned above, we first investigate the reliability of the market multiples methods by comparing results at portfolio level. The fair value of the portfolio is calculated by summing all the fair values (market capitalization and estimated fair values) for each year. The full values are reported in Appendix D. In order to render a proper and comprehensible picture of the results, they are scaled to a common factor, by normalizing the market capitalization at the date of December 31, 2003 to 1000 and by scaling all the other values to it.

Figure 1 depicts normalized results for the "historical" multiples and their polynomial interpolation through the years, while Fig. 2 shows results for "forward" multiples. At first glance, both graphs suggest that the use of market multiples estimation techniques is not reliable in most of the cases.

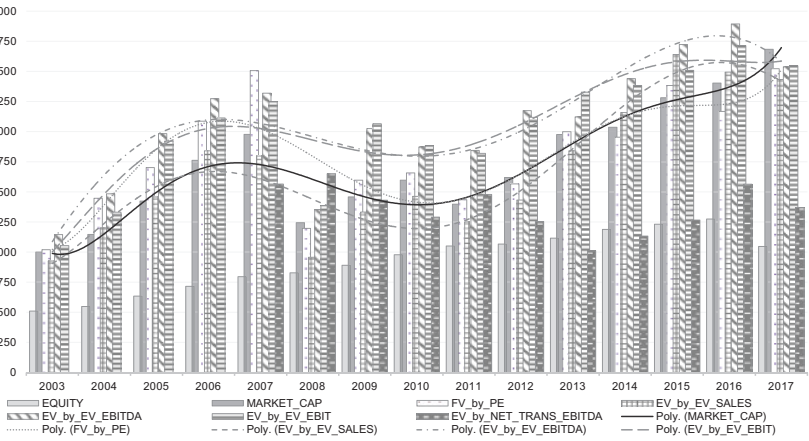

Fig. 1 Normalized results for full portfolio—Stock multiples (*Source* Our processing. Equity stands for Book Value of Equity. Market Cap stands for Market capitalization, FV_by_PE is the fair value calculated via the P/E multiple, EV_by_EV_* is the enterprise value calculated via the market multiple on the economic item indicated (*))

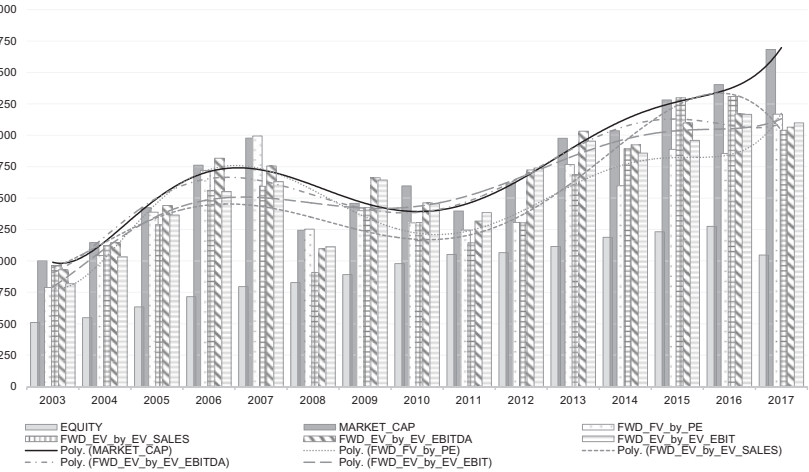

Fig. 2 Normalized results for full portfolio—Forward multiples (*Source* Our processing. Equity stands for Book Value of Equity. Market Cap stands for Market capitalization, FV_by_PE is the fair value calculated via the P/E multiple, EV_by_EV_* is the enterprise value calculated via the market multiple on the economic item indicated (*))

Table 2 P/E-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
+2.0	+26.2	+19.6	+18.4	+26.8	(3.7)	+9.5	+3.8	+2.7	(3.3)	+1.2	(4.0)	+4.5	(9.8)	(6.0)
Standard deviation to mean ratio difference (%)														
(19.3)	(14.8)	+26.5	+11.4	+19.5	(44.4)	+0.8	(7.2)	(18.8)	(15.2)	+4.3	(46.1)	(31.2)	(62.3)	(27.3)

Source Our processing

Table 3 P/E-forward-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
(21.2)	(8.9)	(2.5)	(2.4)	+0.8	+0.7	(4.0)	(18.5)	(10.9)	(19.3)	(10.6)	(21.5)	(17.3)	(22.9)	(19.2)
Standard deviation to mean ratio difference (%)														
(69.8)	(20.0)	+12.4	+1.4	+3.3	(26.0)	+6.3	(16.9)	(17.3)	(11.1)	+12.9	(36.8)	(39.3)	(63.7)	(32.0)

Source Our processing

4.1.1 P/E Fair Values

The P/E market multiple (Fig. 1, dotted bar) shows a threefold trend. In the pre-crisis years (2003–2007) it shows a quite large excess value of +18 to +26% from the market capitalization (medium gray bar). During the crisis years (2008–2012) it shows a more conservative attitude, with smaller differences of –3.7 to +9.5%. In the post-crisis upswing the volatility is slightly exacerbated, with a –9.8 to +4.5% wavering in the portfolio evaluation during the period. Taken as a whole, the P/E market multiple does not seem not capable of depicting the correct value for the portfolio, with a high volatility in the results and in the reliability.

The next table shows the percentage difference of the multiple and the standard deviation to mean ratio difference from the market capitalization (Table 2).

The P/E forward market multiple (Fig. 2, dotted bar) shows a behavior that is even more volatile. The smallest differences can be found in the pre-crisis (2005–2007) and first periods of the crisis (2008–2009), with differences in the range of –4 to +0.8%. In all the other years and periods, the differences are significantly larger (–10.6% down to –22.9%). Moreover, the differences are not correlated to the "historical" P/E market multiple, not even with a time lag (Table 3).

4.1.2 EV/SALES Fair Values

During 2004–2006 period, the EV/Sales multiple fair value (Fig. 1, squared bar) is less than 5% higher than the market capitalization (medium gray bar). Quite the opposite during crisis and recession (2007–2013), when the market multiple severely underestimates the fair value of the enterprise, with offset peaks greater than –10%. Also, in the post-crisis period, the volatility is even greater, with rises and falls in values up to +15.8% and down to –9% (Table 4).

Again, the "forward" multiple (squared bar on Fig. 2) shows great deviations from the real fair value, with large variations between different years (Table 5).

4.1.3 EV/EBITDA Fair Values

The EV/EBITDA multiple (Fig. 1, diagonal line filled bar) is one of the most acknowledged and used in practice, together with the P/E multiple. Our analysis, however, shows that, at portfolio level, the multiple performs poorly in any period and economic situation, with almost constant overestimations greater than +15% (except from year 2003, 2013 and 2017) and up to almost +39%.

Table 4 EV/sales-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
(7.3)	+4.8	+2.4	+4.5	(9.1)	(23.1)	(8.6)	(8.4)	(10.5)	(11.6)	(6.9)	+6.0	+15.8	+3.8	(9.4)
Standard deviation to mean ratio difference (%)														
(32.1)	+16.9	+63.8	+62.0	+37.7	+23.0	(0.6)	+20.3	+31.9	+23.6	+19.2	+33.4	+51.8	(4.0)	+11.0

Source Our processing

Table 5 EV/sales-forward-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
(3.8)	(2.3)	(9.5)	(11.4)	(19.4)	(27.0)	(2.3)	(18.3)	(18.1)	(19.6)	(14.8)	(7.1)	0.7	(3.9)	(24.0)
Standard deviation to mean ratio difference (%)														
(37.4)	(17.3)	+30.7	+29.5	+10.4	+1.0	(6.7)	+3.2	+10.3	+15.9	+12.6	+17.9	+23.0	+1.3	(3.5)

Source Our processing

Also, the overestimations fluctuate through the years with no predictable pattern, which is consistent with Palea and Maino (2013) (Table 6).

In this case, the EV/EBITDA forward multiple (Fig. 2, diagonal line filled bar) seems to perform better than the "historical" multiple, although with deviations similar to those of the other multiples. More specifically, it shows severe losses in reliability during the crisis period (2007–2012) and high volatility during the economic recovery (with fluctuations that rarely leave the "below-zero" deviation) (Table 7).

4.1.4 EV/EBIT Fair Values

As well as the previous multiples, also the EV/EBIT is one of the most commonly used in practice. This multiple (Fig. 1, horizontal line filled bar) shows great differences if compared with the real market capitalization fair value. In particular, the difference is almost in any case an overestimation of more than +10% up to +42%. The volatility over the years is also pronounced, with peaks of variations, in particular during the crisis period (from +11.5% in 2008 to +41.7% in 2009, then +17.8% in 2010 and again up to +30.3% in 2011). According to our analysis, this multiple is one of the most unreliable of all for the estimation of the portfolio fair value (Table 8).

Table 6 EV/EBITDA-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
+14.5	+29.5	+39.4	+29.1	+17.2	+8.8	+38.9	+17.2	+32.0	+34.2	+7.4	+19.8	+19.4	+20.4	(5.4)
Standard deviation to mean ratio difference (%)														
(33.8)	+28.5	+142.1	+108.2	+87.7	+53.4	+0.3	+50.7	+26.7	+107.0	(13.2)	+22.7	(14.5)	(25.9)	(31.6)

Source Our processing

Table 7 EV/EBITDA-forward-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
(7.0)	(0.1)	+1.2	+3.1	(11.3)	(11.8)	+13.9	(8.5)	(5.7)	+6.4	+2.8	(5.5)	(8.0)	(9.7)	(23.0)
Standard deviation to mean ratio difference (%)														
(33.9)	+27.6	+66.6	+68.9	+81.2	(6.2)	(1.0)	+32.7	+12.3	+116.3	(8.6)	+7.6	(40.2)	(41.4)	(39.1)

Source Our processing

Table 8 EV/EBIT-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
+5.3	+16.2	+35.1	+20.0	+13.7	+11.5	+41.7	+17.8	+30.3	+30.8	+17.8	+17.0	+10.0	+12.9	(5.1)
Standard deviation to mean ratio difference (%)														
(18.8)	+39.6	+202.4	+111.3	+96.3	+19.8	(25.2)	+27.2	+12.4	+58.5	(38.1)	(17.2)	(70.9)	(67.9)	(65.5)

Source Our processing

Table 9 EV/EBIT-forward-fair-value percent difference from market capitalization and standard deviation to mean ratio difference

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
(18.2)	(10.1)	(4.1)	(11.9)	(17.5)	(10.7)	+12.8	(8.9)	(1.0)	+7.4	(1.2)	(8.8)	(14.1)	(9.9)	(21.8)
Standard deviation to mean ratio difference (%)														
(38.2)	+29.8	+97.4	+72.5	+58.9	(20.1)	(18.4)	+19.6	+13.8	+64.0	(36.1)	(13.2)	(67.3)	(62.7)	(64.0)

Source Our processing

In the case of the EV/EBIT forward multiple (Fig. 2, horizontal line filled bar), differences are similar to those of the other "forwards". In fact, it results in a consistent underestimation in most of the years, with the same volatility and uncertainty during the crisis period (Table 9).

4.1.5 Transaction Multiples (EBITDA) Fair Value

In line with our results on market multiples, the transaction multiples calculated on EBITDA (Fig. 1, dark gray with lines fill bar), when available, show low levels of reliability. The values are inconsistent through the years and are greatly fluctuating from almost a half of the market cap value up to more than 30% greater. This would result in a great artificial volatility in the financial statement, that is, volatility due to estimation errors and not to changing economic conditions (Table 10).

This volatility is not influenced by the premium applied to the evaluation. The next table reports the transaction multiples gross of the "control premium". Results are consistent with those from the net multiple: low reliability and high volatility. The results of gross EBITDA-Transaction multiple fair value are not reported in the figure, because the Net Transaction (reported as dark gray with lines fill bar) is a mere

Table 10 Net EBITDA-Transaction-multiple-fair-value percent difference from market capitalization

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
% difference														
n.d.	n.d.	n.d.	n.d.	(20.9)	32.7	(1.9)	(19.2)	+5.8	(22.6)	(48.9)	(44.4)	(44.5)	(34.9)	(48.9)
Standard deviation to mean ratio difference (%)														
n.d.	n.d.	n.d.	n.d.	+54.6	+32.9	+27.6	+55.8	(1.1)	(19.9)	(32.7)	+36.2	(43.9)	(1.6)	+22.0

Source Our processing

Table 11 Gross EBITDA-Transaction-multiple-fair-value percent difference from market capitalization

2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
n.d.	n.d.	n.d.	n.d.	+21.8	+104.1	+50.9	+24.3	+62.8	+19.0	(21.4)	(14.4)	(14.7)	+0.2	(21.4)

Source Our processing

proportional reduction of the gross value (that, thus, would be even higher than it is for the "Net" multiple) (Table 11).

4.2 Analysis of the Portfolio Trends and Volatility in the Financial Statements: Estimation of the Variation of the Portfolio Evaluation and Its Effects on P/L Statement

The next step of our analysis consists in the appraisal of the effects that the consistent application of the multiples could have on the financial statement, and in particular on the assets and on the earnings, in the case of implementation of the IFRS principles. In fact, differences between the market capitalization and the fair values estimates deploy their effects not only in the year of evaluation but also in the following years. The effect of the errors in a single year shows the over or underestimation of the asset value. The variation between two consequent years reflects the error on the profit and losses statement, thus on the earnings. Table 12 shows the variations of the portfolio value for each of the different multiple over time. Such variations have to be compared with the variations in the market capitalization.[2]

[2]The variation is scaled by considering the market capitalization of year 2003 equal to 1000. Thus, the variations reported in the table is a "per thousand" result.

Table 12 Variations (‰, per-thousand) of the portfolio value between years

	2003–2004	*2004–2005*	*2005–2006*	*2006–2007*	*2007–2008*	*2008–2009*	*2009–2010*	*2010–2011*	*2011–2012*	*2012–2013*	*2013–2014*	*2014–2015*	*2015–2016*	*2016–2017*
Equity	37.9	85.9	80.9	80.2	32.1	63.2	87.2	72.9	15.41	48.7	72.7	44.0	38.0	85.9
Market cap	145.9	277.2	338.3	216.2	(734.1)	214.3	139.4	(200.1)	222.4	356.3	60.3	244.9	121.5	280.3
P/E	426.9	254.7	384.9	420.6	(1309.5)	399.2	60.7	(222.6)	131.1	433.5	(45.3)	428.8	(215.0)	354.9
P/E fwd	255.5	344.2	331.8	274.7	(742.2)	147.1	(96.8)	(56.9)	61.3	460.2	(168.5)	289.1	(34.1)	313.6
EV/sales	274.4	256.8	382.8	(43.9)	(840.2)	375.4	131.3	(212.3)	181.0	408.1	317.8	482.6	(146.6)	(62.2)
EV/sales fwd	157.7	167.9	273.8	32.3	(685.3)	515.8	(119.5)	(160.4)	158.4	381.4	208.5	405.8	9.9	(268.8)
EV/EBITDA	338.6	500.1	289.9	45.0	(965.6)	671.7	(152.8)	(27.9)	329.9	(51.7)	317.0	283.3	170.7	(355.0)
EV/EBITDA fwd	214.7	295.9	376.0	(62.2)	(657.6)	564.1	(199.2)	(144.5)	406.4	308.1	(108.2)	174.8	70.8	(104.3)
EV/EBIT	279.0	590.6	191.3	134.2	(861.1)	679.1	(184.7)	(61.2)	299.2	208.4	54.2	126.8	205.0	(168.4)
EV/EBIT fwd	212.4	334.7	186.0	79.4	(519.8)	533.1	(188.9)	(71.6)	356.0	213.4	(95.3)	101.2	207.1	(68.0)
Net Trans. EBITDA					84.8	(219.7)	(139.4)	187.3	(225.1)	(243.6)	122.8	133.0	298.7	(193.1)

Source Our processing

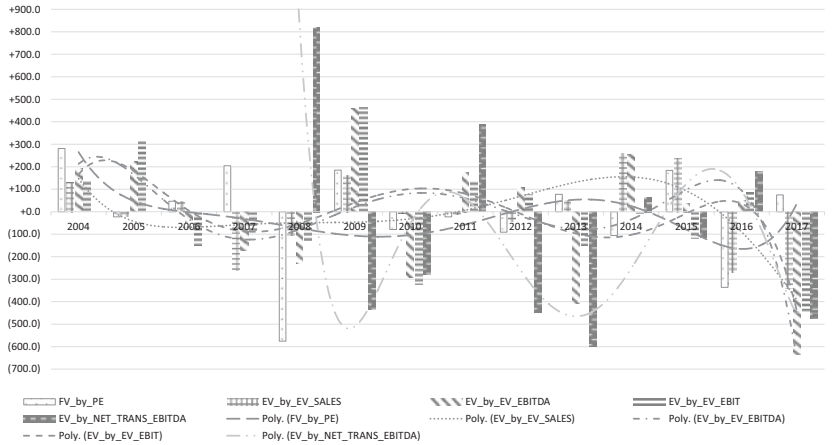

Fig. 3 Surplus of profit/losses (per-thousand) by applying the historical market multiples (*Source* Our processing. Equity stands for Book Value of Equity. Market Cap stands for Market capitalization, FV_by_PE is the fair value calculated via the P/E multiple, EV_by_EV_***** is the enterprise value calculated via the market multiple on the economic item indicated (*****))

Figure 3 shows the over or underestimation of the portfolio variations, thus the extra-profit or loss due just to the different method of fair value measurement. Namely, it shows the variation in the fair value calculated by each multiple that exceeds the variation of the market capitalization. This should eliminate the intrinsic volatility of the enterprises in the portfolio, by showing the extra-profits or extra-losses not related to market risk factors (comprised in the fluctuations of market capitalizations) but caused by the mere usage of the evaluation method.

In particular, the EBIT(DA) based historical multiples show a high level of unreliability, with great over and underestimations almost never lower than ± 10% (± 100‰). The P/E multiple, due to the great volatility, shows peaks of variation during peculiar economic conditions, such as the market turmoil of 2007–2009. The EV/sales multiple shows great volatility during the economic recovery period (2013–2017), but it seems to be less sensitive to crises and stagnations and more conservative. The transaction multiples has a great volatility and thus a high unreliability with overestimations in most cases greater than +20% and underestimation lower than −20% (± 200‰).

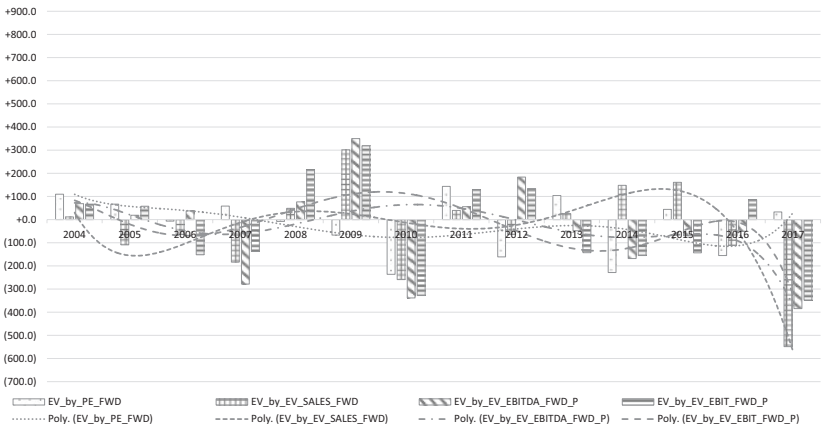

Fig. 4 Surplus of profit/losses (per-thousand) by applying the forward market multiples (*Source* Our processing. Equity stands for Book Value of Equity. Market Cap stands for Market capitalization, FV_by_PE is the fair value calculated via the P/E multiple, EV_by_EV_* is the enterprise value calculated via the market multiple on the economic item indicated (*))

The forward counterparts of each multiple show more or less the same fluctuations, just a bit more moderate than the "historical" ones. Nevertheless, this moderation in the fluctuations goes along with the unreliability described in the previous section, where the values are in most cases lower than the market capitalization. Taken as a whole, forward multiples provide more conservative results (Fig. 4).

4.3 Descriptive Statistics and Distribution of the Estimated-to-Real Fair Value Ratios

In order to investigate whether the differences between the portfolio real and estimated values are statistically significant, we focus on the distribution of the ratios. Accordingly, we calculate the ratio between the estimated value and the market capitalization for each company and for each year.

As reported in Appendix D, the first quartile of the Market Multiples to Market Cap ratios distributions range around a value of 0.60–0.70. This implies that, at single-company level, market multiples estimate a

fair value that is more or less 30–40% lower than the actual market capitalization. The median of the ratio stands in a 0.9–1.5 range. This means that in half of the cases it is higher than a 1:1 ratio. In more than 75% of the cases, the market multiples at a single-company level are not even close to the real fair value.

Furthermore, estimates distribution has a right tail (skewness greater than 0) and that the values concentrate greatly around the mean, which is greater than 1.30 in most cases. This means that, in most of the single-company estimations of fair values, the market multiples return a result that is greater than 1 and on average 30% higher.

As for the forward multiples, the first quartile and the median are much lower than the historical multiple, which is consistent with the results found at portfolio level, where the fair value of the portfolio calculated with P/E forward is mostly lower than the market capitalization. By looking at single periods, results are consistent with previous analysis. The standard deviation at period level varies greatly, showing that there is a large volatility in the application of the technique, even at a single-company level.

5 Comments and Conclusions

In day-to-day life, both practitioners tend to use the market and transaction multiples in the estimation of the fair value of private equities.

In order to test the reliability of fair value estimates based on market and transaction multiples in measuring fair values, we have considered a sample of public companies, which we have treated as if they were private. We have therefore assessed their fair value by using Level 2 inputs. We have used market capitalization as their real fair value, which is consistent with the market efficiency hypothesis (Malkiel and Fama 1970). We have then compared fair value estimates based on transaction and market multiples with market capitalization to test for estimation errors.

Our results are consistent with previous research and show that market multiples introduce great estimation errors in assessing the fair value of private equities. More specifically, the results of our analysis, which have been conducted on data from over 1500 companies over 15 years, show that none of the market multiples is capable of appraising the real market value of a portfolio except in just a few single cases. The use of forecasted ("forward"), rather than historical multiples slightly improves the performance of some of the multiples, in particular for the P/E

multiple, which is consistent with Lie and Lie (2002). Nonetheless, this improvement does not hold during market crises and high-volatility periods.

Moreover, such an inconsistency and unreliability generates economic effects both in the year of measurement and in the following years, with a surplus of profits/losses that tend to be greater than those of market capitalization. In more than three out of four cases, market multiples at single-company level greatly underestimate or overestimate the real fair value, and in more than half of the cases the measurement overestimates it. The unreliability of market multiples is particularly exacerbated in the case of EBITDA and EBIT.

Our analysis is slightly limited for the transaction multiples in the years 2010 and 2014, because in some portfolios and in some years it is not possible to calculate a transaction multiple. Also in this case, however, there is compelling evidence that transaction multiples do not provide reliable fair value estimates either.

Taken as a whole, our results suggest that market and transaction multiples probably do not catch firm-specific risk factors that affect the actual fair value of the firm, as reflected in market capitalization. Indeed, the use of mean and median for market multiples calculated for each industry tend to elide the idiosyncratic component of risk. Along the same lines, transaction multiples incorporate expectations related to specific transactions, which may be not applicable to others.

Such issues should be carefully taken into consideration by regulators. The risk is that fair value estimates based on transaction and market multiples may mislead investors in perceiving the financial data as highly reliable. Therefore, evidence on this point is of direct interest to accounting policymakers since the explicit purpose of the EU Regulation 1606/2002, which has introduced the IAS/IFRS accounting system in the EU, is to ensure a high degree of transparency and comparability in financial statements as well as the efficient functioning of the capital markets.

Appendix

The appendix is stored in a separate document. The related file can be found at the following permanent link: https://goo.gl/hsjteC.

Appendix A—Variables

#	*Description*	*Variable name*	*Source*
1	*ID*	CODE	Extracted from database
2	Company common name	Name	Extracted from database
3	Country of headquarters	COUNTRY	Extracted from database
4	Fitch ratings category	PORTFOLIO	Assigned on the basis of the following categories
5	TRBC industry name	TRBC_INDUSTRY	Extracted from database
6	TRBC industry group name	TRBC_IND_GROUP	Extracted from database
7	TRBC business sector name	TRBC_BUSINESS	Extracted from database
8	FYear	YEAR	Extracted from database
9	Company market cap	MARKET_CAP	Extracted from database
10	Enterprise value (daily time series)	EV	Extracted from database
11	Total equity	EQUITY	Extracted from database
12	Price close	PRICE	Extracted from database
13	Number of shares	SHARES	Extracted from database
14	P/E (daily time series ratio)	PE	Extracted from database
15	Forward P/E (daily time series ratio)	PE_FWD	Extracted from database
16	Basic EPS including extraordinary items	EPS	Extracted from database
17	Basic EPS including extraordinary items (only if positive, for computations)	EPS_P	Calculated
18	Net debt	NET_DEPT	Extracted from database
19	Total revenue	SALES	Extracted from database
20	Enterprise value to sales (daily time series ratio)	EV_SALES	Extracted from database
21	Forward enterprise value to sales (daily time series ratio)	EV_SALES_FWD	Extracted from database
22	EBITDA	EBITDA	Extracted from database
23	Enterprise value to EBITDA (daily time series ratio) (only if positive, for computations)	EV_EBITDA	Extracted from database
24	Enterprise value to EBITDA (daily time series ratio)	EV_EBITDA_P	If #23 Positive
25	Forward enterprise value to EBITDA (daily time series ratio)	EV_EBITDA_FWD	Extracted from database
26	Forward enterprise value to EBITDA (daily time series ratio) (only if positive, for computations)	EV_EBITDA_FWD_P	If #25 Positive
27	EBIT	EBIT	Extracted from database
28	Enterprise value to EBIT (daily time series ratio) (only if positive, for computations)	EV_EBIT	Extracted from database
29	Enterprise value to EBIT (daily time series ratio)	EV_EBIT_P	If #28 Positive
30	Forward enterprise value to EBIT (daily time series ratio) (only if positive, for computations)	EV_EBIT_FWD	Extracted from database
31	Forward enterprise value to EBIT (daily time series ratio)	EV_EBIT_FWD_P	If #30 Positive
32	EV to book value	EV_BV	#10/#11
33	Search string for market multiples calculation	SEARCH	String from #4&"-"&#8
34	Median P/E portfolio multiple	MKT_PE	Median pivot search #14 for portfolio and year

#	*Description*	*Variable name*	*Source*
35	Median P/E_FWD portfolio multiple	MKT_PE_FWD	Median pivot search #15 for portfolio and year
36	Median EV/SALES portfolio multiple	MKT_EV_SALES	Median pivot search #20 for portfolio and year
37	Median EV/SALES_FWD portfolio multiple	MKT_EV_SALES_FWD	Median pivot search #21 for portfolio and year
38	Median EV/EBITDA portfolio multiple	MKT_EV_EBITDA_P	Median pivot search #24 for portfolio and year
39	Median EV/EBITDA_FWD portfolio multiple	MKT_EV_EBITDA_ FWD_P	Median pivot search #26 for portfolio and year
40	Median EV/EBIT portfolio multiple	MKT_EV_EBIT_P	Median pivot search #28 for portfolio and year
41	Median EV/EBIT_FWD portfolio multiple	MKT_EV_EBIT_FWD_P	Median pivot search #30 for portfolio and year
42	Median EV/BV portfolio multiple	MKT_EV_BV	Median pivot search #32 for portfolio and year
43	Transaction multiples (EBITDA)	MKT_TRANS_EBITDA	FitchRatings EV_ ALUATOR 2016
44	Transaction multiples reduced from 35% control premium (EBITDA)	MKT_TRANS_ EBITDA_PREM	#44*0,65
45	Estimated EV (PE)	EV_by_PE	#34*#17*#13
46	Estimated EV (PE_FWD)	EV_by_PE_FWD	#35*#17*#13
47	Estimated EV (EV/SALES)	EV_by_EV_SALES	#36*#19-#18
48	Estimated EV (EV/SALES_FWD)	EV_by_EV_SALES_FWD	#37*#19-#18
49	Estimated EV (EV/EBITDA)	EV_by_EV_EBITDA_P	#38*#22-#18
50	Estimated EV (EV/EBITDA_FWD)	EV_by_EV_EBITDA_ FWD_P	#39*#22-#18
51	Estimated EV (EV/EBIT)	EV_by_EV_BBIT_P	#40*#27-#18
52	Estimated EV (EV/EBIT_FWD)	EV_by_EV_BBIT_ FWD_P	#41*#27-#18
53	Estimated EV (EV/BV)	EV_by_EV_BV	#42*#11-#18
54	Estimated EV (transaction)	EV_by_TRANS_EBITDA	#43*#22-#18
55	Estimated EV (net transaction)	EV_by_TRANS_ EBITDA_PREM	#44*#22-#18
56	Estimated EV/market cap (PE)	DELTA_by_PE	#45-#9
57	Estimated EV/market cap (PE_FWD)	DELTA_by_PE_FWD	#46-#9
58	Estimated EV/market cap (EV_SALES)	DELTA_by_EV_SALES	#47-#9
59	Estimated EV/market cap (EV_SALES_FWD)	DELTA_by_EV_SALES_ FWD	#48-#9
60	Estimated EV/Market Cap (EV_EBITDA_P)	DELTA_by_EV_ EBITDA_P	#49-#9
61	Estimated EV/market cap (EV_EBITDA_FWD_P)	DELTA_by_EV_ EBITDA_FWD_P	#50-#9
62	Estimated EV/market cap (EV_EBIT_P)	DELTA_by_EV_EBIT_P	#51-#9
63	Estimated EV/market cap (EV_EBIT_FWD_P)	DELTA_by_EV_EBIT_ FWD_P	#52-#9
64	Estimated EV/market cap (EV_BV)	DELTA_by_EV_BV	#53-#9
65	Estimated EV/market cap (Transaction)	DELTA_by_TRANS_ EBITDA	#54-#9
66	Estimated EV/market cap (Net Transaction)	DELTA_by_TRANS_ EBITDA_PREM	#55-#9

Appendix B—Market multiples (by sector, by year, based on data from 4 EU countries)

Portfolio	*Year*	*MKT_PE*	*MKT_PE_FWD*	*MKT_EV_SALES*	*MKT_EV_SALES_FWD*	*MKT_EV_EBITDA*	*MKT_EV_EBITDA_FWD*	***MKT_EV_EBIT***	***MKT_EV_EBIT_FWD***	***TRANS_EBITDA_MULT***
Aerospace and defense	2003	24.518	13.060	0.787	0.710	7.284	6.445	13.270	9.339	–
	2004	19.553	14.715	0.816	0.742	7.575	6.613	12.397	10.588	–
	2005	20.344	14.762	1.034	0.786	10.095	7.054	14.029	10.688	–
	2006	17.849	14.485	0.892	0.831	9.495	6.507	11.831	10.471	–
	2007	14.741	13.189	0.934	0.849	8.010	6.213	12.532	9.505	–
	2008	8.542	7.884	0.515	0.494	5.335	4.081	7.702	5.965	–
	2009	14.170	13.723	0.671	0.684	5.660	6.087	9.738	9.311	–
	2010	18.595	14.158	0.857	0.892	8.252	6.137	13.919	8.857	7.1
	2011	13.070	9.902	0.631	0.645	7.477	5.580	12.209	7.774	10.6
	2012	13.530	11.033	0.788	0.671	7.640	5.639	9.015	7.418	11.6
	2013	18.481	12.942	1.167	0.870	9.299	7.168	14.666	9.066	9.1
	2014	18.175	12.611	1.430	0.979	11.787	6.273	18.137	9.808	–
	2015	20.789	15.691	1.319	1.033	8.956	8.659	13.806	12.089	9.2
	2016	18.462	16.648	1.422	1.176	9.593	7.953	14.965	12.208	9.2
	2017	20.042	16.442	1.308	1.369	9.791	9.208	13.818	12.691	–
Auto and related	2003	13.078	9.556	0.703	0.610	5.285	4.269	10.132	8.519	–
	2004	12.477	10.291	0.724	0.634	5.772	4.562	10.167	9.041	–
	2005	14.149	11.252	0.712	0.667	5.728	5.372	10.408	9.416	–
	2006	13.991	12.455	0.865	0.864	6.884	6.814	11.150	10.815	–
	2007	13.349	10.004	0.768	0.783	6.092	5.405	10.203	8.810	6.9
	2008	5.839	7.514	0.509	0.520	4.173	4.504	6.875	8.267	6.75
	2009	15.494	15.816	0.727	0.707	9.356	6.118	19.342	14.184	6.6
	2010	13.834	10.004	0.768	0.682	6.352	5.546	12.823	9.534	–
	2011	6.610	6.229	0.539	0.522	4.770	4.096	8.422	6.491	10.5
	2012	7.967	7.530	0.618	0.579	4.590	4.596	7.603	7.397	7.35
	2013	13.322	12.355	0.783	0.712	6.422	6.834	11.817	9.773	5.75
	2014	13.121	12.320	0.768	0.736	6.726	6.301	12.782	10.564	6.85
	2015	16.607	12.096	0.826	0.759	7.127	6.207	12.930	10.625	6.8
	2016	15.071	11.095	0.834	0.735	6.595	5.988	11.544	9.881	8.15
	2017	14.962	12.792	1.020	0.919	7.563	6.766	13.068	11.013	9.1
Chemicals	2003	15.698	16.041	0.830	0.855	6.009	5.202	10.621	10.180	–
	2004	16.944	13.901	0.870	0.921	6.579	5.993	12.175	10.797	–
	2005	15.816	14.905	0.705	1.038	7.299	6.865	11.920	10.938	–
	2006	20.125	16.926	0.999	1.038	8.633	7.083	13.925	10.751	–
	2007	18.551	15.483	0.998	1.056	8.847	7.428	13.516	12.202	7.5
	2008	10.299	9.898	0.668	0.637	6.102	5.479	8.551	7.342	7.5
	2009	17.812	15.939	0.889	0.905	9.084	8.094	14.436	11.786	7.8
	2010	16.570	13.972	0.967	0.851	7.990	7.467	11.807	9.991	7.35
	2011	10.637	10.641	0.757	0.696	5.812	6.466	8.909	8.678	6.95
	2012	15.734	12.970	0.799	0.761	8.592	6.538	11.145	10.282	7.7
	2013	21.062	17.841	0.961	0.995	7.806	6.991	15.585	12.881	6.85
	2014	21.489	18.099	1.041	1.003	7.840	7.302	13.866	12.857	5.1
	2015	18.997	16.766	1.083	1.123	7.303	6.624	13.423	12.070	8.5
	2016	20.624	18.788	1.338	1.184	8.344	7.549	13.974	13.836	8.85
	2017	20.938	17.813	1.721	1.476	8.479	8.315	14.800	14.741	5.3

Portfolio	*Year*	*MKT_PE*	*MKT_PE_FWD*	*MKT_EV_SALES*	*MKT_EV_SALES_FWD*	*MKT_EV_EBITDA*	*MKT_EV_EBITDA_FWD*	***MKT_EV_EBIT***	***MKT_EV_EBIT_FWD***	***TRANS_EBITDA_MULT***
Consumer products	2003	14.684	12.190	0.694	0.964	6.254	6.491	11.230	8.685	–
	2004	16.848	14.637	0.743	1.276	7.568	7.418	11.171	9.693	–
	2005	17.550	16.217	0.910	1.110	9.945	8.933	12.781	11.212	–
	2006	20.607	15.084	1.007	1.177	10.978	8.774	14.208	10.943	–
	2007	18.299	13.975	0.900	1.049	9.759	8.017	12.021	9.421	9
	2008	9.490	8.879	0.643	0.694	5.593	5.541	7.590	7.110	7.8
	2009	18.724	14.340	0.876	0.914	8.812	7.933	14.828	10.457	5.1
	2010	16.847	14.815	0.837	0.891	8.424	7.824	11.982	9.876	6.1
	2011	14.418	12.169	0.717	0.717	7.910	6.269	9.794	9.103	8.55
	2012	18.605	16.216	0.742	0.844	8.894	7.546	10.977	10.418	8.35
	2013	21.888	19.919	0.963	0.998	10.190	9.642	14.242	13.353	7.75
	2014	19.346	17.797	0.875	1.046	9.202	9.851	12.253	13.130	9
	2015	20.937	17.819	0.984	1.078	10.653	9.239	13.980	12.389	9.5
	2016	19.389	19.910	0.870	0.923	10.423	9.031	14.722	14.069	8.7
	2017	25.067	22.084	0.947	1.094	11.839	10.358	16.898	14.418	9.1
Diversified manufacturing	2003	13.758	12.907	0.560	0.751	6.264	5.636	10.260	8.670	–
	2004	14.909	12.585	0.601	0.735	6.716	5.795	11.049	8.783	–
	2005	16.611	13.697	0.742	0.894	7.582	6.776	11.828	9.147	–
	2006	16.069	13.651	0.907	0.924	8.575	6.826	11.270	8.970	–
	2007	14.267	11.313	0.849	0.814	7.400	6.098	9.669	7.811	8.8
	2008	6.689	7.656	0.477	0.476	4.627	4.502	6.406	6.382	8.8
	2009	14.007	13.467	0.629	0.635	7.348	7.121	10.095	9.756	8.95
	2010	14.310	11.534	0.739	0.633	8.305	6.034	10.703	9.126	8.85
	2011	11.141	8.885	0.571	0.523	5.649	5.014	8.646	7.171	8.65
	2012	11.860	10.278	0.597	0.543	6.522	5.144	9.779	7.943	8.8
	2013	15.979	13.496	0.743	0.659	7.878	6.366	12.519	9.304	8.75
	2014	17.374	12.741	0.751	0.670	8.953	6.534	13.626	9.552	8.2
	2015	16.999	13.512	0.776	0.761	8.787	7.244	12.942	10.354	9.1
	2016	18.470	14.885	0.886	0.809	8.715	7.353	12.881	10.725	8.6
	2017	21.204	17.038	1.081	0.986	10.209	9.208	15.188	12.628	6.8
Diversified services	2003	18.578	16.171	0.679	0.805	7.133	6.601	9.923	9.630	–
	2004	17.631	15.190	0.781	0.659	7.531	6.301	10.778	9.312	–
	2005	22.534	16.321	0.870	0.940	9.623	7.493	12.796	10.183	–
	2006	19.906	16.944	1.141	1.061	9.918	8.235	13.710	11.144	–
	2007	17.195	12.902	0.916	0.750	7.721	5.874	12.521	9.010	10.2
	2008	9.572	8.267	0.603	0.473	4.898	4.058	7.308	5.957	11.05
	2009	14.448	12.454	0.651	0.684	6.945	6.529	10.927	8.728	10.3
	2010	16.247	11.966	0.734	0.706	7.485	5.804	11.159	8.683	8.9
	2011	12.552	9.259	0.581	0.576	5.832	4.996	9.159	7.276	11
	2012	15.973	10.616	0.683	0.706	8.189	5.793	11.381	8.559	9.5
	2013	17.611	14.375	0.776	0.780	9.012	6.229	12.903	10.873	7.1
	2014	16.098	13.442	0.867	0.851	8.732	6.924	12.328	10.634	10.25
	2015	17.063	15.056	1.047	1.059	8.615	6.980	13.994	11.840	10.75
	2016	19.382	15.278	1.109	0.988	9.998	7.117	14.503	11.463	10.85
	2017	24.567	16.459	1.178	1.131	10.443	8.285	15.216	11.780	12.6

Portfolio	*Year*	*MKT_ PE*	*MKT_ PE_ FWD*	*MKT_ EV_ SALES*	*MKT_ EV_ SALES_ FWD*	*MKT_ EV_ EBITDA*	*MKT_ EV_ EBITDA_ FWD*	***MKT_ EV _EBIT***	***MKT_ EV_ EBIT_ FWD***	***TRANS_ EBITDA _MULT***
Energy	2003	15.373	11.904	0.877	0.822	6.644	4.924	12.003	8.843	–
	2004	18.089	13.236	1.250	1.039	8.246	6.800	14.120	11.039	–
	2005	20.154	15.718	1.542	1.252	11.668	6.661	19.196	10.683	–
	2006	19.554	15.028	1.652	1.198	11.623	7.899	15.281	9.980	–
	2007	20.880	14.707	1.634	1.191	11.571	8.734	16.594	10.485	9.7
	2008	7.071	7.464	0.751	0.659	6.500	4.274	7.986	5.317	11.35
	2009	16.606	13.193	1.092	1.011	8.390	7.223	11.874	11.317	8.7
	2010	16.342	10.860	0.975	0.808	8.942	6.539	13.524	9.982	8.35
	2011	11.449	9.844	0.883	0.743	6.721	5.050	10.341	8.319	8.85
	2012	14.964	12.076	0.861	0.778	8.159	6.952	12.234	10.634	4.25
	2013	12.949	12.931	0.881	0.763	6.956	6.905	12.247	10.352	4.5
	2014	14.284	12.734	0.905	0.781	8.184	6.180	13.240	10.927	8.25
	2015	14.165	12.324	0.856	0.833	8.994	5.960	12.328	9.999	7.4
	2016	13.899	11.980	0.949	0.982	9.640	6.034	12.427	9.778	4.95
	2017	14.607	17.206	1.176	0.936	7.406	6.272	10.751	11.011	5.7
Food, beverage and tobacco	2003	16.190	12.512	0.845	0.787	7.436	5.737	10.994	9.183	–
	2004	15.624	12.821	0.911	0.871	8.406	6.781	11.747	9.974	–
	2005	20.043	14.634	1.034	1.088	9.349	8.723	13.665	12.413	–
	2006	17.872	16.321	1.163	1.149	9.706	8.758	15.660	12.471	–
	2007	20.192	17.700	1.086	1.109	10.148	8.728	16.318	12.926	11.3
	2008	13.724	10.718	0.727	0.773	8.736	7.198	12.597	10.793	12.75
	2009	16.100	14.361	0.773	0.809	8.873	8.101	13.150	11.387	11.05
	2010	17.057	15.476	0.890	1.011	10.188	7.677	13.124	12.406	8.45
	2011	14.507	13.405	0.845	0.835	8.752	6.289	12.497	10.280	8.35
	2012	17.771	12.894	0.853	0.777	9.271	7.943	15.690	11.331	7.95
	2013	17.421	14.940	0.942	1.032	9.125	8.649	14.345	12.982	8.55
	2014	20.405	15.596	0.953	0.811	9.796	8.596	15.332	13.464	8.85
	2015	18.729	16.733	0.927	0.866	9.598	8.212	18.181	13.165	9.3
	2016	18.534	17.509	1.085	0.932	10.178	9.577	15.200	14.872	12.9
	2017	23.214	17.245	1.133	0.910	11.022	10.331	18.558	14.668	16
Gaming, lodging and leisure	2003	16.602	15.430	1.086	0.910	7.982	5.852	14.523	9.547	–
	2004	21.987	13.514	1.018	1.020	8.645	7.224	15.293	10.468	–
	2005	20.461	13.361	1.287	1.033	8.647	7.070	15.862	10.497	–
	2006	21.956	16.854	1.530	1.225	10.421	8.581	15.775	12.898	–
	2007	23.121	14.403	1.499	0.954	10.007	7.405	14.795	10.027	11.6
	2008	9.701	10.011	0.710	0.650	5.799	5.531	10.675	8.929	8.95
	2009	19.731	16.905	1.022	0.895	8.215	6.562	17.888	10.655	7.05
	2010	22.962	14.390	1.022	0.784	8.131	5.882	15.014	10.812	7.55
	2011	15.937	9.423	0.842	0.578	6.217	4.608	11.404	8.217	8.95
	2012	17.501	11.420	0.751	0.624	6.473	4.603	13.473	9.670	7.95
	2013	25.068	18.311	0.940	0.754	7.815	6.381	15.708	13.133	6.55
	2014	25.477	16.925	0.846	0.718	8.989	6.884	14.502	12.370	8.65
	2015	20.593	19.200	1.010	0.940	8.904	7.347	16.092	13.126	8.9
	2016	26.018	17.070	1.129	1.198	9.414	8.429	16.564	13.315	9.1
	2017	25.149	18.911	1.630	1.394	10.542	9.066	17.474	14.544	9.9

Portfolio	*Year*	*MKT_PE*	*MKT_PE_FWD*	*MKT_EV_SALES*	*MKT_EV_SALES_FWD*	*MKT_EV_EBITDA*	*MKT_EV_EBITDA_FWD*	***MKT_EV_EBIT***	***MKT_EV_EBIT_FWD***	***TRANS_EBITDA_MULT***
Healthcare	2003	18.718	16.743	1.097	1.207	8.935	6.721	13.206	11.048	–
	2004	24.813	17.525	1.422	1.381	11.314	8.166	15.045	11.576	–
	2005	21.694	18.789	1.855	1.963	10.983	8.717	14.698	13.528	–
	2006	24.295	20.199	2.421	2.064	11.989	11.212	17.784	13.858	–
	2007	21.662	17.492	2.280	1.756	11.074	9.153	17.470	12.508	12.2
	2008	13.319	11.933	1.476	1.168	7.032	6.361	11.140	9.484	14.1
	2009	22.373	15.778	1.839	1.654	9.387	8.342	14.890	12.267	14.45
	2010	18.386	13.674	2.030	1.678	8.493	7.331	13.096	10.517	12.5
	2011	15.983	12.225	1.535	1.415	8.211	5.944	11.374	10.084	11.95
	2012	18.531	14.623	2.093	1.818	8.660	7.527	12.198	10.446	10.95
	2013	22.086	17.386	2.738	2.300	10.565	9.372	15.300	12.869	9.2
	2014	22.857	18.684	3.292	2.525	12.501	10.003	17.450	13.092	10.05
	2015	25.294	21.391	4.109	2.961	13.328	10.183	17.713	15.095	12.4
	2016	24.331	21.270	3.291	2.992	13.371	10.620	16.997	15.206	14.2
	2017	29.355	22.430	3.524	3.108	14.375	11.183	19.138	18.158	15.4
Home-building, building materials and construction	2003	12.489	10.461	0.575	0.638	6.180	5.103	9.656	8.187	–
	2004	14.729	11.168	0.648	0.676	6.410	5.961	9.674	9.191	–
	2005	14.055	14.050	0.895	0.801	7.767	6.765	9.729	10.181	–
	2006	19.769	15.623	1.060	1.011	9.870	8.479	13.362	11.764	–
	2007	14.576	12.795	1.184	1.077	9.071	7.202	12.531	10.651	9.1
	2008	6.230	6.850	0.588	0.692	4.836	5.141	7.335	7.052	8.45
	2009	12.109	12.605	0.775	0.925	7.550	7.609	12.154	11.762	7.75
	2010	13.419	10.724	0.763	0.752	6.995	6.341	11.959	10.127	9.15
	2011	9.889	8.260	0.605	0.588	6.616	5.470	9.404	8.948	9.1
	2012	11.701	9.622	0.610	0.593	6.596	6.021	10.753	9.145	8.1
	2013	14.426	13.078	0.695	0.688	7.456	6.957	12.417	10.346	9.7
	2014	14.576	12.267	0.706	0.631	7.608	6.473	11.649	9.264	9.85
	2015	16.415	13.474	0.762	0.730	8.622	7.199	14.325	11.267	9.6
	2016	17.630	14.144	0.946	0.931	9.082	7.373	14.408	11.295	10
	2017	18.610	14.357	0.949	0.814	8.926	7.774	14.067	11.330	9.7
Media and entertain-ment	2003	28.172	24.454	0.899	1.047	7.415	6.570	16.747	13.991	–
	2004	27.493	17.711	1.226	1.489	8.193	8.022	14.413	11.846	–
	2005	20.199	17.564	1.504	1.416	9.646	7.979	12.708	10.336	–
	2006	17.341	16.256	1.459	1.369	10.063	9.328	12.935	11.481	–
	2007	14.876	12.999	1.280	1.187	8.070	7.007	11.479	8.937	13.4
	2008	8.260	8.730	0.741	0.748	5.103	5.107	8.807	7.667	13.4
	2009	16.513	14.520	0.921	1.026	7.520	7.668	13.061	11.681	11.1
	2010	18.323	11.413	0.863	0.995	6.726	6.849	11.379	9.265	8.15
	2011	11.438	9.707	0.814	0.737	6.325	5.148	10.499	7.196	9.45
	2012	13.692	9.356	0.722	0.612	5.913	4.757	8.969	7.952	10.75
	2013	20.156	15.222	1.159	0.834	7.096	6.797	14.994	11.049	11.3
	2014	22.252	15.502	1.089	0.906	9.608	6.697	14.123	10.186	11.65
	2015	20.104	15.203	0.943	0.816	9.436	7.297	14.654	11.368	10.75
	2016	19.562	14.270	1.036	0.874	8.290	7.197	14.247	10.860	10.2
	2017	21.873	14.256	1.197	1.119	8.503	7.204	13.956	10.677	9.7

Portfolio	*Year*	*MKT_ PE*	*MKT_ PE_ FWD*	*MKT_ EV_ SALES*	*MKT_ EV_ SALES_ FWD*	*MKT_ EV_ EBITDA*	*MKT_ EV_ EBITDA_ FWD*	***MKT_ EV _EBIT***	***MKT_ EV_ EBIT_ FWD***	***TRANS_ EBITDA _MULT***
Natural resources	2003	14.176	13.269	0.578	0.422	6.301	5.108	12.589	9.800	–
	2004	23.130	8.601	0.520	0.395	6.874	3.613	12.577	6.747	–
	2005	10.619	12.467	0.440	0.407	4.730	4.804	7.348	8.668	–
	2006	11.855	12.451	0.652	0.524	7.962	5.578	10.912	9.075	–
	2007	8.489	9.330	0.672	0.510	6.104	5.630	9.202	8.083	8.5
	2008	4.109	6.072	0.387	0.370	4.246	4.346	5.096	5.654	8.8
	2009	14.174	16.208	0.561	0.546	8.202	6.688	11.657	11.248	7.2
	2010	20.376	11.815	0.827	0.518	8.348	5.711	13.532	8.494	4.65
	2011	10.178	8.955	0.705	0.586	5.669	4.828	10.138	6.828	6.35
	2012	15.565	11.246	0.796	0.691	7.622	5.815	10.885	9.411	8.7
	2013	20.388	15.436	0.790	0.675	9.518	6.325	22.152	12.192	5.3
	2014	18.462	14.280	0.873	0.679	8.635	5.765	16.799	9.673	8.25
	2015	13.651	12.873	0.745	0.647	7.464	5.802	13.017	11.649	8.2
	2016	18.025	15.381	0.803	0.636	9.536	6.538	14.375	11.536	7.35
	2017	20.272	14.718	0.963	0.785	7.808	6.351	12.704	10.757	9.5
Retail	2003	16.950	14.146	0.560	0.613	6.867	7.345	12.033	11.119	–
	2004	15.331	15.434	0.572	0.720	8.328	7.459	12.072	11.068	–
	2005	18.083	14.264	0.634	0.566	10.399	7.976	14.289	10.787	–
	2006	19.541	14.368	0.715	0.568	9.658	8.850	13.602	10.893	–
	2007	15.379	13.742	0.698	0.566	8.452	7.529	13.580	9.680	11.3
	2008	9.348	8.852	0.405	0.376	5.941	5.111	8.328	7.841	9.65
	2009	18.307	12.645	0.505	0.429	7.686	7.113	12.103	9.877	10.45
	2010	18.007	11.806	0.616	0.523	7.840	6.805	11.710	9.812	10.6
	2011	12.512	9.472	0.469	0.451	6.463	5.592	10.597	8.628	8.65
	2012	14.220	11.376	0.487	0.445	7.403	6.165	11.281	9.949	8
	2013	16.484	14.528	0.515	0.481	7.113	7.723	10.697	11.028	7.5
	2014	19.323	13.742	0.519	0.513	7.837	7.897	12.628	10.032	9.2
	2015	22.489	14.887	0.521	0.501	8.344	9.382	14.646	11.971	9.5
	2016	20.064	13.802	0.577	0.477	10.715	8.771	16.875	12.541	8.6
	2017	19.722	15.566	0.458	0.458	10.994	8.196	16.935	12.643	–
Technology	2003	21.543	20.817	0.670	0.822	8.003	7.447	13.100	10.237	–
	2004	23.301	16.269	0.699	0.746	8.555	7.334	13.725	10.120	–
	2005	23.369	17.074	0.952	0.880	10.807	7.880	14.712	10.259	–
	2006	22.261	15.986	1.039	0.914	11.627	7.960	16.399	9.909	–
	2007	17.837	12.850	0.896	0.758	8.945	6.342	12.647	7.979	11.9
	2008	8.837	7.839	0.402	0.394	4.605	3.905	6.177	5.322	10.75
	2009	14.331	13.082	0.670	0.659	7.241	6.269	9.688	8.568	8.4
	2010	15.113	11.866	0.711	0.747	7.744	5.859	10.425	7.473	8.1
	2011	12.257	9.613	0.554	0.525	5.390	4.407	7.878	6.032	9.9
	2012	13.608	11.789	0.595	0.572	6.348	5.496	9.107	7.766	10.1
	2013	20.692	15.411	0.748	0.680	8.444	7.453	12.641	9.919	5.25
	2014	20.507	14.301	0.745	0.721	8.687	7.084	12.535	9.715	7.1
	2015	22.581	16.921	0.938	0.985	10.406	8.410	14.656	11.793	14.15
	2016	22.328	18.494	1.041	1.031	10.955	9.206	15.235	12.522	11.25
	2017	25.192	21.430	1.368	1.401	12.379	11.027	17.836	15.257	7.3

Portfolio	*Year*	*MKT_PE*	*MKT_PE_FWD*	*MKT_EV_SALES*	*MKT_EV_SALES_FWD*	*MKT_EV_EBITDA*	*MKT_EV_EBITDA_FWD*	***MKT_EV_EBIT***	***MKT_EV_EBIT_FWD***	***TRANS_EBITDA_MULT***
Telecom and cable	2003	39.525	18.639	2.040	2.095	6.661	6.361	15.639	12.589	–
	2004	36.694	16.456	2.444	2.251	8.947	7.468	13.995	11.267	–
	2005	18.009	13.634	2.544	2.014	10.300	7.346	13.508	10.590	–
	2006	19.262	13.805	2.117	1.839	9.369	7.852	14.189	11.887	–
	2007	21.023	14.676	1.191	1.701	7.787	6.293	10.857	11.845	12.7
	2008	9.814	9.935	0.791	0.902	5.623	4.642	10.260	10.019	11.15
	2009	12.080	10.815	1.011	1.670	6.554	6.013	13.128	10.565	9.15
	2010	12.817	9.997	1.021	1.367	6.015	5.633	10.101	10.920	7.6
	2011	12.839	9.235	0.902	1.195	6.304	4.573	10.994	8.648	5.7
	2012	13.040	9.992	1.151	1.312	5.632	4.924	11.026	10.160	4.15
	2013	23.936	16.134	1.311	1.607	5.920	6.375	11.442	12.820	3.4
	2014	23.559	16.393	1.758	1.755	9.353	6.147	14.911	12.662	5.3
	2015	35.582	23.970	2.042	2.264	11.825	8.413	18.564	16.299	8.45
	2016	15.931	18.158	1.725	2.446	11.632	7.061	18.303	14.372	12.85
	2017	25.359	22.307	1.910	1.992	10.296	7.649	20.162	16.857	14.1
Transportation	2003	16.335	12.974	0.754	0.659	5.938	4.917	9.859	9.699	–
	2004	22.069	13.183	0.811	0.650	7.437	5.139	11.615	10.762	–
	2005	16.507	14.586	0.861	0.685	7.559	6.685	11.744	10.769	–
	2006	15.966	14.836	1.058	1.000	8.971	7.949	13.889	11.499	–
	2007	18.079	14.282	1.451	1.476	10.000	7.978	15.239	12.301	8.4
	2008	8.633	10.439	1.030	1.046	5.375	5.569	9.701	9.443	9.45
	2009	18.896	13.412	1.080	1.286	8.018	6.880	15.569	12.185	8.7
	2010	15.636	12.266	1.353	1.330	8.132	5.919	15.544	11.303	6.9
	2011	10.755	10.513	1.274	1.223	7.599	5.263	12.268	9.530	10.2
	2012	13.845	12.109	1.195	1.039	7.030	5.596	13.286	10.262	8.7
	2013	17.045	15.754	1.409	1.321	7.306	7.692	15.025	12.721	5.9
	2014	21.570	14.803	1.306	1.349	8.331	7.266	15.359	12.225	8.4
	2015	21.751	16.274	1.608	1.680	9.595	8.093	19.708	14.367	8.95
	2016	17.979	16.023	1.761	1.717	10.277	8.213	17.082	14.596	7.85
	2017	21.374	17.698	1.755	1.706	10.171	8.995	17.715	14.435	6.7
Utilities	2003	16.773	16.852	1.495	1.567	8.394	7.172	13.909	12.645	–
	2004	20.873	16.890	2.076	1.664	9.625	7.402	14.790	12.251	–
	2005	19.621	15.253	1.848	1.566	8.806	7.710	14.449	11.421	–
	2006	19.277	17.838	2.177	1.819	9.369	8.293	15.324	11.867	–
	2007	21.782	18.999	1.963	1.662	11.057	8.507	16.923	12.576	12.2
	2008	11.709	12.204	1.242	1.164	7.181	6.005	12.085	8.784	12
	2009	17.621	16.738	1.510	1.546	9.807	8.061	14.017	11.992	13.75
	2010	13.911	14.139	1.481	1.311	7.612	6.210	13.856	11.203	12.3
	2011	12.131	12.481	1.198	1.090	8.221	6.036	12.975	10.336	8.5
	2012	15.065	12.955	1.133	1.049	7.740	6.190	13.771	11.271	8.25
	2013	14.043	15.435	1.303	1.212	7.272	7.012	14.134	12.572	7.6
	2014	17.405	15.752	1.470	1.261	7.554	6.464	15.017	12.496	5.45
	2015	17.107	15.774	1.988	1.542	8.620	7.233	15.635	13.492	4.1
	2016	15.598	15.081	1.757	1.491	8.098	6.933	15.836	12.900	6.6
	2017	16.381	15.888	2.158	1.598	8.575	7.526	16.584	12.721	6.6

Appendix C—Portfolio fair values (book, market cap and multiples fair value)

	2003	*2004*	*2005*	*2006*	*2007*
EQUITY	780,509,009,119.62	838,604,389,391.54	970,017,792,584.20	1,093,717,951,732.09	1,216,404,159,163.57
MARKET_CAP	1,529,145,843,817.03	1,752,277,367,031.61	2,176,199,348,825.06	2,693,439,261,144.61	3,024,002,461,885.44
EV_by_PE	1,559,404,818,866.88	2,212,128,445,779.15	2,601,582,583,307.86	3,190,101,775,282.86	3,833,227,593,209.46
EV_by_PE_FWD	1,205,071,861,915.86	1,595,838,671,707.79	2,122,214,775,124.56	2,629,536,294,758.25	3,049,610,643,648.84
EV_by_EV_SALES	1,417,090,556,749.12	1,836,698,131,895.35	2,229,372,895,910.23	2,814,756,064,917.48	2,747,568,595,494.63
EV_by_EV_SALES_FWD	1,470,729,719,021.89	1,711,840,778,449.82	1,968,535,675,360.83	2,387,239,892,661.38	2,436,597,055,543.36
EV_by_EV_EBITDA	1,751,074,211,453.72	2,268,780,160,064.02	3,033,433,460,630.48	3,476,671,437,361.53	3,545,542,809,495.43
EV_by_EV_EBITDA_FWD	1,422,176,495,044.47	1,750,520,147,457.69	2,203,056,362,656.12	2,777,952,039,975.75	2,682,795,445,063.05
EV_by_EV_EBIT	1,609,691,964,614.14	2,036,249,217,646.84	2,939,365,969,711.72	3,231,962,041,482.56	3,437,234,900,574.96
EV_by_EV_EBIT_FWD	1,251,320,005,305.78	1,576,146,898,088.29	2,087,899,419,790.55	2,372,270,117,018.37	2,493,647,049,058.43
EV_by_TRANS_EBITDA_PREM					2,393,305,321,437.71

	2008	*2009*	*2010*	*2011*	*2012*
EQUITY	1,265,528,656,098.53	1,362,265,910,297.06	1,495,654,046,713.55	1,607,181,840,157.03	1,630,752,182,708.74
MARKET_CAP	1,901,527,486,066.13	2,229,248,349,109.29	2,442,437,530,275.77	2,136,467,450,918.98	2,476,550,433,980.26
EV_by_PE	1,830,805,858,974.19	2,441,181,378,737.66	2,533,968,739,090.64	2,193,578,072,691.96	2,394,124,942,408.74
EV_by_PE_FWD	1,914,700,640,792.46	2,139,664,859,967.59	1,991,634,297,273.07	1,904,552,515,956.22	1,998,235,763,887.73
EV_by_EV_SALES	1,462,723,841,259.62	2,036,768,273,729.50	2,237,489,065,938.78	1,912,909,925,357.24	2,189,657,063,505.96
EV_by_EV_SALES_FWD	1,388,685,937,128.30	2,177,484,299,749.12	1,994,768,660,147.19	1,749,432,708,070.91	1,991,676,633,869.01
EV_by_EV_EBITDA	2,069,042,777,654.01	3,096,220,021,141.71	2,862,613,873,972.74	2,819,923,032,447.55	3,324,420,923,325.14
EV_by_EV_EBITDA_FWD	1,677,213,970,498.61	2,539,832,315,017.47	2,235,172,915,520.18	2,014,242,351,451.89	2,635,711,004,590.89
EV_by_EV_EBIT	2,120,560,584,614.47	3,159,008,720,705.97	2,876,517,016,697.59	2,782,953,122,917.19	3,240,416,912,353.65
EV_by_EV_EBIT_FWD	1,698,787,184,722.82	2,513,918,284,229.20	2,225,053,742,739.56	2,115,566,033,878.61	2,659,902,186,312.23
EV_by_TRANS_EBITDA_PREM	2,522,921,196,733.78	2,187,042,375,355.21	1,973,949,259,448.43	2,260,298,499,140.48	1,916,148,416,878.63

	2013	*2014*	*2015*	*2016*	*2017*
EQUITY	1,705,190,078,540.20	1,816,374,881,433.30	1,883,699,716,684.16	1,949,275,763,498.69	1,600,534,962,677.55
MARKET_CAP	3,021,440,945,544.99	3,113,613,500,798.06	3,488,122,116,417.02	3,673,885,216,511.10	4,102,477,859,926.53
EV_by_PE	3,057,015,962,695.02	2,987,721,040,182.63	3,643,362,680,671.25	3,314,648,309,769.31	3,857,317,325,820.58
EV_by_PE_FWD	2,701,977,939,068.63	2,444,260,377,109.99	2,886,383,612,316.90	2,834,240,481,416.10	3,313,758,571,596.48
EV_by_EV_SALES	2,813,699,854,110.50	3,299,707,191,787.39	4,037,708,095,365.35	3,813,556,568,151.84	3,718,518,772,175.75
EV_by_EV_SALES_FWD	2,574,825,495,558.29	2,893,612,519,576.04	3,514,099,563,681.82	3,529,267,671,280.50	3,118,241,199,328.76
EV_by_EV_EBITDA	3,245,346,465,683.03	3,730,031,326,133.77	4,163,221,736,763.33	4,424,248,553,387.21	3,881,375,348,169.97
EV_by_EV_EBITDA_FWD	3,106,828,557,333.14	2,941,377,171,190.19	3,208,632,207,170.50	3,316,858,777,235.76	3,157,381,727,870.91
EV_by_EV_EBIT	3,559,063,810,646.34	3,641,931,163,496.31	3,835,750,638,380.22	4,149,177,757,593.49	3,891,731,936,659.11
EV_by_EV_EBIT_FWD	2,986,261,345,692.69	2,840,499,188,503.98	2,995,243,859,531.62	3,311,875,247,427.51	3,207,866,312,438.21
EV_by_TRANS_EBITDA_PREM	1,543,722,564,094.46	1,731,522,298,789.41	1,934,927,255,358.94	2,391,625,509,311.60	2,096,378,858,088.11

Appendix D—Market multiples fair value to market capitalization ratio descriptive statistics

P/E fair values to market capitalization ratio															
P/E to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.58	2.15	1.34	1.38	2.26	1.37	1.92	1.99	2.28	4.05	6.57	15.22	16.74	16.64	220.63
Median	1.01	1.05	0.98	1.01	1.00	0.94	1.12	1.00	1.02	1.06	1.03	1.03	1.03	1.00	1.06
Standard deviation	5.67	11.11	3.41	2.84	14.39	2.31	6.77	11.27	15.29	34.03	66.30	159.73	180.73	239.66	5427.52
25 percentile	0.63	0.69	0.66	0.63	0.60	0.60	0.70	0.61	0.60	0.69	0.63	0.63	0.63	0.64	0.66
75 percentile	1.41	1.56	1.36	1.41	1.46	1.50	1.70	1.51	1.50	1.56	1.53	1.54	1.57	1.48	1.57
Skewness	17.64	16.87	18.33	14.08	15.71	9.85	16.56	20.54	18.96	15.11	15.04	14.69	18.32	24.87	25.55
Kurtosis	345.62	315.87	394.33	253.98	263.33	134.06	330.98	474.69	389.41	242.46	243.00	234.96	392.81	683.10	652.71

P/E forward to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.41	1.64	1.10	1.12	1.78	1.37	1.66	1.51	1.88	3.29	5.89	12.20	13.50	13.85	161.80
Median	0.86	0.81	0.81	0.84	0.78	0.93	0.98	0.77	0.82	0.86	0.86	0.81	0.84	0.84	0.87
Standard deviation	5.50	9.15	2.95	2.15	11.40	2.30	5.33	7.84	12.13	27.51	60.57	126.94	150.47	194.26	3940.87
25 percentile	0.56	0.52	0.53	0.53	0.47	0.60	0.61	0.46	0.49	0.54	0.52	0.49	0.51	0.53	0.54
75 percentile	1.22	1.18	1.12	1.14	1.17	1.48	1.49	1.15	1.22	1.29	1.28	1.18	1.24	1.22	1.27
Skewness	17.66	18.14	18.66	12.69	15.86	9.53	14.26	18.53	17.80	14.94	14.69	14.33	19.65	24.50	25.54
Kurtosis	343.25	364.78	404.50	209.60	266.55	121.48	239.27	390.12	342.58	237.08	227.01	221.93	451.62	667.56	652.48

P/E to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	17.91	1.76	2.34	45.67
Median	1.02	1.01	1.02	1.03
Standard deviation	1285.92	9.11	18.01	2132.96
25 percentile	0.63	0.64	0.63	0.63
75 percentile	1.51	1.44	1.55	1.53
Skewness	107.28	22.03	24.93	64.68
Kurtosis	11576.40	551.67	711.03	4206.99

P/E forward to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	13.64	1.42	1.96	34.55
Median	0.85	0.82	0.87	0.84
Standard deviation	934.44	7.41	14.38	1549.92
25 percentile	0.52	0.52	0.54	0.52
75 percentile	1.24	1.16	1.33	1.24
Skewness	107.01	22.05	24.90	64.52
Kurtosis	11,536.28	548.01	715.81	4192.59

EV/sales fair values to market capitalization ratio

EV/sales to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	2.49	1.99	1.83	4.54	2.01	2.18	2.46	2.43	3.07	5.50	7.47	20.88	58.82	68.49	80.95
Median	1.08	1.07	1.03	1.05	1.03	1.17	1.23	1.14	1.16	1.18	1.16	1.11	1.12	1.15	1.11
Standard deviation	10.88	5.55	4.37	79.56	6.67	6.88	7.64	9.96	15.89	50.32	75.03	316.79	1154.45	1103.72	1681.31
25 percentile	0.57	0.56	0.54	0.56	0.51	0.61	0.65	0.56	0.57	0.55	0.53	0.50	0.49	0.52	0.50
75 percentile	2.16	1.97	1.96	2.00	1.95	2.20	2.35	2.13	2.15	2.33	2.46	2.24	2.29	2.35	2.15
Skewness	19.67	15.91	13.59	30.37	14.68	19.82	14.73	16.22	15.31	20.68	20.59	23.83	31.53	22.34	28.78
Kurtosis	448.70	309.81	226.44	926.67	239.55	460.66	260.63	309.38	265.83	488.82	475.39	631.96	1063.00	541.06	858.39

EV/sales forward to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	2.76	2.13	1.81	4.84	1.83	2.15	2.48	2.29	2.84	5.13	6.82	15.81	46.05	58.06	65.52
Median	1.24	1.12	1.01	0.98	0.92	1.13	1.24	1.05	1.07	1.12	1.06	1.02	1.02	1.09	1.03
Standard deviation	10.55	5.11	4.07	93.15	6.29	7.02	7.11	8.88	14.74	47.78	70.72	210.13	755.92	962.39	1228.81
25 percentile	0.66	0.60	0.55	0.51	0.46	0.59	0.65	0.54	0.53	0.50	0.47	0.47	0.47	0.48	0.48
75 percentile	2.53	2.23	1.94	1.85	1.75	2.16	2.42	2.02	1.99	2.18	2.21	2.06	2.13	2.21	2.03
Skewness	17.65	12.38	12.74	30.33	15.45	20.87	13.73	15.18	15.70	21.49	21.84	19.61	27.29	25.45	27.07
Kurtosis	372.87	189.98	200.31	922.19	274.39	513.03	233.56	263.06	277.69	531.87	537.07	410.27	838.79	722.10	777.13

EV/sales to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	19.63	2.60	3.17	46.85
Median	1.12	1.05	1.17	1.13
Standard deviation	629.73	37.46	25.13	1019.51
25 percentile	0.55	0.55	0.58	0.51
75 percentile	2.20	2.01	2.24	2.32
Skewness	60.22	62.78	36.64	37.22
Kurtosis	4109.76	4062.72	1696.74	1567.19

EV/sales forward to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	16.28	2.69	3.01	38.14
Median	1.07	1.02	1.12	1.05
Standard deviation	473.01	43.53	23.73	765.27
25 percentile	0.52	0.55	0.55	0.47
75 percentile	2.11	2.00	2.18	2.13
Skewness	56.87	63.72	38.39	35.22
Kurtosis	3687.81	4143.59	1873.24	1410.19

EV/EBITDA fair values to market capitalization ratio

EV/EBITDA to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.94	1.72	1.90	1.56	1.60	1.69	2.10	2.73	2.24	3.93	4.29	16.79	15.14	33.83	21.39
Median	1.09	1.06	1.07	1.10	1.02	1.11	1.28	1.07	1.20	1.16	1.08	1.12	1.13	1.13	1.09
Standard deviation	7.51	3.92	11.10	3.00	5.99	4.35	6.27	22.60	11.51	32.68	37.83	245.21	165.67	566.18	422.19
25 percentile	0.69	0.71	0.70	0.71	0.62	0.68	0.80	0.67	0.73	0.74	0.71	0.73	0.69	0.74	0.72
75 percentile	1.70	1.67	1.67	1.62	1.51	1.85	1.95	1.66	1.81	1.95	1.80	1.80	1.76	1.80	1.59
Skewness	18.01	13.31	25.46	14.78	20.78	22.34	16.71	24.61	22.00	19.38	17.32	23.91	17.78	26.24	26.37
Kurtosis	369.85	213.64	673.28	299.17	486.84	587.36	329.05	657.75	537.68	422.48	323.64	636.79	374.49	746.87	704.93

EV/EBITDA forward to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.65	1.43	1.55	1.28	1.26	1.57	1.88	2.39	1.79	3.09	3.72	8.22	10.65	15.36	10.41
Median	0.94	0.91	0.87	0.88	0.81	1.00	1.13	0.88	0.93	0.95	0.97	0.93	0.89	0.91	0.92
Standard deviation	6.49	3.19	9.22	2.56	4.72	4.32	5.87	22.79	8.98	25.76	30.75	82.38	108.95	188.02	151.83
25 percentile	0.58	0.61	0.56	0.56	0.47	0.59	0.70	0.54	0.58	0.60	0.61	0.58	0.56	0.60	0.60
75 percentile	1.44	1.41	1.32	1.31	1.18	1.68	1.72	1.35	1.45	1.56	1.64	1.44	1.44	1.45	1.34
Skewness	18.83	13.11	25.41	15.04	21.17	22.65	16.46	25.73	20.70	18.67	16.49	14.66	16.06	22.13	23.66
Kurtosis	400.30	213.97	669.82	307.72	508.40	597.99	311.90	703.92	483.24	373.96	297.28	228.53	296.70	574.72	596.17

EV/EBITDA to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	8.12	1.73	2.56	18.43
Median	1.11	1.06	1.16	1.11
Standard deviation	207.59	6.83	19.13	342.62
25 percentile	0.71	0.68	0.72	0.72
75 percentile	1.75	1.62	1.85	1.76
Skewness	59.68	29.22	29.74	36.24
Kurtosis	4170.87	1072.84	1037.47	1532.96

EV/EBITDA forward to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	4.73	1.41	2.16	9.77
Median	0.92	0.87	0.97	0.92
Standard deviation	76.26	5.68	16.36	124.76
25 percentile	0.58	0.54	0.60	0.59
75 percentile	1.45	1.32	1.55	1.46
Skewness	42.98	29.53	29.83	26.62
Kurtosis	2392.22	1084.84	1011.61	906.15

EV/EBIT fair values to market capitalization ratio

EV/EBIT to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.61	1.60	1.87	1.49	1.67	1.72	2.24	1.95	2.16	3.76	5.57	12.65	14.72	16.60	7.07
Median	1.09	1.12	1.05	1.10	1.07	1.16	1.34	1.11	1.18	1.19	1.16	1.12	1.10	1.12	1.09
Standard deviation	3.79	4.62	12.46	3.30	7.11	3.91	6.52	8.01	9.91	28.43	53.31	145.89	143.10	189.89	71.13
25 percentile	0.69	0.72	0.68	0.65	0.63	0.70	0.84	0.69	0.74	0.77	0.76	0.74	0.69	0.72	0.70
75 percentile	1.68	1.59	1.48	1.55	1.53	1.91	2.04	1.64	1.87	1.90	1.78	1.72	1.72	1.68	1.56
Skewness	15.35	17.91	24.52	17.05	21.87	19.40	14.04	17.33	18.45	15.46	15.67	17.85	13.24	18.74	16.23
Kurtosis	278.20	358.11	618.30	369.91	537.29	464.01	229.93	354.32	362.21	265.53	256.72	354.50	189.32	410.41	298.80

EV/EBIT forward to market cap	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.34	1.30	1.50	1.14	1.25	1.57	1.84	1.54	1.63	3.09	4.28	8.68	10.18	13.15	6.28
Median	0.92	0.90	0.84	0.83	0.78	1.04	1.11	0.86	0.96	0.98	0.92	0.90	0.89	0.91	0.90
Standard deviation	3.29	3.96	10.18	2.49	5.41	3.78	5.51	6.28	6.35	23.43	39.81	87.03	97.27	140.54	63.50
25 percentile	0.57	0.57	0.52	0.50	0.44	0.60	0.66	0.52	0.59	0.64	0.62	0.58	0.54	0.58	0.58
75 percentile	1.39	1.30	1.23	1.17	1.18	1.73	1.70	1.32	1.48	1.56	1.44	1.37	1.37	1.36	1.32
Skewness	16.04	18.38	24.59	15.78	22.17	19.53	14.54	16.68	16.95	15.07	16.85	15.41	13.83	16.29	15.72
Kurtosis	303.87	376.41	619.13	323.10	551.17	467.05	246.73	326.72	312.31	244.03	311.49	273.24	209.01	306.38	277.97

EV/EBIT to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	5.57	1.65	2.38	11.71
Median	1.13	1.08	1.20	1.12
Standard deviation	82.17	7.15	14.62	135.00
25 percentile	0.71	0.66	0.75	0.72
75 percentile	1.71	1.58	1.87	1.71
Skewness	32.99	32.09	26.05	20.25
Kurtosis	1380.02	1253.89	831.28	514.48

EV/EBIT forward to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	4.25	1.30	1.95	8.76
Median	0.91	0.84	0.98	0.91
Standard deviation	57.91	5.78	11.80	94.84
25 percentile	0.56	0.50	0.60	0.58
75 percentile	1.39	1.24	1.56	1.38
Skewness	30.18	32.63	26.18	18.63
Kurtosis	1156.23	1294.45	815.67	435.01

EBITDA net transaction multiples fair values to market capitalization ratio

Net transaction multiples to market cap	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Mean	1.16	2.10	1.58	2.13	1.99	2.55	2.40	5.90	7.75	10.17	7.62
Median	0.74	1.43	0.93	0.78	1.13	0.96	0.62	0.65	0.75	0.72	0.59
Standard deviation	3.58	4.31	5.14	18.64	9.32	20.15	20.51	55.79	76.64	118.74	119.49
25 percentile	0.46	0.83	0.55	0.47	0.66	0.57	0.36	0.40	0.44	0.44	0.34
75 percentile	1.16	2.32	1.44	1.20	1.70	1.58	1.03	1.11	1.21	1.13	0.95
Skewness	18.75	18.86	16.94	23.40	20.81	19.67	15.53	13.82	15.18	18.25	23.80
Kurtosis	398.85	459.11	341.43	595.10	468.48	408.41	250.59	207.44	265.30	383.46	591.05

Net transaction multiples to market cap	*All time*	*Pre-crisis (–2007)*	*Crisis (2008–2012)*	*Post-crisis (2013–)*
Mean	4.18	1.16	2.08	6.85
Median	0.81	0.74	1.02	0.67
Standard deviation	58.77	3.58	13.31	85.78
25 percentile	0.47	0.46	0.59	0.40
75 percentile	1.37	1.16	1.65	1.09
Skewness	34.17	18.75	28.15	23.82
Kurtosis	1456.92	398.85	904.20	697.00

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CHAPTER 4

Non-financial Information and Risk Disclosure: Compliance Levels with Mandatory Requirements in the Italian Market

Fabio Rizzato, Donatella Busso, Simona Fiandrino and Valter Cantino

1 Introduction

In the aftermath of the financial crisis and corporate scandals (e.g. Enron, J.P. Morgan), adequate risk assessment and corporate transparency have been acknowledged as one of their primary deficiencies (Brockett and Rezaee 2012). Furthermore, the increasing awareness of

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environmental concerns (e.g. depletion of natural resources) and sustainability issues, has progressively lead to the consideration of multifaced risks at the core of the business activities. Both financial and non-financial risks have become even more complex and impactful, therefore, the identification of an exposed area of uncertainty, the thorough understanding of its effects and, ultimately the implementation of actions for monitoring have proved to be crucial elements of the corporate reporting and disclosure system.

Risk disclosure is closely intertwined with the company's risk management process since it favors the discussions of risk perceptions and the communication of risk attitudes in the company's annual report (Abdelrehim et al. 2017). On the one hand, risk disclosure drives the management in the decision-making process since it identifies potential threats and sets up actions of monitoring. On the other hand, risk disclosure keeps stakeholders up to date who are involved in the company with a mutuality of different interests. For such reasons, "risk disclosures should stem from a company's risk management process" (Abdelrehim et al. 2017, p. 104).

Consequently, international standards setters and regulators have started to push companies into disclosing their risk management strategies by identifying potential risk, related effects, and actions regarding all the business activities. The recent Italian Legislative Decree No. 254/2016, which transposes the Directive 2014/95/EU of the European Parliament "on the disclosure of non-financial and diversity information", obliges public listed entities to disclose the principal risks related to their business relationships, products or services in their annual report, as well as what might cause adverse impacts in those areas, and which actions are undertaken to manage those risks. With a broader perspective, the Directive 2014/95/EU required public listed entities to explain how they deal with environmental, social, employees, human rights, and anti-corruption issues, along with the description of the business model, related policies, and Key Performance Indicators (KPIs).

In this context, the study examines how and to what extent companies are compliant with the Directive 2014/95/EU, in disclosing non-financial information. Second, this research identifies the level of risk disclosure, and, the disclosure on risk identification, related effects, and actions according to the Directive 2014/95/EU. Thus, the paper has two main objectives: first, it seeks to determine the level of compliance of NFI disclosure with the Directive 2014/95/EU, and then, it seeks to

specify the level of compliance of risk disclosure with a deep focus on the degree of explanation of such a risk disclosure.

To achieve our objectives, the research evaluates the level of compliance of NFI and risk disclosure on a sample of 50 Italian listed companies. In more detail, in order to assess the level of compliance, an NFI disclosure score was developed with 165 hand-collected items. The information was defined with the adoption of the coding procedure following a dichotomous approach: 1 if the information was disclosed, 0 if it was not, NA when the information was not considered by the company to be material.

While previous studies have described non-financial information and risk disclosure in the context of a voluntary regime (Abraham and Shrives 2014; Rezaee and Tuo 2017b), this paper enriches academic literature regarding the normative approach of non-financial information and risk disclosure.

The remainder of the paper proceeds as follows: the "Literature review" section provides the path developments on NFI disclosure, and then it focuses on prior research of risk disclosure. The "Methodology and the data collection" section explains the research method employed in the present study, and then the section "Discussion of findings" examines the results. The paper ends with the "Conclusion" section, where the limitation of the present research and further developments are acknowledged.

2 Literature Review

2.1 Background on Non-financial Information Disclosure

Literature has encountered NFI disclosure in the later 80s, along with the traditional financial accounting and reporting toward the inclusion of sustainability issues within corporate reporting practices (Brockett and Rezaee 2012). One of the first definitions of NFI was provided by Gray et al. (1987) as "the process of communicating the social and environmental effects of organizations (particularly companies) beyond the traditional role of providing a financial account to the owners of capital, in particular shareholders" (p. 9). With this definition, two main characteristics of NFI come up: the first relates to the topics, meaning that "the social and environmental effects of organizations" are the primary issues addressed, and the second refers to the users of such information,

that is "beyond…a financial account to the owners of capital". On the one hand, NFI relates to measures on CSR practices which constitute the narrative of such information and come to exist nearby the traditional financial performances. On the other hand, NFI is released out of the traditional financial statements to serve all stakeholders with, at least, one stake jointly related to the company's business and not only for the common shareholders and investors.

A similar view is embraced by Eccles and Krzus (2010). They define NFI as "a broad term that applies to all information reported to shareholders and other stakeholders that is not defined by an accounting standard or a calculation of a measure based on an accounting standard, such as revenue growth, which we refer to as 'financial information'. Thus, non-financial can include economic information (e.g. market size in dollars), ratios that use accounting information (e.g. sales per square foot), and accounting-type measures for which no formal standard exists (e.g. core earnings)" (p. 84). So, it is clearly evident that this definition combines both the content of such information and the users to whom this information may be of interest. The study of Eccles and Krzus (2010) is one of the first to recognize the fuzzy terminology around NFI, thus they group NFI into three main subcategories: (1) intangible assets (including intellectual capital and other intangibles); (2) KPIs addressed as quantitative measures of results, achieved using tangible and intangible assets and related to some financial performance indicators; and (3) ESG metrics, which can be both intangible assets and KPIs and explain Environmental, Social and Governance performances. Other scholars outline NFI by considering the reporting boundary around this disclosure, that means the inward or outward location of such information referring to the traditional annual report (Amir et al. 2003; Robb et al. 2001) or other channels of communication. Accordingly, NFI can be exhibited within the financial statements or via other means such as press releases, websites, and surveys toward an extension of a qualitative disclosure assessment. To give an example, Barker and Imam (2008, p. 313) refer to NFI as "information drawn from outside the financial statements" (cited from Erkens et al. 2015). Nowadays, NFI fits within the mainstreams of "sustainability accounting" and the recent "integrated reporting" movement (Cantino and Cortese 2017), but there is no unanimous consensus on NFI's terminology so far (Eccles and Krzus 2010; Haller et al. 2017).

International standards setters, regulators and academics have progressively drawn attention to disclosures of socially responsible practices (European Commission 2017; Global Reporting Initiative 2016; Rezaee and Tuo 2017b).

First, international standards setters have developed guidelines for reporting binding sustainability with a twofold aim. On the one hand, they have enacted international standards schemes to provide stimuli on voluntary disclosure of non-financial information with reference to business results as for both financial and non-financial performance. On the other hand, they have set up a homogenous language in favor of sustainable development to increase transparency and comparability among data (Global Reporting Initiative 2017). Examples of international standards frameworks on sustainability issues are the Global Reporting Initiative (GRI), AA1000 (AccountAbility 1000, for social and ethical accounting, auditing and reporting, Climate Disclosure Standards Board (CDSB) Framework, Carbon Disclosure Project (CDP), the Eco-Management and Audit Scheme (EMAS), the Guiding Principles Reporting Framework on Business and Human Rights, ISO 26000 of the International Organization for Standardization and the recent IR—Integrated Reporting Framework.

Second, regulators have forced companies to disclose their sustainable actions in order to enhance CSR in the interest of both enterprises and society as a whole (European Commission 2011). In this regard, the recent Italian Legislative Decree No. 254/2016, which has transposed the Directive 2014/95/EU of the European Parliament on the disclosure of non-financial and diversity information, has obliged Italian listed companies to disclose their business model, policies, and outcomes, as well as risks and opportunities, related to, at least, environmental, social, and employee matters as well as human rights, anti-corruption, and bribery issues (European Parliament and the Council 2013). Thus, public-interest entities[1] are required to prepare a non-financial statement in accordance with the law which applies to all those undertakings for the 2017 financial year.

[1] Public-interest entities are companies exceeding the criterion of the average number of 500 employees during the financial year and covering, at the end of the financial year, one of the following boundary: (a) total assets: 20,000,000 Euro, and (b) total revenues: 40,000,000 Euro.

Third, academic scholars have further developed several studies on NFI voluntary disclosure, investigating the meanings (Erkens et al. 2015; Haller et al. 2017), the assessments of the content and the quality of information (Beretta and Bozzolan 2008; Melloni et al. 2017), the determinants that favor non-financial information disclosure (Ioannou and Serafeim 2017; Rezaee and Tuo 2017b), and the effects of such implementation (Bini et al. 2017; Dhaliwal et al. 2012; Lu and Abeysekera 2017) that eventually can constitute the reasons underpinning such disclosures.

Furthermore, accounting studies have attempted to figure out the determinants of such disclosure, as for example economic performance (Hackston and Milne 1996), stakeholder pressure (Roberts 1992), and to understand the consequences of different levels or types of non-financial disclosure including low information asymmetry (De Klerk et al. 2015), corporate reputation (Kansal et al. 2014) and firm value (Cahan et al. 2016; De Villiers and Marques 2016).

Additionally, scholars have enriched the academic literature by developing various assessments of NFI disclosure. They have engaged with several research methods in order to construct indexes which describe the content and/or the quality disclosures. The content of NFI mostly refers to socially responsible practices and company strategies and it is grouped into categories like historical information and forward-looking information (Rezaee and Tuo 2017a) or considering monetary and non-monetary quantifications. Such contents are often linked to the amount of words or sentences (Hackston and Milne 1996) and are derived from the personal elaboration of the researchers' checklists (Mangena et al. 2016; Thijssens et al. 2015), from the adoption of referred international guidelines frameworks such as the GRI (Hummel and Schlick 2016; Mallin et al. 2013; Martínez-Ferrero and Frías-aceituno 2015; Martínez-Ferrero et al. 2015) interlinked with other international standards guidelines (ISO 26000, UN Global Compact) or from lists of other authorities, like the one of AICPA (Rezaee and Tuo 2017a; Robb et al. 2001).

Overall, prior research on NFI disclosure mainly have focused on a voluntary-based approach and there have been fewer which investigate compliance levels and normativity in a mandatory regime (Chelli et al. 2018). Considering the recent regulatory changes to track, understanding how companies deal with the regulatory adequacy is a value of interest (Schneider et al. 2018). With this aim, the first research question is the following:

RQ1 Which is the level of compliance of non-financial information with mandatory disclosure in the first year of the application of the Directive 95/2014/EU?

2.2 Related Risk Disclosure Studies

Risk disclosure is defined as "the communication of information concerning firms' strategies, characteristics, operations, and other external factors that have the potential to affect expected results" (Beretta and Bozzolan 2004, p. 269). Information on risks and opportunities has always been seen as interlinked with forward-looking information since its inception in 1994 in the Jenkins Committee Report (AICPA 1994). Likewise, according to (ICAEW 2000) and (CPA Canada 2014), forward-looking information and disclosures on risks are closely aligned with each other since they "describe management's strategy and future events, decisions, circumstances, opportunities and risks that management considers likely to materially impact future prospects" (CPA Canada 2014, p. 4). Such information is crucial for the management to drive business decisions and plans for the future as a result of market and industry changes. Because the management is the closest to the business, it considers risks and opportunities when planning for the future, and in turn, such information is useful for stakeholders in order to understand management plans.

Other attempts in favor of inclusion of key risks were made in the United Kingdom in 1993 when the Operating and Financial Review (OFR) encouraged companies to report on their key risks (Beretta and Bozzolan 2004). In 2005, German companies were required to present information about risks in a self-contained section. However, such a mandatory requirement was counterproductive of an efficacy mandatory risk disclosure (Kajüter and Winkler 2003). Conversely, in Finland, the Finnish Accounting Practices Board enacted detailed risk disclosure schemes to drive companies toward the assessment of their significant risks (Miihkinen 2012), and significant increases were revealed. The standard on risk disclosure actually positively favor the extensive explanation of a broader set of risk topics.

Apart from the above-mentioned mandatory efforts to enhance disclosure on risks, such information has mainly remained voluntarily, and the mainstream academic literature has developed research accordingly. Among others, the study of Beretta and Bozzolan

(2004) proposes a novel framework for the analysis of the voluntary disclosure of risks that considers 4 spheres: "the content of information disclosed; the economic sign attributed to expected impacts; the type of measures used to quantify and qualify the expected impacts; (the outlook orientation of risk communication) and the managerial approach to the management of risks" (p. 270). In more detail, the analysis addresses on a sample of Italian non-financial listed companies to understand whether disclosure quality depends on size or industry as determinants, and no significant influences among those variables emerge. Similarly, the study of Godwin (2015) reviews prior research which investigates the determinants that favor risk disclosure as for the company size, industry type, financial leverage, board composition, and audit quality. The findings of Godwin's (2015) study exhibits discrepancies among such relationships, supporting that "there are no globally accepted determinants of risk disclosure" (p. 6). The work of Abdelrehim et al. (2017) enriches the literature with reference to the main characteristics of risk disclosure, relying on the neo-Durkheimian institutional theory, which builds on social beings and social relations as the drive to shape risk perceptions and attitude to risks. In particular, the results show that the "pattern of social relations does influence both the risk perceptions and risk attitudes of the company contained within the annual report risk disclosures" (p. 108). Finally, Abraham and Shrives (2014) discuss the literature on voluntary risk disclosure, focusing on the quality of risk reporting in order to understand how risk disclosures have changed over time. They develop the risk factor's assessment with the adoption of alternative forms of content analysis; form oriented (objective) and meaning oriented (subjective) analysis in line with prior research (Smith and Taffler 2000). The results suggest that "the current disclosures can be seen as 'symbolic window dressing'" (Carruthers 1995, p. 315).

All the previous studies considered, we aim to understand the extent of risk disclosure in compliance with the recent regulatory adequacy. Therefore, the second research question unfolds as follows:

RQ2 Which is the level of compliance of risk disclosure with the mandatory requirements of the Directive 95/2014/EU?

3 Methodology and Data Collection

The sample covered 50 Italian listed companies which prepared the 2017 non-financial statement in accordance with the Italian Decree 254/2016 in 2018. The sample was collected from DataStream, including 394 Italian listed companies. First, we excluded companies with less than 500 employees, as those companies were not obliged to provide the non-financial statement in accordance with the law. Second, we did not consider companies for which the number of employees was not available. Third, and lastly, we removed companies because they were neither subjected to the Directive 95/2014/EU, nor were they obliged to prepare the non-financial statement, since it was provided by their parent companies. We ended with a sample of 50 companies: 12 Italian listed companies of 50 belong to the financial sector (24%), 38 of 50 belong to the non-financial sector.

To assess the level of compliance, the research study developed an NFI disclosure score following the disclosures of topics in accordance with Article 19 of the Directive 95/2014/EU and Article 3 of the Italian Legislative Decree 254/2016 and building a checklist. Table 1 shows the linkage between the Directive 95/2014/EU's requirements and the international standard frameworks adopted to construct the checklist accordingly.

For each content topic (environmental, social, employees' matters, anti-corruption, and human rights issues), we included the Topic-specific Standards of the GRI Framework (from GRI 201 to GRI 419). For these sections, 68 items were added. Prior academic studies have adopted the GRI Sustainability Reporting Guidelines as the coding framework (Hummel and Schlick 2016; Lu and Abeysekera 2017). Even if the GRI has also been criticized in several studies to emphasize the "tick GRI box" (Michelon et al. 2015; Moneva et al. 2006), according to Lu and Abeysekera (2017), it addresses standardization of metrics and supports reliability of disclosure measurement. Such a measurement is reasonably acceptable for assessing compliance levels, therefore we proceeded accordingly.

To make the business model more accurate, we added 11 items of the Integrated Reporting <IR> Framework since it discusses the business model in detail, including the inputs, the subsequent business activities, followed by the outputs (products) and the outcomes (effects) of the organization's activities.

Table 1 Checklist of NFI items according to the directive

Directive 95/2014/EU	*Source*	*Number of items added*
• Environmental issues • Social issues • Employees • Human rights • Anti-corruption	Topic-specific Standards of the Global Reporting Initiative (GRI) Framework	68
• Business model	Integrated Reporting <IR> Framework	11
Policies		
• General description	Management approach (GRI 103) of the GRI Framework (14) and IR Framework (2)	16
• Environmental issues • Social issues • Employees • Human rights • Anti-corruption	• Qualitative disclosure on the current period • Qualitative disclosure on the prior period • Qualitative disclosure on the future period	15
Risk and opportunities		
• Environmental issues • Social issues • Employees • Human rights • Anti-corruption	• Identification of risks • Explanation of effects • Undertaking actions to manage risks	15
KPIs		
• Environmental issues • Social issues • Employees • Human rights • Anti-corruption	• Quantitative indicators on the current period • Quantitative indicators on the prior period • Quantitative indicators on the future period • Benchmarks • Method of evaluations	25
General disclosure	General standards of the Global Reporting Initiative (GRI)	15
Total items		165

Source Own elaboration (2018)

To describe the undertaking policies of the companies, we included the GRI 103 (Management Approach—16 items) and qualitative disclosures with reference to the time frames (current period, prior period and future period—15 items).

To explain "risks and opportunities", we referred to the EU Directive, which forces companies to explain "the principal risks related to those matters linked to the undertaking's operations including, where relevant and proportionate, its business relationships, products or services which are likely to cause adverse impacts in those areas, and how the undertaking manages those risks" (Directive 95/2014/EU, p. 5). For this section, we added personal items regarding the identification of risks, the explanation of related effects, and the actions undertaken to manage such risks, for each "content" dimension: 15 items are under analysis.

To describe the KPIs, we included 25 items in order to consider the time frames (prior, current and future period), the measurement methods and the presence of benchmarks for each content topic. Finally, we included 15 items from the GRI 102—General Disclosure with reference to "stakeholder engagement" (from GRI 102-40 to GRI 102-44), "ethics and integrity" (GRI 102-16 and GRI 102-17), and "economic impact" (from GRI 201-1 to GRI 204-1).

We refined the checklist with a double match with other international standard frameworks (AA1000 standard for accountability, ISO 26000 on social responsibility, the CDSB framework, and the United Nations (UN) Global Compact) to overcome overlapping items and to erase duplicates. We ended up with 165 items; the overall checklist of 165 items is shown in Appendix A.

We hand-collected NFI of the 2017 financial statements and, then, to cluster information and identify the presence or absence of information, the following coding procedure with a dichotomous approach was adopted: 1 if it was present, 0 otherwise, not applicable (NA) information in case of a clear explanation of the non-materiality of a particular "content", in line with prior research which employed the same method of analysis (Devalle et al. 2016).

We defined NFI Disclosure Score as follows:

$$\text{NFI\_disclosure\_score}_j = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} x_i}$$

where:

j = the company;

i = the item;

d = the item can assume 1 if the information is presented, otherwise it is 0; and

x = the material item, which is NA coding.

This score is unweighted, and it refers to Cooke's Method Unweighted (Cooke 1989).

For each company, we determined the level of compliance of NFI with mandatory disclosure of the 2017 financial year, which was the first year of the law's adoption.

4 Discussion of Findings

Table 2 shows the level of compliance of non-financial information.

As we can see in Table 2, the NFI disclosure score is 52.259%, which is quite far from the 100% in a mandatory regime. However, this result may depend on the number of items included in the NFI disclosure score, which has been developed considering a high degree of specificity. Companies in the financial sector exhibit a lower level of disclosures (45.231%) compared to companies in the non-financial sector, with a range of 0.53563 between minimum (0.28082) and maximum (0.81645) scores. By contrast, the non-financial sector disclosure level is 54.478%, above the overall average, and the range between the minimum and maximum disclosure levels is higher (range = 0.62909) in comparison with the financial one.

Overall, the median is not as distant in comparison with the mean, and this is true both in the financial sector and the non-financial sector. This is also confirmed by the standard deviation which is approximately equal in all three cases. Furthermore, such a distribution of data is likely to be similar to the normal distribution, as illustrated in Fig. 1.

As shown in Table 2, the skewness is equal to 0.42319, which means that the distribution is skewness to the right. Considering the Kurtosis (−0.33285), the distribution is platykurtic (Fig. 2).

Similarly, the distribution of the NFI disclosure score with reference to the non-financial sector, is likely to be equal to the prior distribution.

Related to the distribution of the NFI disclosure score of the financial sector, we can see in heavy-tails Fig. 3, as confirmed by the Kurtosis (equal to 2.56099), thus the distribution is skewness to the right (1.23345).

Table 2 The level of compliance of NFI

NFI disclosure score	*Total sample*	*%*	*% cum.*	*Non-financial sector*	*%*	*% cum.*	*Financial sector*	*%*	*% cum.*
N	50			38			12		
Mean	0.522			0.544			0.452		
Median	0.491			0.523			0.452		
Std. Dev.	0.15			0.146			0.147		
Min.	0.213			0.213			0.28		
Max.	0.842			0.842			0.816		
Range (Max.–Min.)	0.629			0.629			0.535		
0.00–20.00%	0	0	0	0	0	0	0	0	0
20.01–30.00%	2	4	4	1	2.6	2.6	1	8.3	8.3
30.01–40.00%	7	14	18	4	10.5	13.1	3	25	33.3
40.01–50.00%	18	36	54	13	34.2	47.3	5	41.7	75
50.01–60.00%	9	18	72	7	18.4	65.7	2	16.7	91.7
60.01–70.00%	6	12	84	6	15.8	81.5	0	0	91.7
70.01–80.00%	5	10	94	5	13.2	94.7	0	0	91.7
80.01–100.00%	3	6	100	2	5.3	100	1	8.3	100
Skewness	0.423			0.304			1.233		
Kurtosis	−0.332			−0.395			2.560		

Source Own elaboration (2018)

The following sub-sections show the descriptive statistics with reference to our hand-collected data. The analysis is grouped into two distinctive sub-sections: the former presents data related the levels of compliance of NFI for each mandatory topic and whereas the latter centers on risk disclosures with reference to the identification of risks, the explanation of effects and declarations of actions.

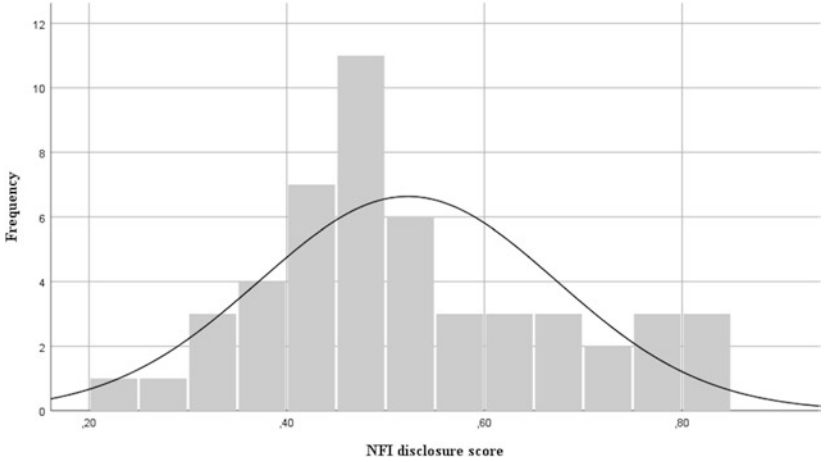

Fig. 1 Distribution of the NFI disclosure score (*Source* Own elaboration 2018)

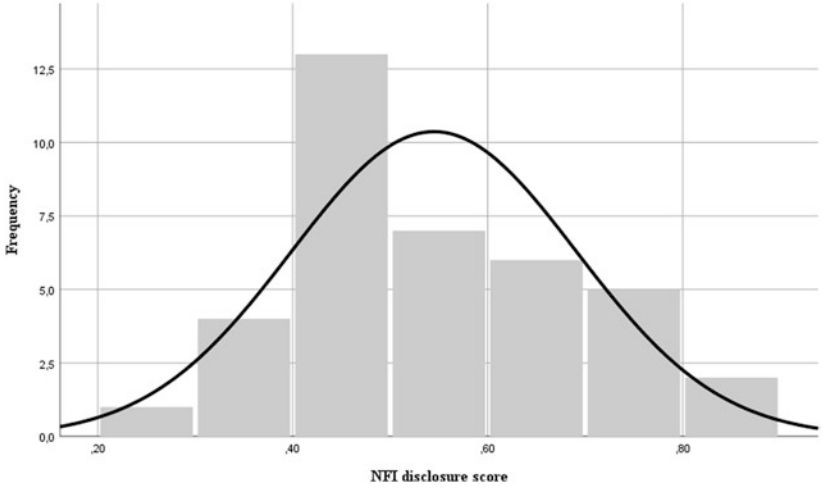

Fig. 2 Distribution of the NFI disclosure score (non-financial sector) (*Source* Own elaboration 2018)

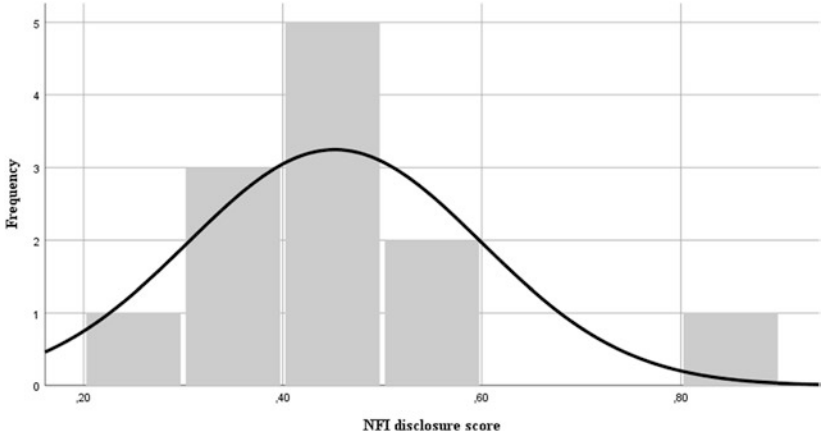

Fig. 3 Distribution of the NFI disclosure score (financial sector) (*Source* Own elaboration 2018)

4.1 The Level of Compliance of NFI

Table 3 provides the descriptive statistics for each mandatory requirement topic. The score for the environmental dimension is slightly below the average, at 47.651%. The environmental score of the non-financial sector is 0.48327, and the financial sector score is 0.4551, without a significant standard deviation, which is, respectively, equal to 0.23052 and 0.22630. Generally, companies broadly address energy (42%), emission (52%), effluents, and waste (26%) by explaining at least one of the various indicators proposed by the GRI for each sub-environmental topic (see Appendix A for further details). Surprisingly, companies do not yet assess suppliers or other stakeholders using environmental criteria: few companies have adopted environmental screenings, only 25% of the sample provide such information (see Appendix A). The underlying idea is that companies are not likely to be aware of how their stakeholders deal with environmental issues, which could undermine the companies' performance when suppliers do not manage environmental protection appropriately.

With reference to the social dimension, the score sets at 55.15% on average. There are similar data variations for the standard deviations: 0.22119 and 0.25142 for the financial and non-financial sectors, respectively. However, the social dimension is addressed differently in the

Table 3 The level of compliance of NFI

		Envir.	*Social*	*Empl.*	*Human right*	*Anti Corr.*	*Diversity*	*Business model*	*Policies*	*Risks*	*KPIs*	*General disclosure*
Total sample	*N*	50	50	50	50	50	50	50	50	50	50	50
	Mean	0.47651	0.55159	0.54215	0.45372	0.61666	0.71000	0.49818	0.61707	0.60139	0.35400	0.56193
	Std. Dev.	0.22753	0.25723	0.23567	0.35251	0.29306	0.32090	0.28762	0.17162	0.26598	0.15061	0.27223
	Min.	0.20000	0.10000	0.09090	0.00000	0.00000	0.00000	0.00000	0.29032	0.00000	0.12000	0.00000
	Max.	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.75000	1.00000
	Tot. item	30	12	11	9	4	2	11	31	15	25	15
	Item = 1	10.36	4.92	5.84	2.76	2.38	1.42	5.48	18.9	8.68	8.28	8.04
	Item = 0	11.34	4.06	4.92	2.46	2.38	0.5	5.52	11.7	5.74	15.52	6.16
	Item = NA	8.3	3.02	0.24	3.78	1.48	0.08	0	0.38	0.58	1.2	0.8
Non-financial sector	*N*	38	38	38	38	38	38	38	38	38	38	38
	Mean	0.48327	0.59961	0.53301	0.49894	0.64035	0.71100	0.50000	0.64689	0.63157	0.37315	0.57447
	Std. Dev.	0.23052	0.25142	0.23391	0.35472	0.30823	0.32110	0.28728	0.16448	0.26226	0.15334	0.25131
	Min.	0.20000	0.10000	0.27272	0.00000	0.00000	0.00000	0.00000	0.29032	0.00000	0.12000	0.00000
	Max.	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.75000	1.00000
Financial sector	*N*	12	12	12	12	12	12	12	12	12	12	12
	Mean	0.45510	0.39953	0.57110	0.31051	0.54166	0.70800	0.49242	0.52263	0.50580	0.29333	0.52222
	Std. Dev.	0.22630	0.22119	0.24932	0.31758	0.23435	0.33430	0.30140	0.16555	0.26588	0.12914	0.33973
	Min.	0.20000	0.14285	0.09090	0.00000	0.25000	0.00000	0.09090	0.32000	0.13333	0.12000	0.06666
	Max.	1.00000	0.81818	0.90909	0.88888	1.00000	1.00000	1.00000	0.90322	0.91666	0.52000	1.00000

Source Own elaboration (2018)

financial sector and the non-financial sector. As a matter of fact, differences emerge when comparing means. On the one hand, the score of the financial sector is 39.95%, whereas the score of the non-financial sector is 59.96%. This is primarily due to the fact that, in the various sectors, companies deal differently with the sub-topics within the social dimension. Examples on which divergences emerge are marketing and labeling issues (38%) and issues related to customer health and product safety (42% of the sample), and such topics are much more likely to be of interest to non-financial companies. Conversely, banks and financial institutions are likely to focus on programs that support financial literacy through face-to-face and digital channels, such as training sessions to facilitate access to credit for low-power stakeholders (e.g. social enterprises and communities) and promote cultural initiatives. Disclosures on social topics refer primarily to consumer privacy (56%) and the socioeconomic compliance (52%). As for the environmental dimension, the assessment of suppliers' adoption of social criteria is of little interest: this sub-topic is disclosed by 41% of the sample. Social programs for communities are disclosed in broad terms, to the extent the information focuses first on initiatives (35% of the sample disclose such information—see Appendix A). Further developments to enhance social sustainability programs are broadly spread (48.98%), and companies attempt to assess the potential impact. By contrast, information on operations with significant actual impact on local communities is not disclosed in depth (20.41%).

The disclosure score for the employee dimension is 54.215%, which is close to the overall disclosure score. Furthermore, the results are similar for both sectors: banks and financial institutions have a disclosure score of 57.11%, and the non-financial sector has a disclosure score of 53.30%. With respect to deviations from the mean, we find no significant difference between sectors. This is confirmed by the standard deviation, which is very similar for both sectors: 0.24432 for the financial sector and 0.23391 for the non-financial sector. This means that the data have similar variations and are somewhat consistent in the two sectors, even if the score for the non-financial sector is lower than that for the financial sector. With respect to the sub-topics, 58.6% of companies disclose the number of new employees hired and the employee turnover, and 62% disclose the training sessions for their employees.

The overall disclosure score for human rights is 45.72%, with considerable discrepancy between the sectors: 31.05% for the financial sector and 49.89% for the non-financial sector. In this section, we can see that

the human rights score gets the minimum, setting at 0%, which we have never seen before. In other words, the result suggests that some companies are not likely to disclose such piece of information. Furthermore, as we can see in Appendix A, the disclosure with reference to non-discrimination is the highest (60% of the sample provide such information), whereas the disclosure on securities practices is less disclosed (only 16% of the sample explain such information).

Companies engaged with anti-corruption reported their results quite consistently; on this regard, the disclosure for anti-corruption is 61.66%. However, the discrepancy between sectors needs to be acknowledged: the financial sector has a lower score (54.166%) than the non-financial sector (64.03%), and such a difference is mainly due to the fact that companies belonging to the financial sectors address the training sessions on anti-corruption policies and procedures oppositely in comparison to those in the non-financial sector. At least one of the non-financial companies does not provide this kind of information, whereas in the financial sector, banks and financial institutions explain their actions toward anti-corruption actions.

The disclosure score for gender diversity is 71%: respectively 71.10% for the non-financial sector and 70.80% for the financial sector. These scores are, on average, the highest, meaning that companies disclose gender diversity issues well. This section evaluates two items from the GRI list: the diversity of the board and employees and the basic salary and remuneration ratios for women and men. With regard to the first item, companies are generally in favor of clearly disclosing the ratio of women to men. This information is present in 46 of 50 non-financial statements and is available in other documents for those companies that do not disclose it in their non-financial statements. Salary information is disclosed in 25 non-financial statements, not disclosed in 23 non-financial statements, and considered to be non-material in 1 non-financial statement. The results show that companies tend not to disclose all the items on the disclosure list with respect to diversity issues. However, they do tend to provide general information (i.e. the number of employees and governance board members of each gender).

The disclosure scores for the business model are very similar: the overall score is 49.818%, and there are no significant differences between the financial sector (49.24%) and the non-financial sector (50%). To see the differences and understand whether companies are likely to provide full disclosure, it is necessary to understand how companies disclose their

business models. In total, this dimension comprised 11 items divided into three sub-sections. The first set of questions covered a general description or diagram, an explanation of critical stakeholders, and a discussion of linkages with strategy and main KPI indicators. Generally, companies disclose this information. The second group of items covered how companies deal with their inputs and how they manage their business activities. Companies are also likely to disclose information for this sub-section. They describe their inputs (55% of the sample) and their business activities (64.67% of the sample) well, but few companies address potential outcomes: only the 35% of the sample disclose such information. We can conclude that companies are less likely to explain their outcomes within the business model for future strategic decisions.

Disclosure for policies gets high scores. The overall disclosure score is positive, at 61.70%, meaning that companies provide information on their practices and policies. This section comprised 31 items in two main sections: one concerning the management approach and the materiality determination process, and the other concerning qualitative information grouped according to the time frame (past period, current period, future period) for each topic (environmental, social, employee, human rights, anti-corruption) mentioned in the Directive. This approach supports an understanding of the extent to which information is presented. In more detail, analyzing the first group, we can see that nearly all companies (46 out of 50) provide the materiality matrix, and 26 explain why this topic has been classified as material. They also identify their targets and objectives with respect to their management approaches (98%) and commitments (100%). What the statements are most likely to lack are a detailed explanation of the results of an evaluation of the management approach (disclosed in only 20% of the sample) and limitations concerning the management approach and how the companies deal with these limitations through possible adjustments (disclosed in only 16% of the sample). On the other hand, considering qualitative disclosures for each theme in line with the Directive (environmental, social, employees, human rights, anti-corruption), companies unanimously present qualitative data for the current period (96.4%) and 58% show a descriptive comparison with the prior period. For each topic explained for previous years, qualitative explanations of social and environmental practices are detailed for at least two years. However, companies rarely provide plans with a forward-looking perspective (15.2%) (see Appendix A—Qualitative disclosure on material matters).

The KPIs section has the lowest disclosure scores, at 35.4% overall and 29.33 and 31.37% for the financial and non-financial sectors, respectively. This means that companies do not generally give a full picture of current, past, and expected performance. The range between the minimum and the maximum is 0.40 for banks and financial institutions and 0.63 for the others. The data are very close to one another, as confirmed by the standard deviation, which is 0.26598 for the whole sample, therefore, companies seem to behave in a similar way. For a better understanding, it is necessary to analyze each of the sub-sections. A total of 25 items were examined, as we determined whether companies disclose quantitative indicators for each of the five topics (environmental, social, employees, human rights, and anti-corruption) with respect to the time period: current, prior and future. Therefore, we expect to see KPIs for the current year in comparison to prior years. We also expect KPIs suggesting companies' forward-looking goals and quantifying future objectives. We add the measurement methods for each topic and compare the sectors since such disclosures could indicate full and in-depth explanations. Generally, companies provide quantitative data on the current period (74% of the sample) and the prior period (58% of the sample), yielding a two-year comparison. Both forward-looking information and comparisons are lacking: only 6 and 3% of the sample provide such information, respectively. Finally, the section on the general disclosure gets a score of 56.19%: on the one hand, the score of the non-financial sector is 57.44%, on the other hand the score of the financial sector is 52.22%. For this section, 15 items were under analysis, and, in more details, we can consider the presence/absence of GRI items going from 201 to 204 regards the economic performance, then ethics and integrity dimension, and finally the stakeholder engagement section.

With reference to the ranges of the NFI disclosure score, we can see in Table 2 the results. Companies achieve a disclosure score higher than 20.01%, suggesting that they are compliant with the minimum requirements. None companies are in the first range from 0 to 20%. 54% of the total sample show an NFI disclosure score which is less than 50.01%, depending mostly from the companies which belong to the financial sector. 75% of the total sample has an NFI disclosure score lower than 50.01%. Lastly, 6% of the sample has an NFI disclosure score between 80 and 100%, and the companies within this range belong to the non-financial sector foremost.

4.2 The Level of Compliance of Risk Disclosure

This section explores the level of compliance of risk disclosure with mandatory requirements according to the Directive 95/2014/EU. In particular, it investigates whether companies identify risks, how they explain the possible effects of risks, and how they describe their actions in response to the risks. In total, 15 items were examined, as shown in Table 4; Appendix A provides the details.

Looking at the boxplots that illustrate the distribution of information availability (disclosed, not disclosed, and non-material), we can observe the positive results of risk disclosures. The illustrative results are shown in Fig. 4, and descriptive statistics (items disclosed-not disclosed -not

Table 4 Checklist of risks and opportunities

EU Directive	*Risks and opportunities*	*N. of items*
Art. 19 bis 1d	Identification of risks (for each topic—5)	5
Art. 19 bis 1d	Explanation of effects (for each topic—5)	5
Art. 19 bis 1d	Undertaking actions to manage risks (for each topic—5)	5

Source Own elaboration based on the EU Directive's requirements (2018)

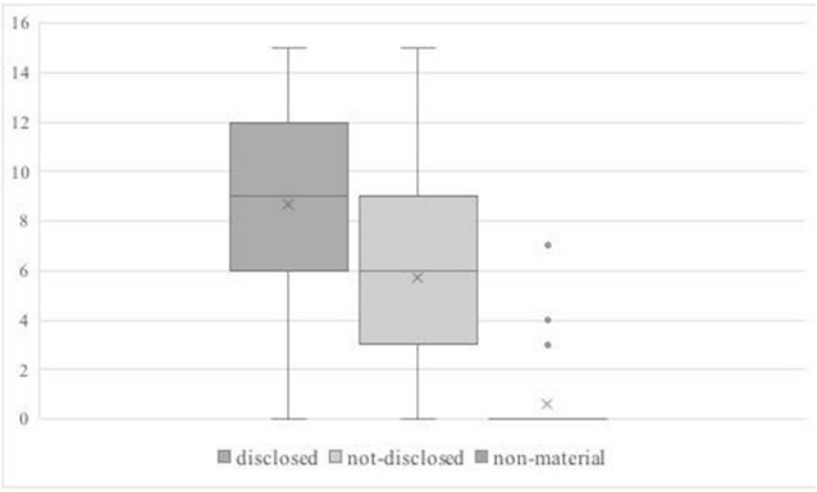

Fig. 4 Boxplots of risks and opportunities (*Source* Own elaboration 2018)

Table 5 The level of risk identification for each content topic

Content topic	*Number of companies disclosing such information*	*% of companies disclosing such information*
Environmental	47	94
Social	45	90
Employees	41	82
Human right	33	66
Anti-corruption	37	74

Source Own elaboration (2018)

material) are reported in Table 5. The center of the dispersion is 8.68, meaning that, on average, companies disclosed 8.68 out of 15 items. The boxplot representing available information is 5.75 items wide (range: from Q3 at 11.75 to Q1 at 6). This means that the amount of information is centered over the average of items. Analogous results are found for not-disclosed information, because not-disclosed items are spread on the mean which is equal to 5.74 in the range from 3 to 8.75 (Q1 and Q3). This means that some information is missing within the non-financial statements.

The risk disclosure score (60.139%) is higher than the NFI disclosure score (52.25%), thus, it seems that companies disclose risks in a manner that such information is well disclosed in comparison to the other requirements (environment, social, employees, anti-corruption, human rights, business model, policies, KPIs). Figure 5 shows the distribution of the risk disclosure score. As confirmed by the skewness (equal to −0.09531) and the Kurtosis (equal to −0.7077), the distribution of the NFI disclosure is skewness to the left and platykurtic.

Overall, the results we observed are good: the risk disclosure score was 60.139%, and, in more details, 63.25% for the non-financial sector and 50.58% for the financial sector. The median is 60%, meaning that the results do not diverge from the mean. To understand whether or not such information is well explained, we split the risk disclosure score into three components, for each item addressed according to the regulatory requirements.

First, the risk identification score is equal to 84.02%, with similar scores for both the financial and the non-financial score, which is 86.667 and 83.684%, respectively. This means that companies identify

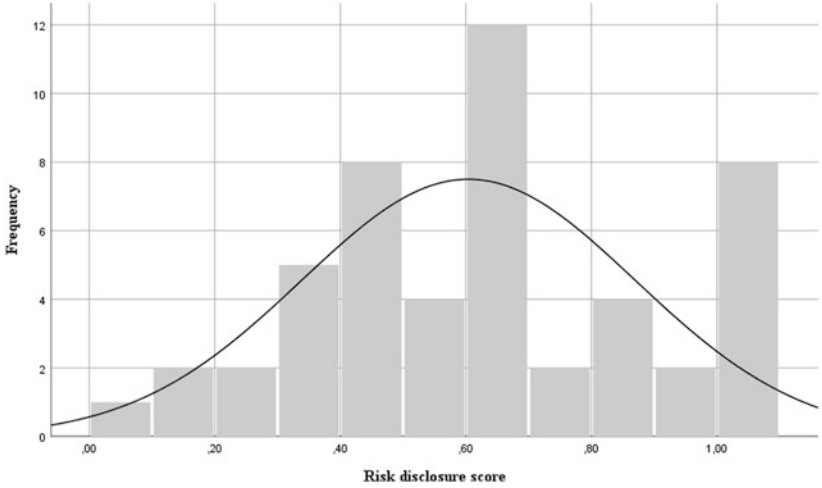

Fig. 5 Distribution of the risk disclosure scores (*Source* Own elaboration 2018)

non-financial risks properly. The risk identification for each content dimension is as follows: 47 out of 50 (94%) discuss environmental risks, 45 out of 50 (90%) discuss social risks, 41 companies (82%) identify risks on employees, 33 companies (66%) determine risks on human rights and, finally 37 of 50 (74%) identify risks related to corruption issues. Table 5 illustrates the results.

Figure 6 shows the distribution of the risk identification score: the distribution is leptokurtic, since we can see higher densities of values at the extreme-right ends of the curve; with the Kurtosis equal to 2.2638. The skewness is equal to −1.63789: the value is negative; thus, thus the distribution is skewness to the right. This is even confirmed in Fig. 4; we can see that most of the group are likely to disclose the identification of non-financial risks.

Second, a lower score is achieved with reference to the explanation of effects. As a matter of facts, the average score is 35.70%, which is the lowest results of each item, even lower than the overall NFI disclosure score.

Figure 7 represents the distribution of score on the explanations of the effects, which has a positive skewness (0.54049). The Kurtosis is

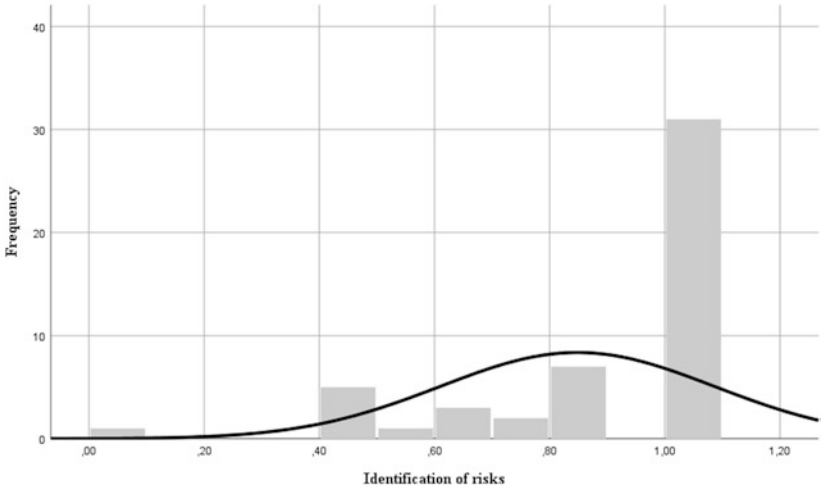

Fig. 6 Distribution of the disclosure of risk identification (*Source* Own elaboration 2018)

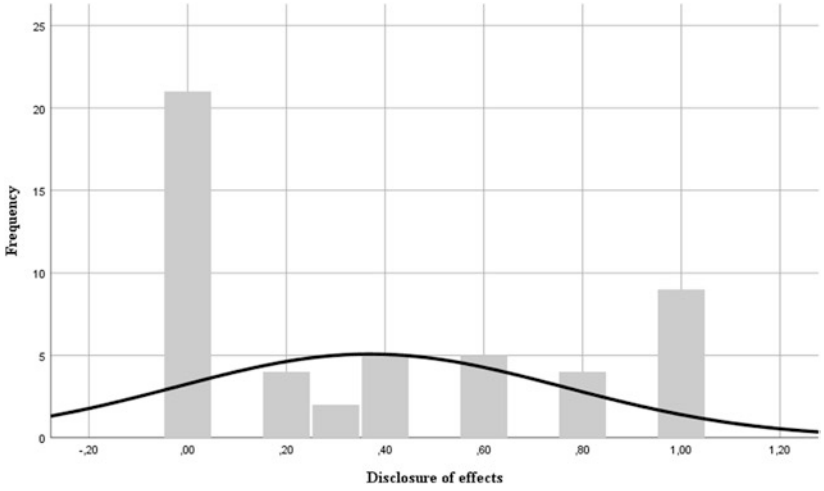

Fig. 7 Distribution of the disclosure of related effects (*Source* Own elaboration 2018)

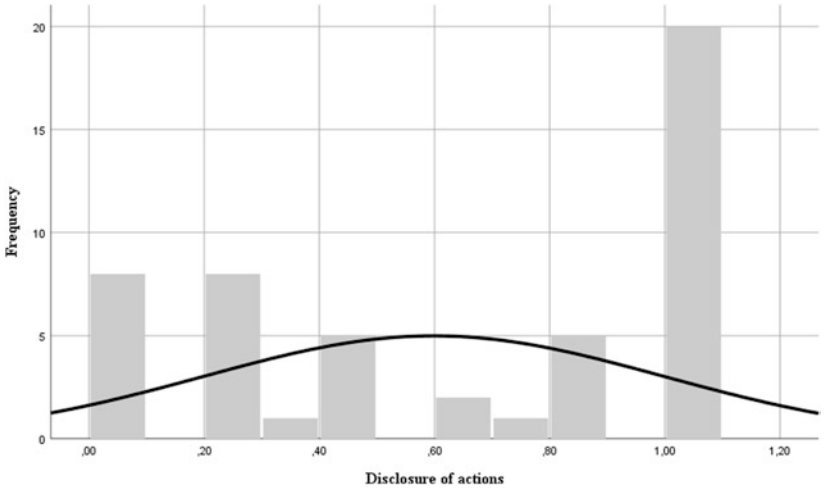

Fig. 8 Distribution of the disclosure of related actions (*Source* Own elaboration 2018)

−1.29450, meaning that the distribution of data looks flatter compared to the normal distribution.

Third, with reference to the actions in response to risks, the related score is equal to 0.59864, which is similar to the overall Risk disclosure score. The median, which is 0.80, is quite above the mean, indicating a positive disclosure in favor of actions to cover risks. Figure 8 shows the distribution, and similarly to the prior, the distribution of data looks flatter compared to the normal distribution.

Overall, as we can see in Table 6, the financial sector gets a higher score with reference to the identification of risks and opportunities (86.67%) in comparison with the non-financial sector. By contrast, the non-financial sector gets higher scores with reference to the explanation of effects (40.65%), and the declaration of actions (65.61%), in comparison with the financial sector.

In order to understand how companies approach at risk disclosure separately for each sub-dimension (environmental, social, employees, human rights, anti-corruption), the information available has been detailed accordingly. The results are shown in Table 7.

Table 6 The level of compliance of risk disclosure

Disclosures scores		*Risks and opportunities*	*Identification of risks*	*Explanation of effects*	*Declaration of actions*
Total sample	Mean	0.60139	0.84082	0.35700	0.59864
	Median	0.60000	1.00000	0.20000	0.80000
	Std. dev.	0.26599	0.23725	0.39474	0.39933
	Min.	0.00000	0.00000	0.00000	0.00000
	Max.	1.00000	1.00000	1.00000	1.00000
	Skewness	−0.09531	−1.63789	0.54049	−0.30806
	Kurtosis	−0.70777	2.26386	−1.29450	−1.59756
	Tot. items	15			
	Items = 1	8.68			
	Items = 0	5.74			
	Items = NA	0.58			
Non-financial sector	Mean	0.63166	0.83684	0.40658	0.65614
	Median	0.65152	1.00000	0.40000	0.80000
	Std. dev.	0.28674	0.25487	0.40155	0.39099
	Min.	0.00000	0.00000	0.00000	0.00000
	Max.	1.00000	1.00000	1.00000	1.00000
Financial sector	Mean	0.50556	0.86667	0.20000	0.45000
	Median	0.53333	0.90000	0.00000	0.20000
	Std. dev.	0.15944	0.17753	0.34112	0.40113
	Min.	0.13333	0.40000	0.00000	0.00000
	Max.	0.66667	1.00000	1.00000	1.00000

1. Is equal to the number of groups which identify the risks only. Neither information on related effects, nor information on related actions is present.
2. Is equal to the number of groups which identify the risks and related effects. The information on related actions is missing.
3. Is equal to the number of groups which identify the risks and related actions. The information on related effects is missing.
4. Is equal to the number of groups which identify the risks, related effects, and related actions.

Table 7 aims at identifying the ways through the disclosure of risks is presented; to this end, the risk disclosure is split into 4 cases accordingly.

First, we consider the risk identification stand-alone, and, as we can see, the data are closely to each other for each content topic, meaning

Table 7 Number of groups which provide risk disclosures for each content topic

Content dimensions	*Risk identification only (1)*	*Risk identification + explanations of effects (2)*	*Risk identification + declarations of actions (3)*	*Risk identification + explanations of effects + declarations of actions (4)*	*Tot.*	*% with respect to the total sample*
Environment	9 (19.15%)	3 (6.38%)	14 (29.79%)	21 (44.68%)	47	94
Social	11 (23.91%)	4 (8.69%)	11 (23.91%)	20 (43.48%)	46	92
Employees	10 (24.39%)	2 (4.87%)	12 (29.27%)	17 (41.46%)	41	82
Human rights	12 (36.36%)	2 (6.06%)	11 (33.33%)	8 (24.24%)	33	66
Anti-corruption	10 (26.31%)	1 (2.63%)	16 (42.11%)	11 (28.94%)	38	76

Source Own elaboration (2018)

that, some companies identify only risks related to business activities, but they neither address the related effects, nor conduct proper actions.

Second, few cases emerge when companies identify risk identification and related effects, and the data on this section are the lowest. This is the first piece of data that confirm that companies are not aware of the possible harms.

Third, linking the risk identification and the declarations of actions (and therefore excluding the explanation of effects), we see that, companies are much more likely to disclose the two combinations altogether. This leads us to the following considerations: on the one hand, companies seem to be active toward a declaration of non-financial risks and related initiatives. However, on the other hand, without an appropriate disclosure of related effects, such information is not appropriate for decisions addressed by investors and stakeholders. Ultimately, when considering the sub-dimension of the risk disclosure, few companies address a detailed information which entails a full risk disclosure.

With reference to each content dimension, the environmental topics is presented in 47 companies out of 50 (94%) with the highest degree of detail (44.68%). Similarly, to the environmental topic, the social issue is well detailed: 43.48% of the sample provide the full disclosure on the risk identification, related effects, and actions. This is analogous for the employees' matters, for which the full risk disclosure is presented in 41.46%. By contrast, the human right dimension as the lowest topic which companies disclosed on (33 out of 50). 12 companies out of 33 only identify the risk, and this is the highest score (36.36%) with reference to the risk identification in comparison with the other themes. More interestingly, if we look at the full disclosure on human right, we have the lowest score (24.24%), meaning that disclosure of human rights is not full.

It is worth mentioning the disclosure on anti-corruption for two reasons. First, it gets the highest score when risk identification and declarations of actions are linked (42.11%), and the score is the lowest (2.63%) in case companies address risk identification and related effects jointly together. Only 11 groups out of 38 provide full disclosure on the matter. The most disclosed topic is that of the environment because it has been properly addressed by 47 companies out of 50, and, in addition, 44.68% provide the full risk disclosure.

Figure 9 shows the detail with reference to each categories of the risk disclosure for each content topic.

5 Conclusions

The aim of this research was to determine compliance levels of NFI, with a thorough understanding of risk disclosure in the first year of the application of the Directive 95/2014/EU (2017 financial year). The study investigated how and to what extent 50 Italian listed companies are compliant with the mandatory requirements on NFI and risk disclosures. To achieve such objectives, the study developed the NFI disclosure score with the adoption of a checklist with a total of 165 items. The sample of investigation covered 50 Italian listed companies which were forced to apply Directive 2014/95/EU.

The NFI disclosure score was set at 52.25%: this means that companies respected the minimum adequacy to claim that a report has been prepared in accordance with the law, but there was not a comprehensive

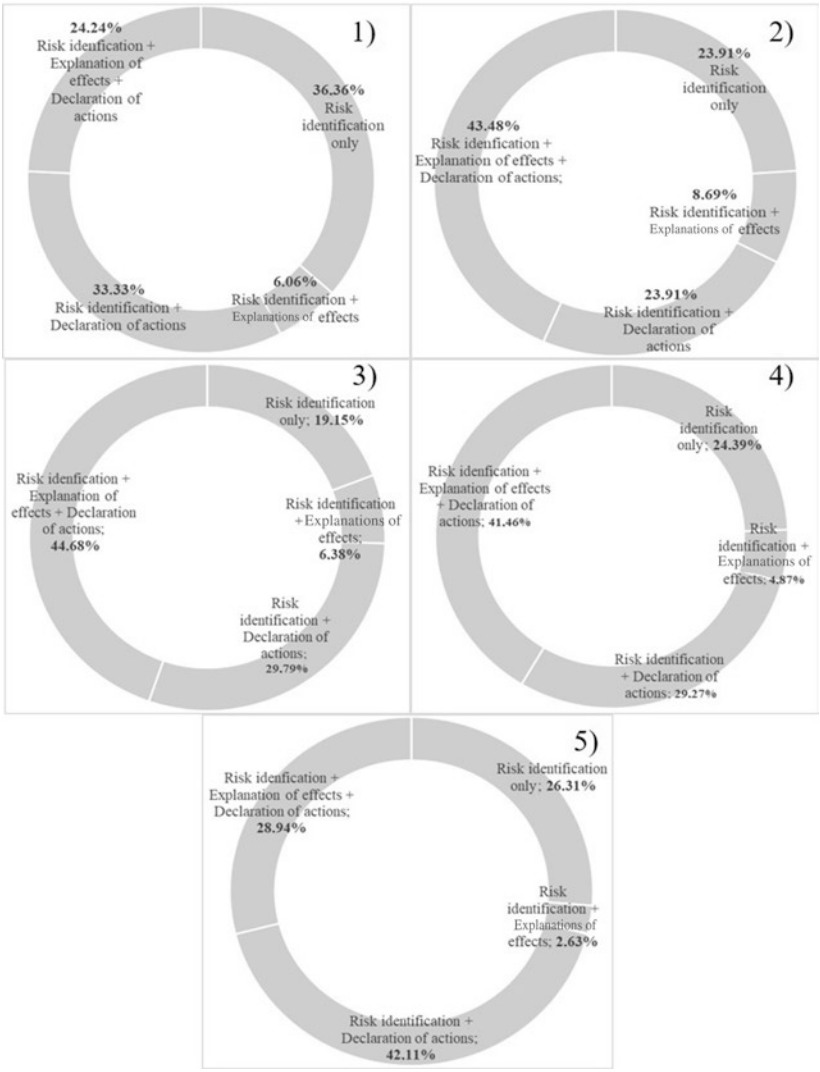

Fig. 9 Risk disclosures for each content topic **1** human rights **2** social issues **3** environment **4** employees **5** anti-corruption

disclosure of all requirements for each topic the companies addressed as material. Such a level of compliance may be a result of the high degree of specificity we defined with the inclusion of 165 items. Our results confirmed that companies provided a general description of their business model, but very few provided details, such as potential outcomes in the long term. KPIs seemed to be perceived as stand-alone results without target ends, and the result showed the little quantification of future target objectives in comparison to previous and past quantitative results.

The risk disclosure score was 60.13%, which means that companies were aware of the potential risks and they disclosed such information in a good way. Thus, to thoroughly understand levels of substantial compliance with risk disclosure, the research split the risk disclosure score into three according to each item included for the risk disclosure analysis. The risk disclosure score which assessed the effect got the lowest score, so we concur that companies unanimously identified potential risks, but they rarely disclosed the potential dangers of these risks and the effects through which these risks may occur, which, in turn, may negatively influence business activities. In this regard, risks and opportunities seemed to be disconnected from future planned activities.

These findings lead us to acknowledge the following managerial implication: both for policy-makers and regulators may need to rethink on risk disclosure, because disclosure on declaration of effects does not seem to be addressed properly. Such a limitation may in turn jeopardize the core business activities, and undermine stakeholders' decisions; therefore, regulators may set narrow requirements on that.

The research has certain limitations in relation to the sample of 50 Italian listed companies analyzed. Consequently, to overcome this drawback, future developments toward a broader inclusion is addressed, even with a cross-country comparison. Moreover, the present study limits the analysis to the first year of the law requirements, but it opens further research to track the effectiveness of the mandatory disclosure with a comparison with previous periods, to understand whether the Directive 2014/95/EU is actually a value-enhancing factor of disclosure quality.

Appendix A

Ref. Directive 2014/95/EU	*Topic disclosure*	*N. items*	*% of companies disclosing such information*	*Related references*
Art. 19a—environmental issues	Materials	3	24	GRI 301 – G4-EN1, EN2, EN28
	Energy	4	42	GRI 302-1 G4-EN3, EN4, EN5, EN6, EN7
	Water	3	33	GRI 303 – G4-EN8, EN9, EN10
	Biodiversity	4	12	GRI 304 – G4-EN11
	Emissions	7	52	GRI 305 – G4-EN15, EN16, EN17, EN18, EN19, EN20, EN21
	Effluents and waste	5	26	GRI 306 – EN22, EN23, EN24, EN25, EN26
	Environmental compliance	1	54	GRI 307 – G4-EN29
	Supplier environmental assessment	2	25	GRI 308 – G4-EN32, EN33
Art. 19a—social issues	Local communities	2	35	GRI 413 – G4-SO1, SO2
	Supplier social assessment	2	41	GRI 414 – G4-HR10, HR11
	Public policy	1	32	GRI 415 – SO6
	Customer health and safety	2	42	GRI 416 – PR1, PR2
	Marketing and labeling	3	38	GRI 417 – G4-PR3, PR4, PR7
	Customer privacy	2	56	GRI 418 – G4-PR8, PR9
	Socioeconomic compliance	1	52	GRI 419-1 – G4-PR9

Ref. Directive 2014/95/EU	*Topic disclosure*	*N. items*	*% of companies disclosing such information*	*Related references*
Art. 19a—employees	Employment	3	58.6	GRI 401-1 – G4-LA1, LA2, LA3
	Labor/management relations	1	54	GRI 402-1 – G4-LA4
	Occupational health and safety	4	42	GRI 403-1 – G4-LA5, LA6, LA7, LA8
	Training and education	3	62	GRI 404-1 – G4-LA9, LA10, LA11
Art. 19a—human rights	Non-discrimination	1	60	GRI 406-1, G4-HR3
	Freedom of association and collective bargaining	1	34	GRI 407-1 – G4-HR4
	Child Labor	1	32	GRI 408-1 – G4-HR5
	Forced or Compulsory Labor	1	28	GRI 409-1 – G4-HR6
	Security practices	1	16	GRI 410-1 – G4-HR7
	Rights of indigenous peoples	1	16	GRI 411-1 – G4-HR8
	Human rights assessment	3	30	GRI 412-1 – G4-HR9, HR2, HR1
Art. 19a—anti-corruption	Anti-corruption	3	62.6	GRI 205-1 – G4-SO3, SO4, SO5
	Anti-competitive behavior	1	50	GRI 206-1 – G4-SO7
Diversity	Diversity and equal opportunity	2	71	GRI 405-1 – G4-LA12, LA13
"Context" Topics Art. 19a—business model, policies, outcomes, risks and opportunities, KPIs	Business model (general description)	3	55.3	<IR> Framework
	BM—input	1	48	<IR> Framework

Ref. Directive 2014/95/EU	*Topic disclosure*	*N. items*	*% of companies disclosing such information*	*Related references*
	BM—business activities	3	64.7	<IR> Framework
	BM—outcomes	4	35	<IR> Framework
	Management approach (materiality, topic boundaries, targets, responsibilities, actions and practices, mechanisms to evaluate the management process)	14	65.2	GRI 103-1, GRI 103-2, GRI 103-3
	Materiality determination process	2	64	<IR> Framework
	Qualitative disclosure of material matters—current period	5	56.5	Authors' elaboration
	Qualitative disclosure of material matters—present period	5	96.4	Authors' elaboration
	Qualitative disclosure of material matters—forward-looking period	5	15	Authors' elaboration
	Risk and opportunities (for each topic: identification, effects on the business relationship, actions to manage)	15	57.8	Authors' elaboration

Ref. Directive 2014/95/EU	*Topic disclosure*	*N. items*	*% of companies disclosing such information*	*Related references*
	KPIs (for each topic): current period	5	74	Authors' elaboration
	KPIs (for each topic): prior period	5	58	
	KPIs (for each topic): forward-looking period	5	6	
	KPIs (for each topic): benchmark	5	3	
	KPIs (for each topic): measurement methods	5	24	
Others	Economic performance	4	38.5	GRI 201-1 – G4-EC1, EC2, EC3, EC4
	Market presence	2	24	GRI 202-1 – G4-EC5, EC6
	Indirect economic impacts	2	34	GRI 203-1 – G4-EC7, EC8
	Procurement practices	1	54	GRI 204-1 – G4-EC9
	Ethics and integrity	2	69	GRI 102-16 – G4-56, G4-57
	Stakeholder engagement	4	85.5	GRI 102-40, 42, 43, 44 – G4-24, G4-25, G4-26, G4-27
	Total	165		

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CHAPTER 5

Mutual Correlation and Interaction on Capital Markets in Countries of Development, Certain EU Member Countries and Development Countries: Evidence of Federation of Bosnia and Herzegovina

Almir Alihodžić

1 Introduction

Stock exchange indices are benchmarked on the basis of which the efficiency of investment management in securities is determined, i.e., they show what kind of result would be achieved without active portfolio management (Šoškić 2006, p. 89). Therefore, stock exchange indices should provide the answer to the question: How is the financial market moving? Stock exchange processes and stock exchange indices are the most important instrument for analyzing the movements of the stock market in a certain period of time. Stock exchange indices serve to analyze historical developments in the financial market and represent

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leading indicators in order to forecast future movements (Jeremić 2006, p. 61). An efficient market is an ability for market prices to reflect publicly available information. Securities that are liquid have a higher price because they allow investors to enter and enter the market at any time. In the emerging market, i.e., transition, investors have a significant role because they want to have an exit strategy, or when they buy shares of an enterprise can and sell them if they estimate that the market has become too risky.

The structure of the financial system largely determines the development of all parts of the system. In Bosnia and Herzegovina, the structure mainly refers to banks and conservative bank lending, whereby due to underdeveloped capital markets, the capital market continues to use the capital market as a primary form of financing its own development.

The capital market in the Federation of Bosnia and Herzegovina in terms of investment activities and potential for growth has not yet reached a level that would support the development of economic activity. In addition to commercial banks that are oriented toward the government debt market, largest institutional investors are not even present. The main motive of banks orientation toward the government debt market is high net profit margins and a safe return. The presence of individual investors in the capital market of the Federation of Bosnia and Herzegovina is limited for the following reasons: low real income, insufficient experience and tradition of trading on the stock market and other factors (The Central Bank of Bosnia and Herzegovina, Financial Stability Report 2016, p. 57).

The referendum on the outbreak of Great Britain from the European Union has strongly influenced the financial markets. The increase in the uncertainty of Brexit and its political influence led to a fall in the value of the European stock index, where the yield of Germany ten-year bonds recorded a level below 0% (The Central Bank of Bosnia and Herzegovina, Annual report 2016, p. 17). The total turnover realized on the Sarajevo Stock Exchange in 2017 amounted to 272,317,816 euros, which makes 52% of the total turnover realized on the BH stock exchanges (The Sarajevo Stock Exchange, Annual Report 2017, p. 2).

The paper is designed from five parts. The first part goes on to the introductory considerations. The second part describes a brief overview of relevant literature in the context of the application of the Granger test of causality. The third part refers to the analysis of selected indicators of the capital market of the Federation of B&H, the countries of

the Western Balkans, EU member states and developed countries. The fourth part relates to the obtained research results. The fifth part points to final considerations and further recommendations.

2 Brief Review of Relevant Literature

Chen et al. (1986) tested the multifactor model in the US using seven macroeconomic variables. They found the consumer prices, oil prices do not affect the capital market. However, industrial production has the impact of risk premiums where a return to the stock is substantially explained. Mookerjee and Yu (1997) have come to the conclusion that money and foreign exchange reserves have a long-term relationship with the stock prices in Singapore.

Chakravarty (2005) investigated the positive link between industrial production and stock prices using the Granger causality test where it came to the conclusion that there is an indirect causal relationship between industrial production and stock prices in India.

Tan et al. (2006) carried out research in terms of a dynamic link between macroeconomic indicators and capital markets in Malaysia between 1996 and 2005. They found that the inflation rate, industrial output, crude oil price, and treasury bonds have a long-term relationship term with an index in the Malaysian capital market. The results of the survey showed that the consumer price index, industrial production index, crude oil prices, and long-term treasury bills were significantly and negatively related to the Kuala Lumpur Composite Index, except for the industrial production index combined with a positive coefficient.

Generally, the market efficiency hypothesis claims that stock prices contain all the information available. In this regard, three forms of efficiency can be distinguished: the weak, semi-strong and strong form of market efficiency. All of these three forms have different meanings in the context of the availability of information. The weak form (EMH) considers only the usual publicly-matched information about the market in past prices, the volume of trading, etc. A semi-strong form of market efficiency adds some new information on market efficiency such as company information, such as product information, management, balance sheet. The last form is a strong form that contains all the information plus information available only to insiders (Bodie et al. 2011).

Dasgupta (2012) used Johansen and Juselius's cointegration test where was discovered that the Indian capital market was co-integrated

with certain macroeconomic variables. In the long run, it was determined that the prices of stocks were positively correlated with the interest rate and industrial production, while the wholesale price index used as inflation compensation and the exchange rate was negatively correlated with the return on stock exchange indices. In the end, however, he came to the conclusion that it is difficult to establish a short-term relationship between the Indian stock market and macroeconomic variables. Dasgupta (2014) explored the integration of the stock markets of BRIC countries. Using Johansen-Juselius and Engle-Granger steam cointegration tests. The results of the survey indicate a long-term and short-term two-way builder causation between the Indian and Brazilian stock exchanges. In addition, the movement in the Chinese stock market affects the Brazilian stock market, which has an indirect impact on the Russian capital market. Also, Dasgupta concludes that the BRIC countries are a convenient investment environment and that the Indian stock market inclines to the BRIC countries. BRIC countries include Brazil, Russia, India, and China.

3 Research Hypothesis

HO1 There is no significant relationship between capital markets in the Federation of Bosnia and Herzegovina, certain Western Balkan countries, EU member states, and developed countries.

HO2 There is a significant relationship between capital markets in the Federation of Bosnia and Herzegovina, certain Western Balkan countries, EU member states, and developed countries.
Hypotheses will be tested using the smallest square test, i.e. *F*-test and *p*-values.

4 A Brief Overview of the Performance of the Capital Markets of the Countries of Western Balkans, EU Member Countries and Developed Countries

Performance depends on the ability of the market to absorb a large volume of transactions without major changes in transaction prices. Every quality market should have three key characteristics: depth, breadth, and elasticity of the market (Jeremić 2006, p. 336). Total turnover on Bosnia and Herzegovina stock exchange at the end of 2016 amounted to 1.38 billion BAM, which of 54.7% belong to the Sarajevo Stock

Exchange and 45.3% to the Banja Luka Stock Exchange. Thus, in return for the previous year, there was a decrease in the turnover on SASE and an increase in turnover of BLSE. The increase in turnover on BLSE is not real, but it is about the issuance of debt instruments in the primary market and the new debt (The Central Bank of Bosnia and Herzegovina 2016).

From the Fig. 1, it can be seen that the highest values were achieved by the following countries: Japan—NIKKEI 500 (21.81%), Hungary-Budapest SE (18.48%), USA—S&P 500 (13.84%), Turkey—BISTAllShare (10.99%) and Germany—DAX (10.59%). On the other hand, it can be seen that the largest fall (and even negative) was recorded by the indices of the following countries: GreeceFTSE/Atex 20 (−4.17%), then the Federation of Bosnia and Herzegovina—SASX-30 (0.86%), Czech Republic—PX (1.06%) and Croatia—Crobex (1.53%).

From Table 1, it can be seen that between the frequency of trading and changes in the value of the stock indexes there is mostly inverse causality except for developed markets such as S&P500 (13.91%), FTSE (3.84%), CAC40 (3.7%), FTSEMIB (1.86%). Also, certain emerging markets have shown a positive link between changing the index value and the frequency of trading. However, this is not a sign of liquidity with regard to the volume of transactions, but it is the structural component of the index of the strongest state-owned companies holding a monopoly on the one hand, and a short time horizon for a year on the other hand.

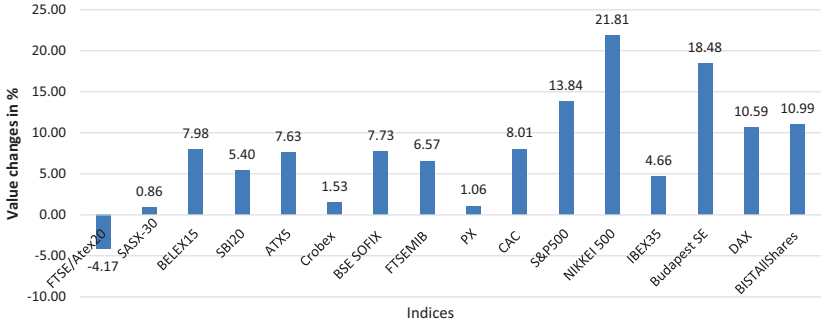

Fig. 1 The average movement of the stock exchange index of the countries of the Western Balkans, the EU member states and the developed countries for the period: 2012–2017 (in %) (*Source* Calculation by the author)

Table 1 The countries of the Western Balkans, the EU member states and the developed countries on 15 July 2018

Indices	*Performance*				
	Prev. Close	*Open*	*1-year change (%)*	*Volume*	*Average volume (3m)*
SASX-30	1.079,66	1.079,66	9.65	7.604	9.544
Crobex	1.807,51	1.808,5	−2.53	–	114.75
Budapest SE	35.485,87	35.490,73	−1.39	1.671.972	8.571.155
DAX	12.540,73	12.539,97	−0.80	82.975.902	105.557.737
SBITOP	802.25	890.02	9.99	–	35.750
Belex 15	736.28	732.19	2.7	–	–
FTSEMIB	21.892,35	21.889,5	1.86	330.479.396	425.931.435
BISTAllShare	91.225,36	91.654,08	−13.65	1.214.689.082	1.501.653.080
ATX5	1.681,5	1.678,29	0.74	–	–
S&P500	2.801,31	2.796,88	13.91	–	–
CAC40	5.405,89	5.428,04	3.7	–	85.120.288
FTSE100	7.661,87	7.693,52	3.84	592.166.181	887.433.429

Source https://www.investing.com

5 Research Methodology

Granger causality represents the path of causality test between the two observed variables for a series of time series. Therefore, the method is a probabilistic causality calculator that uses empirical data in order to find the correlation form. For example, if we observe two removable X and Y, and if the variable X can affect the predicted variable Y, then Granger can cause Y and vice versa. If the variable Y can affect the predictability of the variable X then we come to the conclusion that Y granger causes X. In this case, this is a two-way causality. On the other hand, if only one of the variables causes the other, and not vice versa, then it is a one-way causality. There is also a situation where the observed variables are statistically independent, i.e., there is no interdependence between them. In this study, the *F*-test and *p*-value will be used to test the zero and alternative hypotheses. Also, the model used in this study is the smallest square method, where a significance level of 0.05 is used. In terms of applying Toda-Yamamoto (1995) causality test, where it is required to create bivariant VAR models for data with delay length, where p represents the number of found lags in the previous analysis according to AIC and represents the maximum order of integration of the variables in the process.

$$Y_t = a_0 + \sum_{i=1}^{p+m} a_i Y_{t-1} + \sum_{i=1}^{p+m} b_i X_{t-1} + \mu_t \quad (1)$$

$$X_t = c_0 + \sum_{i=1}^{p+m} c_i X_{t-i} + \sum_{t=1}^{p+m} d_i Y_{t-1} + \mu_t \quad (2)$$

In the paper, we will test the Granger causality between the observed capital markets using the Wald test for the linear limit, but for the first p lagged values.

5.1 Research Results

Table 2 illustrates wider descriptive return statistics, standard deviation and wider dimensions of the asymmetry of selected stock indexes. The total number of observations taken into consideration is 752.

As can be seen from Table 2, the value of returns of stock exchange indices ranged from minimum 0.004 (Slovenian capital market—SBITOP) to a maximum of 0.12 (Hungarian capital market—Budapest SE). Therefore, the return value of all selected stock exchange indices

Table 2 Descriptive statistics Daily stock exchange index of border markets, market of EU member states and developed countries for period January 5, 2015 to December 29, 2017

Indices	*Obs*	*Mean*	*Std. Dev.*	*Skew*	*Kurt*	*Min*	*Max*
SASX-30	752	0.007	0.303	0.236	2.31	−1.316	1.179
Crobex	752	0.007	0.568	−0.519	4.49	−2.984	2.314
Budapeset SE	752	0.117	0.768	0.006	1.43	−3.274	3.295
DAX	752	0.043	1.055	−0.637	5.39	−7.333	3.533
SBITOP	752	0.004	0.522	−0.651	3.61	−3.001	2.125
Belex15	752	0.018	0.565	0.248	1.71	−1.766	2.392
FTSEMIB	752	0.025	1.182	−0.646	5.05	−8.152	5.090
BISTAllShare	752	0.045	1.038	−0.676	6.24	−7.034	6.495
ATX5	752	0.063	1.098	−0.778	2.97	−6.248	4.689
S&P500	752	0.037	0.619	−0.618	6.23	−4.314	3.587
CAC40	752	0.031	1.015	−0.470	4.47	−6.494	4.208
FTSE100	752	0.022	0.734	−0.399	4.39	−4.776	2.947

Source Calculation by the author (STATA IC 13.0)

was below 1. Therefore, there is a very slight deviation from the value of zero, which is in line with the theoretical assumption of many approaches and models for measuring market risks, which contain the premise that the long-term average return is zero. The basic of the reasons for the low returns of stock exchange indices is the fall in the prices of certain shares that comprise the structure of stock exchange indices, the sub-crises period, and the period of recovery, and the decline in turnover in individual capital markets. From Table 2 it can be seen that the first measure of risk, i.e., the standard deviation is the smallest in the capital market of the Federation of Bosnia and Herzegovina (0.303). The obtained result should be taken with a certain reserve because, in the underdeveloped capital market such as the capital market in Bosnia and Herzegovina, there are more days of interrupted trading or days without trading. On the other hand, the riskiest market in terms of market indices is the capital market in Italy—FTSEMIB (1.18). Also, and other developed capital markets do not deviate much from the capital market in Italy. The paper presents measures that better describe riskiness. The first measure is skewness, which represents the third point around the middle, i.e., the deviation of the value of the numerical variable from the arithmetic mean. The skewness usually moves in the interval ± 2, and when it comes to a highly asymmetric schedule, higher values are also assumed.

Table 2 shows that the biggest skewness was registered with the market index—SASX-30 in the capital market of the Federation of B&H (0.236), but again within the acceptable limits. Most market indices had a negative value of skewness. Unlike skewness, kurtosis represents a fourth-point ratio around the middle and a standard deviation to the fourth potency. It is usually used to describe extreme events, that is events that belong to the distribution. In the case of normal distribution, kurtosis is 3. The highest values of kurtosis were recorded in the following stock indices: BISTAllShare (6.24), S&P500 (6.23), DAX (5.39), FTSEMIB (5.05). Observed from the other side, the lowest value, i.e., values within the normal range, were realized by the following stock exchange indices: BudapestSE (1.43), Belex15 (1.71), SASX—30 (2.31) and ATX5 (2.97).

Table 3 shows that for the analyzed period, the stock index SASX-30 had the largest relationship with the stock exchange indices of the following countries: the stock exchange index of the Vienna Stock Exchange—ATX5 (0.518), then the stock exchange index of the Budapest Stock Exchange—Budapest (0.433), the stock exchange index

Table 3 The pearson coefficient of correlation of frontier markets, the market of EU member states and developing countries from January 5, 2015 to December 29, 2017

	SASX-30	*Crobex*	*Budapest SE*	*DAX*	*SBITOP*	*Belex15*	*FTSEMIB*	*BIST All Share*	*ATX5*	*S&P500*	*CAC40*	*FTSE100*
SASX-30	1.000											
Crobex	0.069	1.000										
Budapest SE	0.433	0.572	1.000									
DAX	0.324	0.501	0.674	1.000								
SBITOP	0.014	0.399	0.406	0.801	1.000							
Belex15	0.208	0.657	0.652	0.887	0.797	1.000						
FTSE MIB	0.346	−0.104	−0.020	0.600	0.491	0.456	1.000					
BIST All Share	0.320	0.336	0.748	0.815	0.755	0.736	0.414	1.000				
ATX5	0.518	0.419	0.804	0.921	0.704	0.834	0.538	0.907	1.000			
S&P500	0.337	0.582	0.903	0.873	0.664	0.821	0.254	0.888	0.920	1.000		
CAC40	0.369	0.345	0.523	0.955	0.744	0.820	0.777	0.750	0.883	0.749	1.000	
FTSE100	0.168	0.698	0.713	0.898	0.822	0.898	0.315	0.778	0.818	0.883	0.786	1.000

Source Calculation by the author (STATA IC 13.0)

of the Paris stock exchange—CAC40 (0.369), the stock market index of capital markets in Italy—FTSE MIB (0.346), the stock market index of the capital market in the USA—S &aP500 (0.337) and the Istanbul Stock Exchange Index—BIST All (0.320). Observed from the other side, the weakest causality with the stock exchange index of the Sarajevo Stock Exchange—SASX-30 was achieved by the following indices: the stock exchange index of the Zagreb Stock Exchange—Crobex (0.07), the Ljubljana Stock Exchange stock exchange—SBIT OP (0.014) and the Stock Exchange Index of the London Stock Exchange—FTSE100 (0.168). Firstly, the creation of a new index called Bosnian Traded Index—BATX is followed by the movement of the most liquid and capitalized shares of the capital market in Bosnia and Herzegovina and ranked as an index for investments from Austria. The index is calculated in real time and is expressed in currencies such as EUR, USD, and BAM. Secondly, the financial system in view of the ownership structure belongs to Austrian investors. Also, the cause of causality lies in the increased foreign trade in the context of exports where exports in 2017 increased by about 23% compared to the previous year in Austria.

The results of the survey showed that there is a twofold causality between the capital market in the Federation of Bosnia and Herzegovina (stock index: SASX-30) and capital markets in Serbia (stock exchange index: Belex15) and Turkey (stock index: BISTAllShare). The relationship between the capital market of the Federation of B&H, Turkey, and Serbia can be explained by the presence of foreign investments from these countries, and then by the increased volume of trade. Exports to Turkey increased by 731% in 2017 compared to 2009, and by 7.49% compared to 2016. Unlike Turkey, exports to Serbia in 2017 increased in relative terms by about 47% compared to 2009, and by about 33% compared to 2016. Unlike exports in the observed countries, imports from Turkey to Bosnia and Herzegovina in 2017 increased by around 108% compared to 2009, and by about 11% in relation to 2016. Imports from Serbia to Bosnia and Herzegovina increased by about 42% in 2009 compared to 2009, and by about 5% compared to 2016. Table 4 does not show that there is causality between the developed European and world markets. The main reasons may be the lack of connection with the given markets, to a certain extent the liquidity of the capital market of the Federation of B&H, which is followed on certain days without trading in the segments of the domestic capital market. Also, time series and this particularly interrupted have an impact on the Grenger causality test

Table 4 Multivariate time series—vector autoregression—VAR

	Coef.	*Std. Err.*	*z*	*P>[z]*	*[95% Conf. Interval]*	
SASX-30						
SASX-30						
L1.	1.2578	0.0473	26.58	0.000	1.1650	1.3505
L2.	−0.2931	0.0475	−6.16	0.000	−0.3863	0.1999
CROBEX						
L1.	−0.0094	0.0124	−0.76	0.447	−0.0339	0.0149
L2.	0.0125	0.0124	1.01	0.312	−0.01178	0.0369
Budapest SE						
L1.	−0.00058	0.00069	−0.83	0.406	−0.00195	0.00078
L2.	0.00074	0.00070	1.06	0.290	−0.00063	0.00211
SBITOP						
L1.	−0.02156	0.036275	−0.59	0.552	−0.0926	0.04953
L2.	0.034562	0.03580	0.97	0.334	−0.0356	0.10473
Belex15						
L1.	−0.00343	0.03857	−0.09	0.929	−0.07904	0.0721
L2.	−0.02345	0.03839	−0.61	0.541	−0.09871	0.0517
FTSEMIB						
L1.	0.0019	0.0119	1.59	0.111	−0.00043	0.0042
L2.	−0.0015	0.0117	−1.32	0.185	−0.00385	0.0007
BISTAllShare						
L1.	0.0004	0.00017	2.51	0.012	0.000097	0.000791
L2.	−0.0005	0.00017	−2.97	0.003	−0.000849	−0.000173
S&P500						
L1.	−0.0139	0.0125	−1.11	0.265	−0.03847	0.010577
L2.	0.0152	0.0124	1.22	0.221	−0.00918	0.039672
CAC40						
L1.	−0.0033	0.00602	−0.55	0.582	−0.015117	0.008485
L2.	0.00516	0.00606	0.85	0.395	−0.006724	0.017049
FTSE100						
L1.	0.001317	0.00467	0.28	0.778	-0.007839	0.010473
L2.	−0.00096	0.00464	−0.21	0.835	−0.01007	0.0081395
_cons	24.66474	13.53072	1.82	0.068	−1.854986	51.18447

Source Calculation by the author (STATA IC 13.0)

and the discrepancy between other capital markets. In order to increase the liquidity and stability of the capital markets of the Western Balkans, some countries of the EU are of the utmost importance to link the capital markets of the mentioned countries in order to allow trading through a certain observation platform (Table 5).

Table 5 Granger causality Wald tests

Equation	*Excluded*	*Chi2*	*df*	*Prob > chi2*
SASX-30	Crobex	3.5273	2	0.171
SASX-30	Budapest SE	3.2386	2	0.198
SASX-30	DAX	1.1145	2	0.573
SASX-30	SBITOP	2.8004	2	0.247
SASX-30	**Belex15**	**9.443**	**2**	**0.009**
SASX-30	FTSEMIB	3.6546	2	0.161
SASX-30	**BISTAllShare**	**10.991**	**2**	**0.004**
SASX-30	S&P500	1.5097	2	0.470
SASX-30	CAC40	0.927	2	0.629
SASX-30	FTSE100	0.1432	2	0.931
SASX-30	**ALL**	**34.455**	**22**	**0.044**

Source Calculation by the author (STATA IC 13.0)

6 Conclusion

The empirical results obtained in this paper show that there is a significant causality between the capital market in the Federation of B&H with the capital market of Turkey and Serbia. The paper tested the trend of the coefficient of correlation between the SASX-30 stock market index and the stock exchange indices of developing countries, and some EU countries. The results of the survey show that the capital market in the Federation of B&H is in the most significant correlation with the capital markets in Austria, Hungary, Italy, France, and Turkey and Serbia. The strongest link in terms of Granger causality was achieved by the capital market in Serbia and Turkey.

Therefore, it can be concluded that the market index SASX-30 can predict the developments in the prices on the capital market in Serbia (Belex 15) and in the capital market in Turkey (BISTAllShare). Similarly, the results show that there is a two-way causality, i.e., that the stock exchange indices in Turkey and Serbia can predict price movements in the Federation of B&H. Therefore, the zero hypothesis was rejected while the alternative hypothesis was partially accepted. Further integration and linking of the capital markets of the countries of the Western Balkans, EU member states and developed countries are the basis for increasing liquidity and stabilizing demand.

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CHAPTER 6

Who Uses Trade Finance? Case-Based Evidence from Italian Exporters

Francesco Baldi, Ruggero Di Mauro and Marina Damilano

1 Introduction

Trade finance ("TF") is often referred to as "*the oil in the engine of international commerce*" (International Chamber of Commerce 2017). The term "trade finance" is reserved for bank products that are linked to underlying trade transactions (exports or imports) (Clark 2014). Bank-intermediated TF enables importers or exporters to shift some of the non-payment or non-performance risks to banks or obtain bank financing to allow the exporter to receive payment before the importer is required to make it (Asmundson et al. 2011).

TF fosters trade activity, which may in turn contribute to international development, poverty reduction, and economic inclusion. There is a

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strong link between commerce and TF, which is evident looking at their respective growth projections. TF revenues will soon outpace trade flows as the former are expected to grow at about 4.7% per year from $36 billion in 2016 to $44 billion in 2020 due to a greater use of traditional TF products in the "documentary trade markets" (Asia Pacific, Middle East, Eastern Europe).[1]

The prospects of the TF market are shaped by two phenomena. On one hand, there exists a gap in global TF (of about $1.6 trillion annually) concentrated in developing Asian countries, which represents a growth opportunity for the banking industry. Banks, still characterized by capacity constraints, need to equip themselves to be able to address it. On the other hand, banks find increasingly costly to meet compliance and regulatory requirements associated with their portfolios of correspondent relationships, thus leading to a reduction in partner networks around the globe.[2]

International trade increasingly involves not only big corporations but also small and medium-sized enterprises (Mooney and Blodgett 1995). Global commerce gives rise to cross-border capital flows and financial claims, thus exposing exporters and importers to substantial risks. Indeed, international transactions are unique as longer transportation times increase working capital requirements, more complicated cross-border procedures may rise costs and variation in legal systems may create difficulties for contract enforcement (e.g., supply of goods of lower quality) (Schmidt-Eisenlohr 2013).

To manage such risks, firms can engage in trade credit transactions with their counterparties (cash-in-advance, open account) or access special products offered by banks. For instance, financial managers of firms doing business internationally must decide which financing terms to use in their export transactions to collect payments from importers (Antràs and Foley 2015). An exporter can require the importer to pay for goods before they are loaded for shipment (cash-in-advance), can allow the importer to pay at some time after the goods have arrived at their destination (open account), or can use some form of bank intermediation

[1] Commercial trade flows are predicted to grow at around 4.3% per year from $15.8 trillion in 2016 to $18.7 trillion in 2020 (Boston Consulting Group 2017).

[2] Compliance per relationship is now 5 times more costly than a decade ago. The cost of maintaining a basic correspondent relationship for commercial banks rose from €15,000 to 75,000 (International Chamber of Commerce—ICC 2017).

(e.g., letter of credit, international guarantee, forfaiting of debt instruments) (Niepmann and Schmidt-Eisenlohr 2017). Each alternative term will help corporate managers to mitigate risks to a certain degree while imposing distinct capital requirements.

Despite its growth prospects just described, TF involving bank intermediation is not yet the most preferred method of financially arranging an international trade transaction (as the various forms of trade credit still prevail in business practice) (Antràs and Foley 2015). Assessment of TF conditions (e.g., interest rates, characteristics of borrowing firms, etc.) is also complicated by the absence of organized markets for bank-intermediated TF and the proprietary nature of bank information about customer relationships (Asmundson et al. 2011). Moreover, the related scarcity of reliable quantitative information on TF transactions makes strategizing by bank managers in such area rather difficult and policy-making a guesswork (Korinek et al. 2010). This has maintained a research gap in the characterization of TF markets. Prior literature has concentrated more on trade credit (Petersen and Rajan 1997; Cook 1999; Chor and Manova 2012) failing to explain which firms buy TF products from banks and what terms banks can apply to their customers to offer these instruments depending on the level of implied riskiness of trading partners and other firm-specific characteristics. This may be important in the light of the above prospective rise of compliance costs that banks need to incur to maintain existing correspondent relationships.

Our study aims to investigate the characteristics of those export-oriented firms that are more inclined to borrow capital or receive payments via use of TF products so as to boost their international trade activities and expand globally being exposed to a minimum counterparty risk. In this sense, this article seeks to provide additional empirical evidence enlightening the mechanics of the commercial bank-(corporate) customer relationship in the international trade financing context characterized by shortage of data and business practice opacity. Relying on the fact that only banks collect data on their own TF transactions for internal reporting purposes, we had the opportunity to access the proprietary information on export lending conducted by Crédit Agricole with 155 corporate customers in 2015. This enabled us to collect a case study-based set of TF transactions. In this regard, despite the limits associated with performing a statistical analysis on case applications, our study challenges extant research by adding novel empirical evidence on how TF

works so as to address the issue of the dearth of data that limits empirical efforts in this area.

The contribution of our research is threefold. First, we advance the knowledge of Italy considered as an interesting country case study in the international trade area due to its characteristics of an export-oriented and bank-driven economy (Del Prete and Federico 2014).[3] Second, we investigate the characteristics of those firms that are more in need and thus organized to obtain bank-intermediated export finance to successfully pursue their international expansion strategies. Third, we provide guidelines to bank managers on how to set the main terms of TF products for corporate clients by drawing upon a better understanding of the latter's features. This may improve the way relationship lending is conducted in the international commercial banking business. In this vein, our study expands the body of research on *relationship banking* defined as the provision of financial services by a financial intermediary that invests in obtaining customer-specific (often confidential) information beyond that readily available in the public domain and uses it to profit from multiple business interactions with the same customer (Boot 2000). TF is one of the financial services that a bank engaging in relationship lending can provide to exporting firms by leveraging prior information-intensive interactions with such customers.

The remainder of this article is organized as follows. Section 2 provides an overview of the main TF products offered to exporters by banks. Section 3 contains the review of relevant literature. Section 4 illustrates our empirical analysis and the related findings. Section 5 concludes suggesting the implications of our study for researchers, banks, and policymakers.

[3] Italy plays a leading role in foreign trade transactions, with domestic firms being the 7th largest exporters in the world with exports worth $446 billion and the 11th largest importers with imports worth $404 billion in 2015 (*Source* The Observatory of Economic Complexity, OEC). The 12-month moving average of Italian exports to both EU and Extra-EU countries steadily increased over the past seven years (since 2010), with the greatest contribution from EU countries and a significant improvement of importers from Extra-EU countries in the first quarter of 2017. In March 2017, Italian exports remarkably reached a monthly increase of +14.5%, a peak not reported for over five years (+15.2% in August 2011), mostly driven by a boost of export sales to Asian countries (+31.1%), with China gaining the leadership of partner country (+32.3%), and, more traditionally, to EU countries [Romania (+25.2%), Poland (+24.5%)] (*Source* Istat).

2 A Primer on Bank-Intermediated Export Finance Instruments

TF includes short-term, payment or lending products offered by banks that are reserved to exporters. The most commonly used export finance instruments are three:

- letter of credit ("L/C") [A]
- international bank guarantee [B]
- forfaiting of promissory notes and bills of exchange [C]

The L/C [A] is a payment instrument issued by a bank on behalf of its customer (*importer*) to the benefit of a foreign (third party) firm (*exporter*) through which the bank leverages its creditworthiness in place of that of the importing firm so as to hedge the credit risk the exporter is exposed to in the course of the transaction (Citibank 1999).

The exporter—because of the bad credit standing of the importer (*counterparty risk*) and/or because the importer operates in a high-risk country (*country risk*)—may require the insurance of the payment due by the importer demanding for the issuance of a L/C. The importer is the *applicant* asking its own bank (*issuing bank*) to issue a letter of credit upon effective request and in favor of the exporter (*beneficiary*), who will receive the payment directly from its own bank (*confirming bank*). The confirming bank (which operates in the exporter's country) acts as an "issuing bank for the issuing bank", as its creditworthiness ultimately replaces that of the issuing bank (in turn replacing that of the applicant).

The issuance and use of a L/C involves a sequence of distinct operational stages. The issuing bank issues the L/C specifying information about the terms of the deal.[4] The L/C is sent to the exporter's confirming bank, which forwards it to its customer, thus enabling the shipping of goods to the importer. The exporter will receive its payment upon the sending (to the confirming bank) of the documentation proving the shipping of goods and their delivery to the importer (Fig. 1, Panel A). L/Cs are thus primary payment mechanisms relying solely on documents

[4]These terms include beneficiary, confirming bank, dates of issuance, validity, shipment of goods, and expiry.

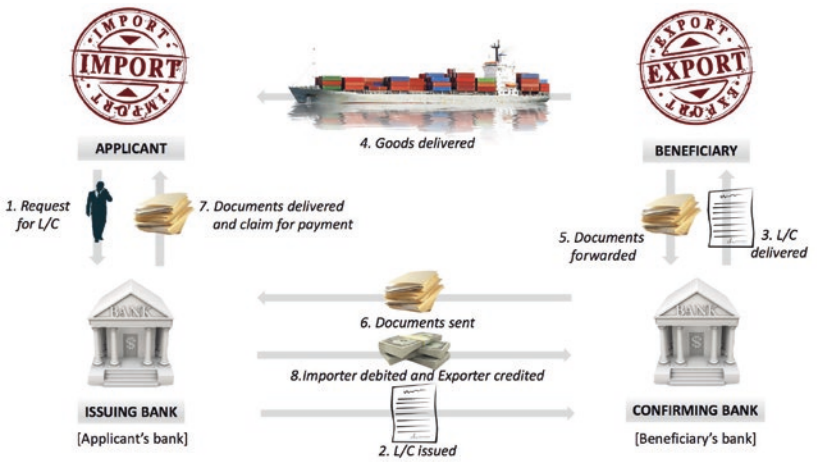


Fig. 1 The logic of export finance instruments. Panel A illustrates the operational process for issuing a letter of credit. Panel B illustrates the operational process for issuing an international bank guarantee in the form of payment bond. Panel C illustrates the functioning of forfaiting

(rather than goods) (Credit Research Foundation 1999).[5] Two are the most used proofs of shipment (of goods): *bill of lading* and *airway bill*.[6]

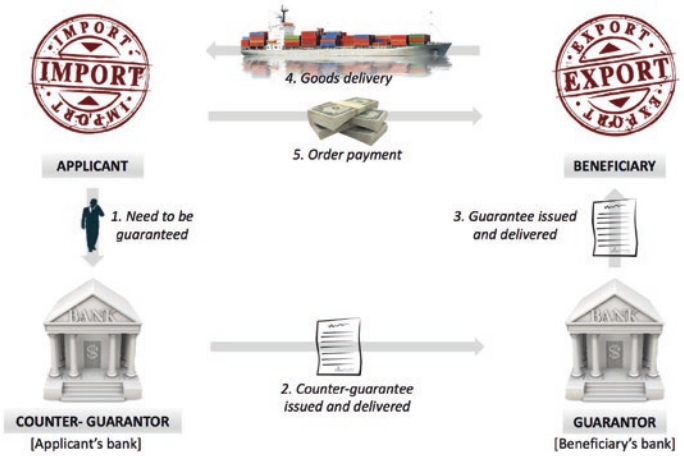
The international bank guarantee [B] is not a payment instrument, but an irrevocable guarantee (named as *bond*) that a bank (*guarantor*) may issue upon request of its customer (*applicant*) to pay a predefined

[5]The ICC ruled L/Cs in 1993 releasing the Uniform Customs and Practice for Documentary Credit (UCP), revised in July 2007 (UCP 600).

[6]The bill of lading certifies the shipment of goods from the exporter's home harbor, the arrival of the merchant ship in the final destination harbor and the delivery of goods to the importer. Characteristics of the load indicated in the bill must match those described in the L/C. At destination, exporter, conveyor and importer sign the bill (with the latter accepting the delivered goods despite potential divergences—e.g., color, weight—from what agreed in the L/C). The exporter is paid by the confirming bank, which receives the money from the issuing bank (which in turn will debit the importer's credit line). The same logic applies to the airway bill (delivery via merchant airplane).

Panel B- International Bank Guarantee

Payment Bond



Panel C - Forfaiting

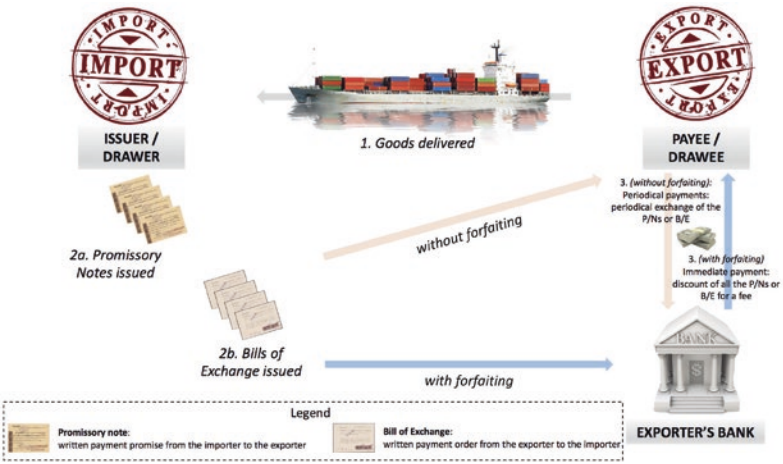


Fig. 1 (continued)

amount of money to a third party (*beneficiary*), insuring the value of the underlying trade agreement, if a certain loss-related event occurs. Beneficiaries may include both exporters and importers (Nordea Bank 2010). There are five most commonly used bond instruments: advance-payment bond, performance bond, retention bond, tender bond (*beneficiary*: importer), and payment bond (*beneficiary*: exporter).

More specifically, if the exporter ships goods to the importer in advance of the payment being exposed to a credit risk, then a *payment bond* may be issued (by the importer's bank). Such a bond will enforce the payment of the shipped goods (effected by the exporter's bank with the counter-guaranty of the importer's bank) to the benefit of the exporter if the importer (*applicant*) does not fulfill its obligation. Hence, payment bonds have the same purpose of the L/Cs providing exporters with a credit risk hedge (see Fig. 1, Panel B).

Forfaiting [C] is a TF instrument offered by banks to their customers involving the possibility to advance without recourse (*pro soluto*) all or part of deferred payments those firms receive from their clients in the form of *promissory notes*[7] or *bills of exchange*.[8] The use of promissory notes and bills of exchange is typically activated by the exporter when the trade has a highly valuable underlying good, thus requiring a sequence of payment installments over time. In the presence of agreed payments deferred from the importer via promissory notes or bills of exchange, the exporter (in the need for cash) may ask its bank to pay in advance a discounted amount of the entire set of those papers in exchange for a (fixed plus variable) fee. The credit (and its embedded risk) is transferred from the exporter to its bank.[9] (for details on the mechanics of forfaiting, see Fig. 1, Panel C).

[7]The *promissory note* is a financial debt instrument containing a written promise indicating that one party (importer; the issuer) will unconditionally pay another party (payee/exporter) a given amount of money at a predetermined future time.

[8]The *bill of exchange* is a financial debt instrument through which the debtor (importer) is requested by the exporter (creditor; the issuer) to pay the agreed amount at a predetermined future date (maturity). The debtor must accept the written order for the bill to be legally enforceable.

[9]After the forfaiting contract is signed, the exporter sends a certified letter to the importer indicating the bank as the new beneficiary of the future promissory notes or bills of exchange.

3 Literature Review and Hypotheses' Development

Our study is related to four main lines of research on (1) the financing arrangements used to support international trade, (2) the role of financial ratio analysis in bank lending, (3) the role of the bank lending channel in originating financial shocks with effect on firms' trade activity, and (4) the role of counterparty risk for firms' payment choices in international commerce.

The first literature explores how the choice of financing terms for cross-border (vs. domestic) commercial transactions is influenced by timing to delivery (from factory gates of the exporter to the importer' site) and contract enforceability. Financing needs associated with international commerce are exacerbated by longer transport times (e.g. via sea) and higher degree of formality of bureaucratic procedures (Hummels 2001; Djankov et al. 2010) and/or differences in legal systems (which makes contracts less easily enforceable across borders), thus raising the implied riskiness of such trade transactions.

To allocate risk and to finance the time gap between production and sale in international trade, a range of different payment contracts (e.g., trade credit, TF) is utilized. Schmidt-Eisenlohr (2013) investigates the trade-off between financing costs and contracting environments in different countries to optimally finance trade transactions. He finds out that trade increases in enforcement probabilities and decreases in financing costs (proportional to the time needed for trade), suggesting that a transaction should be financed by a firm in countries characterized by lower financing costs and a weaker contract environment. Menichini (2009) argues that the use of TF might be restricted if institutions like contract enforcement and bankruptcy laws are not sufficiently developed. Ahn (2011) points out that larger trade volumes incentivize banks to invest in acquiring information suggesting that, for example, learning about counterparty credit risk may foster the use of L/Cs. Olsen (2013) considers the role of repeated interaction claiming that enforcement between banks is easier than between two trading partners as the former interact more frequently. Antràs and Foley (2015) show that the firm's use of L/Cs decreases with the degree of contract enforcement in the destination country and that the firm is more likely to use a L/C when interacting with a new customer. Consistently with the above studies, the dependent variable of our econometric model is a composite indicator of the multiple set of TF products offered by banks to exporters.

In assessing the rigor of conventional ratio analysis, Altman (1968), in his seminal article, shows that a set of financial ratios, if considered in a multivariate discriminant analysis framework for corporate bankruptcy prediction, may improve their statistical significance power. Altman proposes operating profitability (in the form of the earning power of a firm's assets) among the key financial ratios of his model claiming that firms with highly profitable operations are less likely to default. Several studies on the role of ratio analysis in bank lending activities and, more in general, in the finance area, have followed since the publication of Altman's article. Exporters operating a profitable business and thus less likely to go bankrupt are ideal borrowing customers for banks. Based on the above, we posit:

H1 High profitability of exporting firms' operations is positively associated with the granting of export finance.

A growing body of literature investigates how and to what extent bank credit supply shocks impact on trade. Ahn (2011) and Ahn et al. (2011) study why international transactions become riskier and credit supply constraints affect international trade loans relatively more in a financial crisis. Paravisini et al. (2011) show that Peruvian exports in 2007–2009 decreased more for firms whose main bank was exposed to the Post-Lehman, foreign liquidity shocks than for the rest of firms. Amiti and Weinstein (2011) find that financial stress at the lead foreign trade bank caused a reduction in lending to Japanese exporters (with a related decline in export transactions). In contrast, Behrens et al. (2013) show that limited access to credit had no effect on exports of Belgian firms during the 2007–2008 crisis. Bricongne et al. (2012) argue that most of the 2008–2009 collapse in trade of French exporters was driven by demand and product characteristics (rather than credit constraints).

Using data on loans granted by Italian banks to domestic manufacturing firms (accounting for almost half of Italy's exports of goods) in the ante and post-Lehman 2006–2010 period, Del Prete and Federico (2014) analyze for the first time the specific role of TF in the context of a credit shock faced by exporters finding that TF is lowly sensitive to bank funding shocks (mostly affecting ordinary lending) due to its short-term, standardized and low-risk nature. This explains why firms, confronted with higher risk exposures resulting from the consequences of the recent financial crisis, have turned more heavily to bank-intermediated finance as opposed to intra-firm financing (e.g., trade credit),

thus causing TF to fall less than other forms of credit (Malouche 2009; Korinek et al. 2010). Del Prete and Federico (2014)'s study also advances the idea that Italy is an interesting case to examine for two reasons: (1) its financial system is largely bank-driven, with credit supply fueling trade more than in other countries; (2) it is an export-oriented economy, with close trading ties and commercial agreements with most countries around the world. The findings of such prior research spur to undertake further research on relationship lending in Italy by collecting proprietary data on the use of bank-intermediated TF across Italian firms. Moreover, based on the interplay between the bank channel and trade investigated by the above studies (research stream 2), we hypothesize:

H2 The higher the prior usage of existing bank credit lines, the lower the recourse to export finance by exporters.

Finally, the risk (of non-payment or non-performance) firms face when trading internationally plays a crucial role in influencing their choice among TF and trade credit products. The use of TF increases in country risk (Glady and Potin 2011), with a preference for L/Cs (vs. international bank guarantees) and for exports to intermediate risk economies (Niepmann and Schmidt-Eisenlohr 2017). Riskiest destinations are excluded as confirming bank fees rise leading exporters to opt for other non-bank intermediated solutions (e.g., cash-in-advance from importers). Own risk-bearing also enables exporters to save such fees in the case of low-risk countries. Hence, in the light of the above studies (research streams 1 and 3), we posit:

H3 The use of trade finance products by exporting firms rises with the increase in the credit risk of importers.

Next is the description of the econometric strategy adopted to empirically test the three hypotheses presented above, followed by the discussion of the main results.

4 Empirical Analysis: Data, Model, and Findings

To investigate the characteristics of those firms resorting to bank-intermediated export finance products to mitigate risks when doing business internationally, we build up an empirical model. To this end we have created a

dataset relying on the exclusive access to the proprietary database of 4155 Italian customers of the corporate banking division of Crédit Agricole (a French bank ranked 7th in the Italian banking market). To comply with internal standards, such enterprises engaged in a commercial banking relationship with the Italy-based operations of Crédit Agricole are characterized by annual revenues ranging from €5 million to €300 million.

To select companies that made a significant use of export finance instruments in 2015, we set the firm-level fraction of sales supported by export finance to a minimum of €550,000 (also eliminating those customers of which Crédit Agricole holds a controlling equity stake). These two criteria (access to export finance, minimum amount of international sales facilitated via TF out of total) enabled us to obtain a sample of 155 small, medium and large-sized firms that received export lending from Crédit Agricole in 2015. Data on TF transactions were hand-collected based on a restricted use of internal digital repositories, which limited information gathering (e.g., one financial year only). The characteristics of our final sample are summarized in Fig. 2. Figure 2 describes the composition of the sample of Italian small, medium and large-sized firms receiving export lending from Crédit Agricole in 2015.

Geographic region		
Northern Italy	131	84.52%
Central-South Italy	24	15.48%

Firm Size		
Small-sized firms	14	9.03%
Medium-sized firms	63	40.65%
Large-sized firms	78	50.32%

Industrial sector		
Oil & Gas	16	10.32%
Apparel	10	6.45%
Food processing and packaging	27	17.42%
Household products	10	6.45%
Machinery	74	47.74%
Pharmaceutical products	6	3.87%
Transports and services	12	7.74%

Export Finance (€ m)		
less than EUR 5 million	132	85.16%
between EUR 5 and 10 million	17	10.97%
over EUR 10 million	6	3.87%

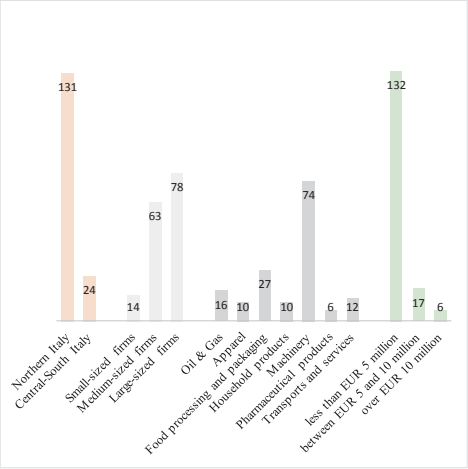


Fig. 2 Sample composition

About 85% (131) of firms in our sample are based in Northern Italy, with the remaining 15% (24) headquartered in the Central and Southern regions. 50% of our sample includes large-sized firms (78), while 40% (63) consists of medium-sized enterprises and 9% (14) of small-sized ones. Size-based grouping follows the criterion established by the European Commission in the recommendation 2003/361/EC.[10] The companies included in the sample operate in 7 different industries, with about 48% (74) of them producing machineries and equipment and 17% (27) offering food processing and packaging. 132 enterprises (out of 155; 85%) were granted access to export finance products worth less than €5 million in 2015 and 23 (15%) between €5 and 10 million (17; 11%) or above €10 million (6; 4%). However, the degree of recourse to export finance by a firm can only be assessed by computing its proportion to the amount of annual revenues. Hence, we calculate the *Export Finance to Sales ratio*, defined as follows, for each firm of our sample:

Numerator—amount of export finance transactions completed (as of 2015):

$$ExportFinance = A + B.2 + C$$

where:

- [A]: *Export Letters of credit* issued by foreign banks and received by Crédit Agricole (confirming bank), with the applicant being a foreign company (importer) and the beneficiary entity (exporter) one of our sample firms requiring the insurance of the payment due by the importer upon the formally documented delivery of goods (or services) at the destination country (so as to hedge the exporter's credit risk);
- [B.2]: *Payment bonds* issued by Crédit Agricole (guarantor) in favor of Italian companies (exporters/beneficiaries)[11] that shipped their

[10] Small-sized firms report annual sales lower than €10 million, medium-sized ones report yearly sales ranging from €10 million to €50 million, large-sized ones report annual sales of €50 million (and above).

[11] Usually 100% covered by a counter-guarantee issued by a foreign bank which ensures the soundness of the importer.

own products (or provided their own services) to foreign counterparties (importers/applicants) abroad before receiving the related payment and are thus willing to obtain a mitigation of their credit risk;
- [C] *Forfaiting* granted by Crédit Agricole to our sample firms by paying in advance (*pro soluto*) a discounted amount of payments due by the respective importers via transfer of promissory notes or bills of exchange (expected to be received from such foreign counterparties).

Denominator—amount of sales (as of 2015).

Our empirical strategy consists of choosing the *Export Finance to Sales* ratio as dependent variable and a set of independent variables grouped into five classes to account for the key economic and financial characteristics of exporting firms, the implied riskiness of export transactions, the geographic position of exporting firms, the size of such firms and their industrial sectors. The source of information for the variables of the first (firms' economic and financial characteristics) and the fifth group (industries) is *Aida—Bureau Van Dijk*,[12] for the variables of the fourth group (size) *Cerved*,[13] for those of the third group (geographic regions) *Crif*,[14] The degree of riskiness of export transactions (second group) is obtained from *SACE*[15] and measures (using a score ranging from 0 to 100) the credit risk of (foreign) importers based on the key characteristics of their own home countries. To determine, for each sample firm, the most important foreign country as destination of their export transactions, we have counted the number of Swift MT 700 and MT 760 messages that

[12] *Bureau Van Dijk* is an information and business intelligence provider managing *Aida*, a database containing comprehensive information on companies in Italy (about 1,300,000), with up to ten years of history.

[13] *Cerved* is the leading information provider in Italy and one of the major rating agencies in Europe.

[14] *Crif* is a global company specializing in credit bureau and business information, outsourcing and processing services, and credit solutions.

[15] *SACE* is Italy's main export insurer supporting the growth and competitiveness of Italian businesses around the world. It is a joint-stock company wholly owned by Cassa Depositi e Prestiti SpA (Italian Treasury) and offers a wide range of insurance and financial products: export credit, investment protection, financial guarantees, surety bonds and factoring. It operates in 198 countries, ensuring more stable cash flows and transforming the insolvency risks of 25,000 business customers into development opportunities.

each of these firms has received from each distinctive country in 2015.[16] The dominant export destination country is identified by the prevalent number of Swift messages. Hence, the *SACE* score measuring the counterparty risk associated with a given dominant destination country is assigned to each of the 155 sample firms. Definitions and sources of all variables are described in Table 1. Their descriptive statistics is summarized in Table 2. Correlation matrix is shown in Table 3.

Table 1 Variables' definitions

Variable	*Definition*	*Source*
Export Finance to Sales	Ratio of Export Finance (2015) to Sales (2015). The numerator is composed by the sum of Export Letters of Credit [A], Payment Bonds [B.2] and Forfaiting [C]	*Crédit Agricole, Crif*
ROA	Ratio of Net Income (2015) to Total Assets (2015)	*Aida-Bureau Van Dijck*
EBITDA margin	Ratio of EBITDA (2015) to Sales (2015)	*Aida-Bureau Van Dijck, Crif*
Leverage	Ratio of Total Assets (2015) to Equity (2015)	*Aida-Bureau Van Dijck*
Bank debt	Natural logarithm of the Bank Debt to Sales ratio (2015)	*Aida-Bureau Van Dijck*
Counterparty risk	Score 0–100 based on the riskiness of foreign importers (counterparties). This riskiness is driven by characteristics of the country with which each Italian firm performs the highest number of export transactions(0 = low risk; 100 = high risk)	*Sace, Swift*
Geographic region	Dummy variable based on the geographic position of the firm's operations (1 if based in Northern Italy; 0 if in Central-South Italy)	*Crif*
Small-sized firms	Dummy variable based on the sales turnover of the firm (1 = sales turnover < EUR 10 million; 0 = otherwise)	*Cerved*

(continued)

[16] Swift MT 700 and MT 760 are those messages exchanged via the Swift network that commercial banks utilize to issue Letters of Credit (700) and Bonds (760), respectively. More specifically, MT 760 messages have been grouped based on the type of international bank guarantee so as to consider only those associated with Payment Bonds.

Table 1 (continued)

Variable	*Definition*	*Source*
Medium-sized firms	Dummy variable based on the sales turnover of the firm (1 = EUR 10 million < sales turnover < EUR 50 million; 0 = otherwise)	*Cerved*
Large-sized firms	Dummy variable based on the sales turnover of the firm (1 = sales turnover ≥ EUR 50 million; 0 = otherwise)	*Cerved*
Oil & Gas	Dummy variable based on the firm's membership in an industrial sector (1 = OilGas; 0 = otherwise)	*Aida-Bureau Van Dijck*
Apparel	Dummy variable based on the firm's membership in an industrial sector (1 = Apparel; 0 = otherwise)	*Aida-Bureau Van Dijck*
Food	Dummy variable based on the firm's membership in an industrial sector (1 = Food; 0 = otherwise)	*Aida-Bureau Van Dijck*
HouseholdProd	Dummy variable based on the firm's membership in an industrial sector (1 = HouseholdProd; 0 = otherwise)	*Aida-Bureau Van Dijck*
Machinery	Dummy variable based on the firm's membership in an industrial sector (1 = Machinery; 0 = otherwise)	*Aida-Bureau Van Dijck*
Pharma	Dummy variable based on the firm's membership in an industrial sector (1 = Pharma; 0 = otherwise)	*Aida-Bureau Van Dijck*
Transport	Dummy variable based on the firm's membership in an industrial sector (1 = Transport; 0 = otherwise)	*Aida-Bureau Van Dijck*

Table 2 Descriptive statistics

	Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
Non-dummy	Export Finance to Sales	0.0884	0.1464	0.0001	0.8963
	ROA	0.0501	0.1101	−0.9104	0.3307
	EBITDA margin	0.1225	0.3687	−2.3966	3.3782
	Leverage	4.9781	4.7501	−1.3400	38.7700
	Bank debt	13.5274	6.0785	0.0000	18.9971
	Counterparty risk	53.8839	22.0357	12	98
Dummy	Geographic region	0.8452	0.3629	0	1
	Small-sized firms	0.0903	0.2876	0	1
	Mid-sized firm	0.4065	0.4928	0	1
	Large-sized firm	0.5032	0.5016	0	1

Table 3 Correlation matrix

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
1. ROA	1.0000															
2. EBITDA margin	0.5140	1.0000														
3. Leverage	−0.0849	−0.1057	1.0000													
4. Bank debt	0.0223	0.1481	−0.1098	1.0000												
5. Counterparty risk	−0.1342	−0.0800	−0.0496	0.0053	1.0000											
6. Geographic region	0.0143	0.0320	0.0634	−0.0541	0.0992	1.0000										
7. Small-sized firms	−0.3460	−0.0484	0.2256	−0.2220	0.0744	0.0727	1.0000									
8. Mid-sized firms	0.1094	−0.0347	0.0147	−0.2354	−0.1116	−0.0452	−0.2608	1.0000								
9. Large-sized firms	0.0909	0.0618	−0.1438	0.3585	0.0670	0.0028	−0.3171	−0.8329	1.0000							
10. OilGas	0.0122	0.0503	0.0450	0.0518	0.1022	−0.0892	−0.1069	−0.1081	0.1675	1.0000						
11. Apparel	0.0126	−0.0299	0.0382	0.1189	−0.0680	0.0398	−0.0828	−0.0034	0.0508	−0.0891	1.0000					
12. Food	0.0637	0.0191	0.0146	−0.0667	0.0442	0.1025	−0.0260	0.1741	−0.1561	−0.1558	−0.1206	1.0000				
13. HouseholdProd	−0.0276	0.0343	−0.0019	0.1068	−0.0799	−0.0328	0.0089	0.0500	−0.0542	−0.0891	−0.0690	−0.1206	1.0000			
14. Machinery	−0.1325	−0.0504	−0.0939	−0.0806	0.0151	0.0164	0.1044	−0.0020	−0.0578	−0.3243	−0.2510	−0.4390	−0.2510	1.0000		
15. Pharma	0.0400	0.0528	0.1010	0.1338	0.1031	−0.0066	0.0534	−0.1661	0.1325	−0.0681	−0.0527	−0.0922	−0.0527	−0.1918	1.0000	
16. Transport	0.1283	−0.0324	−0.0027	−0.1177	−0.1457	−0.0762	−0.0071	−0.0431	0.0464	−0.0983	−0.0761	−0.1330	−0.0761	−0.2769	−0.0581	1.0000

Our empirical analysis employs a multiple regression model estimated with the ordinary least squares (OLS) method. Our basic regression specification is presented below:

$$\frac{Export\ Finance}{Sales} = \beta 0 + \beta 1 * ROA + \beta 2 * EBITDA\ margin + \beta 3 * Leverage + \beta 4 * Bank\ debt + \beta 5 * Counterparty\ risk + \beta 6 * Geographic\ region + \beta 7 * Firm\ size\ (small, medium, large)$$

where *ROA* indicates how efficient a firm's management is at using its assets to generate earnings; EBITDA *margin* measures a firm's operating profitability driving its operational cash flow potential; *Leverage* determines the degree of financial leverage (that is, the proportion of financial debt relative to equity resources) employed by a firm; *Bank debt* quantifies the amount of prior credit lines granted by Crédit Agricole (or other banks) to a firm and effectively used; *Counterparty risk* is a proxy for the credit risk of the importer (based on the main characteristics of its home country and measured by the *SACE* score) with whom an exporting firm predominantly does business; *Geographic region* is a dummy variable aimed at identifying where a firm's business operations are located across Italy, which takes the value of 1 if they are in the North and 0 if they are in the Centre-South of the country; *Firm size* is a multiple dummy measuring how large, medium or small a firm is. Such a variable is defined based on the European Commission (EC)'s notion of small-medium enterprises.[17]

Our model provides empirical evidence on the characteristics of those firms more inclined to use export finance instruments to support their international trade transactions and mitigate the related implied credit risk (Table 4). Industry variation (inclusion of industry controls; omitted in Table 4) is not statistically significant (providing no additional evidence) but confirms the results obtained.

[17] EC defines large-sized enterprises as those recording an amount of revenues greater than €50 million; medium-sized enterprises as those with revenues equal or lower than €50 million and greater than €10 million; small-sized enterprises as those with revenues equal or lower than €10 million.

Table 4 Regression analysis

R-squared	*64.71%*		
# Observations	*155*		
Dependent variable	*Export finance to sales*		
	Model		
Independent variables	**Coefficient**		$p > \|t\|$
ROA	−0.1591		0.106
EBITDA margin	0.0472	*	0.091
Leverage	0.0091	***	0.000
Bank debt	−0.0054	***	0.000
Counterparty risk	0.0008	**	0.037
Geographic region	0.0343		0.146
Small-sized firms	0.3054	***	0.000
Medium-sized firms	0.0980	***	0.000
Large-sized firms	0.0715	*	0.082

Legend: Statistical significance: * $p <= 0.10$ (10 %); ** $p <= 0.05$ (5 %); *** $p <= 0.01$ (1 %)

The findings of our regression analysis provide an interesting empirical evidence on the use of export finance across Italian enterprises. Our model's explanatory power is remarkably high ($R^2 = 64.7\%$). *ROA* (return on assets) has a negative coefficient (only close to statistical significance; $p = 0.106$) showing an inverse relationship with the propensity to utilize export finance instruments. To shed more light on such a relationship, it is worthwhile pointing out that the correlation between *ROA* and *counterparty risk* is negative (−0.1342), thus implying that a profitable firm is less inclined to do business (e.g., export) with customers located in highly-risky (e.g., emerging) countries. The higher the firm's *ROA*, the lower the riskiness (score) assigned to its counterparties (purchasing its products) by *SACE*.

The coefficient associated with the *EBITDA margin* is positive (0.0472) and statistically significant at 10% level ($p < 0.1$). This means that a 1% increase in the *EBITDA margin* leads (on average) to an increase of about 0.05% in the *Export Finance to Sales* ratio. Such a positive correlation may be interpreted in a two-fold way. On one hand, firms showing growing *EBITDA margins* may be willing to keep up with such successful outcomes seeking to increase their export-driven revenues. On the other hand, commercial banks would tend to open credit lines for export lending purposes to the benefit of more profitable firms with more cash flow-generating potential and hence higher debt service capacity. Hence, our first hypothesis, *H1*, is empirically confirmed.

Leverage shows a positive (0.0091) and strongly significant coefficient (at 1% level; $p<0.01$). The higher the degree of leverage employed by firms to finance their business operations (sample firms are on average highly levered: total assets/equity is 4.98), the higher their propensity to resort to export financing to support their international sales activities. In the presence of a moderately large use of debt, firms would probably opt for forfaiting (among the 3 key export finance products) to anticipate payment installments due from customers/importers and be able to reduce leverage through interest/principal reimbursements.

Bank Debt is a variable measuring the amount of credit lines activated by Crédit Agricole and other bank institutions with each of the sample firms and effectively used. Such a variable is negatively correlated with the proportion of export sales to total revenues reported by each firm: the related coefficient has a negative sign (−0.0054) and a high statistical significance (at 1% level; $p<0.01$). Noticeably, the greater the amount of credit granted to a firm in the form of traditional lending (e.g., loans, cash pooling) by Crédit Agricole (and the rest of the banking sector), the smaller the room still available for using the existing (residual) credit line for (further) export finance purposes. This finding provides support to *H2*.

Counterparty risk (based on the *SACE* score) reflects the credit risk associated with the dominant export destination country of sample firms. The coefficient of such a variable is positive (0.0008) and statistically significant at 5% level ($p<0.05$). The higher the level of riskiness of export transactions and embedded credit risk faced by a sample firm, the greater the amount of export lending requested to mitigate such a *counterparty risk* arising from international sales activities. This result corroborates the use of TF instruments as means for mitigating the risks associated with international expansion strategies pursued by firms. Our third hypothesis, *H3*, is thus empirically validated.

The variable *Geographic region* is not statistically significant at conventional levels, thus implying that the location (in the Northern or Southern regions of Italy) of export finance borrowers is irrelevant for the use of such a bank-intermediated product when pursuing international expansion strategies.

Size—reflected in three dummy variables accounting for *low*, *medium*, and *large-sized firms*—shows a direct relationship with the demand for export finance instruments from companies and a strong statistical significance ($p<0.01$, 1% for *small* and *medium-sized firms*; $p<0.1$, 10% for *large-sized firms*). More specifically, the coefficient with the greatest

magnitude is the one associated with *small-sized firms* (0.3054), thus suggesting that such companies are likely to be exposed to higher risks when expanding their activities beyond domestic borders and in greater need of benefiting from the provision of credit risk hedging associated with export finance instruments. Hence, *small-sized* enterprises are more inclined to use export finance compared to *medium* and *large-sized firms*, which may be better equipped with the set of information and experience (e.g., on legislation, customers' tastes) needed to penetrate a new, foreign market.

5 Conclusions

This article is one of the first to study what type of exporters buy export finance products from banks to alleviate counterparty risk, thus adding evidence to address the issues of the dearth of data and business practice opacity that have so far undermined other empirical work in this area. This sheds new light on how the TF market really works.

Based on a combined use of multiple microdata sources on Italian firms, our empirical analysis suggests that the recourse to bank-intermediated TF products is appealing for those (mostly) small- or medium-sized firms capable of generating cash flows (with debt service capacity), moderately levered, exposed to credit risk of importers and eligible for further bank credit (in terms of usage of outstanding credit lines).

The findings of our study have implications for researchers, banks and policymakers. On the research side, our analysis contributes to the extant strands of literature on TF which rarely investigated the characteristics of those firms more prone to demanding for export finance lending. Our research is limited to the extent that the sample only includes Italian enterprises receiving export financing from a single bank institution. This inevitably restricts our study to the domain of case-based empirical analyses. However, the availability of microdata on TF transactions is very scarce and our work may help better characterize such a market. In this respect, scholars are encouraged to collect data on firms headquartered in other European countries to further inquire into the recourse to TF across a wider, more heterogeneous sample of enterprises.

On the front of commercial banking business, top managers of banks may exploit the results of this study to design a dedicated pricing of fees, terms and conditions for those corporate customers that are more likely

to make use of export finance lending depending on their key financial/economic and export destination (e.g., counterparty risk) characteristics. A more flexible pricing strategy may be important for commercial banks now confronted with rising compliance costs per correspondent relationship and greater business opportunities in the developing markets.

Finally, policymakers may benefit from this study to better understand the features of the TF market so as to foster and facilitate the match between demand and supply of related products by companies and commercial banks, respectively, with the aim of strengthening Italian exports. Through the organization of meetings among firms, local chambers of commerce and banks, the government may raise the awareness of the advantages associated with the use of TF and disseminate their combined and synergistic use across all actors involved in the process of internationalization of a country's economic system. Although internationalization may expose firms to increasing credit/counterparty risks, TF may enable the conversion of export sales into a lower-risk, higher-margin business activity. This may create additional growth opportunities for both firms willing to engage in international trade transactions and global commercial banks aimed at attracting (or retaining) them as customers.

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CHAPTER 7

Patient Investors Taxonomy: A Behavioral Approach

Christian Rainero and Giuseppe Modarelli

1 Introduction

The aim was to provide a new taxonomy building of patient investors, highlighting differences in the level of patience according to expected returns, risk-opportunity and time preference. These variables are determinant in shaping the motivation to invest. The literature on patient capital considers patience as the base of protracted durable growth, thanks to the mission-oriented view of "Long-Vision Capital" (Lin and Wang 2017). Compared to the literature, the approach of Deeg and Hardie (2016) is innovative, based on attitudes to be committed (loyalty and engagement) and time preference. We took a different approach, considering the time factor plus the variables widely accepted in the behavioral finance literature, including risk-opportunity and expected returns, to pursue the interest in interpreting investors' action by motivation. We pursued categorization by traits as per the model of Bailard et al. (1986),

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assuming that traits are behavior determinants which influence motivation and subsequently patience.

A crucial point for the future is sustainability. The principal inspiration of the term comes from the Report of the World Commission on Environment and Development (WCED): Our Common Future (1987), which states that "*humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*". In the last report of Higher Level Expert Group on Sustainable Finance, sustainability is defined as the possibility to make economic prosperity long-lasting, more socially inclusive and less dependent on exploitation of finite resources and the natural environment (Higher-Level Expert Group on Sustainable Finance 2018). There are several definitions of sustainability, but the meaning does not change, i.e. "*maintaining wellbeing over a long, perhaps even an indefinite period*" (Kuhlman and Farrington 2010).

Hofstede et al. (2010) use Confucius' words to suggest that long-term orientation (LTO) also affects the way a society influences the natural environment. Thus, the virtue of patience has a fundamental role in defining our contribution and long-term investment, taking risks to pursue real sustainable growth, identifying the different kinds of investors, determining their level of patience and subsequently their long-term views.

2 Literature Review

2.1 Patience Between Attitudes and Time

"Patience" is a concept long considered in different ambits. Adam Smith (1863) referred to "prudent man" as: "*in the steadiness of his industry and frugality, in his steadily sacrificing the ease and enjoyment of the present moment for the probable expectation of the still greater ease and enjoyment of a more distant but more lasting period of time*".

Hofstede et al. (2010), in researching on Culture and Organizations referred to the Confucian principles arguing that: "*Virtue with regard to one's tasks in life consists of trying to acquire skills and education, working hard, not spending more than necessary, being patient, and persevering*".

Other perspectives consider patience in relation to the wealth of nations (Dohmen et al. 2016). The literature on "patience" and "long-term orientation" is rife with different influences, sociological, psychological, behavioral economics, etc. Conversely, OECD has a strict definition of "long-term" in which "patience" is correlated to financing

for at least five years (Garonna and Reviglio 2015). More recently, Deeg and Hardie (2016) defined "patient capital" as "*equity or debt whose providers aim to capture benefits specific to long-term investments and who maintain their investment even in the face of adverse short-term conditions for the firm*" (Deeg and Hardie 2016). They also provided a taxonomy for patient investors based on three key variables:

1. Engagement
2. Loyalty
3. Time horizon.

The framework provided by Deeg and Hardie (2016) highlights the different levels of "patience" within an innovative approach, focused on conditions by which patience is influenced (attitudes to be committed and time).

Because of their approach, Deeg and Hardie (2016) really differ from most of the literature, because firstly, they considered the diversified interests and corporate objectives of investors, secondly, they took into account the engagement and loyalty variables and thirdly, they judged the time factor a discriminant of patience. Combining these variables they provided a taxonomy to identify patient capital suppliers.

The first variable considered by Deeg and Hardie (2016) was Engagement. The literature recognized it as having an everyday connotation of involvement, commitment, passion, enthusiasm, absorption, focused effort, zeal, dedication and energy (Schaufeli 2013). Csikzentmihalyi (1988) mentioned a "state of flow". This state of mind is one of full absorption, whereby individuals are so involved in their activity to the point of losing awareness of time and space. The definition of engagement by the Merriam Webster Dictionary, explains involvement and commitment as a state or condition of being obligated or emotionally impelled, high emotional involvement, full participation.

Deeg and Hardie (2016) considered the first function of engagement which, according to them was broadly recognized as overcoming information asymmetries through dialogue with management (Aoki 2001). They also looked at it from another aspect, through its potential influence on the preferences alignment between management and investor/lender. Thus where present, engagement becomes a variable able to modify patience orientation. Engagement might even encourage and promote prioritization of long-run time preference (Deeg and Hardie 2016). Engagement has been regarded as the process whereby investors attempt a sort of alignment between management and investors'

objectives. This approach could promote patience, ensuring information for investors. By contrast, relative impatience is an attribute of investors who use engagement to pursue short-term performance (Deeg and Hardie 2016), possibly resulting in high emotional involvement.

Another definition of engagement focused on the promise to be loyal to someone or something. This aspect pointed to the second variable considered by Deeg and Hardie (2016) for their taxonomy. They believed that an investor pursuing long-term objectives could be actively engaged remaining loyal. As stated by Larmer (1992), an adequate definition of loyalty to someone was that loyalty involves acting in accordance with what one has good reason to believe to be in that person's best interest.

Based on the assumption of Deeg and Hardie (2016), it is possible to distinguish between conscious and unconscious loyalty. In fact, one must consider that regulations, penalties, and disincentives exist "to break the promise". The object of rational loyalty is the explicit set of mission statement, goals, value statement and code of conduct of the organization judged legitimate (Vandekerckhove and Commers 2004).

Relating conscious loyalty variable to engagement, the former becomes more significant for determining relative patience (Deeg and Hardie 2016). As proposed by Hirschman (1970), the opposite of conscious loyalty, i.e. unconscious loyalty, results from the difficulty of interpreting change.

For this reason to make it conscious, the abstract concept of loyalty must be contextualized. The reference framework considered loyalty a discriminant variable for evaluating patience which increases its potential influence when the time horizon becomes wider. Thus, some significant degree of loyalty is necessary to enhance patience (Deeg and Hardie 2016). This point of view seems highly original and strictly correlated with the authors' research objective, in view of the constituent conditions highlighting patient capital.

Based on adequate considerations and perspectives, the Deeg and Hardie (2016) approach may be applied to impact investors' patience. Our ideas to promote a behavioral approach to a new taxonomy building is outlined hereunder.

3 Methodology

Social research uses abstractions and generalizations to explain and interpret the complexity of phenomena. Understanding phenomenological behavior is not always simple, especially in view of the external and internal influences involved.

This paper aims to bridge the gap of the literature on patient capital.

Although Deeg and Hardie (2016) provide cogent taxonomy of patient capital suppliers, we attempted to expand their approach to taxonomy of patient investors by including behavioral variables. Whereas they focused on attitude variables such as loyalty and engagement, we went for fuller and exhaustive taxonomy.

By reading and interpreting investor reality through a risk management view, we considered different types of investors and their motivation to invest, including behavioral approach to taxonomy. This idea led us to undertake interpretative analyses using qualitative techniques to build a theoretical framework for further diverse contributions functional to advance in this field.

We opted for an inductive method, taking the illustrative categories of investors extrapolated from the literature, implementing and correlating them with different levels of "patience" (lower, medium and higher), taking into account behavior (mission-oriented, disinterested, profit-oriented) through risk-opportunity variables (lower, medium, higher), expected return (lower, medium, higher) and time horizon (short-run, long-run). The result of the scaling technique yielded taxonomic conceptualization of possible patient investors constituting not only the final result, but the leitmotiv of the contribution in its entirety, intersecting areas and aspects of important strands of literature, resulting in a current approach for tackling today's challenges in terms of high-risk investment.

4 Findings Discussion: Patience Between Traits, Propensity, Needs and Time: A Motivational Approach to Invest

4.1 Introduction to the Taxonomy

The aim of this contribution tries to change perspective, focusing not so much on attitudes[1] to be committed, which were the constituent of patience in Deeg and Hardies's (2016) work, but rather on the motivational aspects of investing. This led to the development of a taxonomy

[1]Attitude is the propensity or otherwise of someone for or against a type of social object or social action (Guilford 1959).

Table 1 Categorization methodology

VARIABLE	LEVEL							
Expected Return	Higher		Lower		Higher		Lower	
Risk-Opportunity	Higher		Lower		Lower		Higher	
Trait	Adventurer		Guardian		Straight Arrow (1)		Straight Arrow (2)	
Time	Short-run	Long-run	Short-run	Long-run	Short-run	Long-run	Short-run	Long-run
Behavior	Profit-oriented	Mission - oriented	Disinterested	Disinterested	Profit oriented	Profit-oriented	Mission - oriented	Mission - oriented
Patience	Lower	Higher	Medium	Medium	Lower	Medium	Lower	Higher

(*Source* Our processing 2018)

based on the motivational determinants which influence behavior. Our approach typifies investors by traits (behavioral expression).

Guilford (1959) assumed that personality is a unique set of traits. According to this definition, personality is something internal, as internal are the needs moving motivational force (Deci 1971). According to Allport (1937), personality is a dynamic organization of psychological systems within the individual, which determines unique adjustment to the environment (behavior). A behavioral trend may be attributed to hypothetical force (need and propensity), hypothetical construct that originates from motivation (Murray 1938) (Table 1).

We focused on two different variables more easily accepted in behavioral finance literature. In addition to time horizon, we considered two additional variable, namely:

1. Risk-opportunity
2. Expected returns.

The variables, identified as needs or propensity, influence motivation. Because of connotation, it was possible to identify traits and behavior, defining level of patience in investment, framing a new taxonomy building (Table 2).

On time horizon the literature covers two ambits, i.e. long-term orientation and short-term orientation. Cartensen et al. (1999) state that

Table 2 Motivation to invest and patient capital: A new taxonomy building

Motivation to invest		*Expected return*	*Risk—opportunity*	*Behavior*	*Patience level*	*Investors taxonomy*
Time preference	Short run	Higher	Higher	Profit-oriented Trait: ADVENTURER	Lower	Active hedge funds Private equities
		Higher	Lower	Profit-oriented Trait: STRAIGHT ARROW (1)	Lower	Insider traders
		Lower	Higher	Mission-oriented Trait: STRAIGHT ARROW (2)	Lower	Nonprofit donors Philanthropists
		Lower	Lower	Disinterested Trait: GUARDIAN	Medium	Citizens and households in lower-risk national bonds Account holders
	Long run	Lower	Lower	Disinterested Trait: GUARDIAN	Medium	Citizens and households in lower-risk national bonds Account holders
		Lower	Higher	Mission-oriented Trait: STRAIGHT ARROW (2)	Higher	State investment banks Sovereign wealth funds Philanthropists Nonprofit donors
		Higher	Lower	Profit-oriented Trait: STRAIGHT ARROW (1)	Medium	Pension funds insurances Passive hedge funds
		Higher	Higher	Mission-oriented Trait: ADVENTURER	Higher	Entrepreneurs Venture capitalists Business angels Private equities

Source Our processing 2018

time perception plays a major role in social goals selection and pursuit. In fact, long- and short-term oriented cultures are characterized by two different lines of thought. The major values of short-term oriented cultures include freedom, achievement and thinking for oneself (Hofstede et al. 2010). By contrast, Bearden et al. (2006) state that persistence is a long-term value.

We assumed the concept of persistence to be similar to that proposed in Table 2 on patience. Our assumption is not diametrically opposed to that of Deeg and Hardie (2016), but takes into account the same objective with a different approach, disregarding attitudes to be committed and concentrating on behavioral expression embedded in traits, based on needs and propensity, translated into risk-opportunity and expected return variables strictly correlated with investment choice and time preference.

In psychology, researchers suggest that traits, interpretation of information, sentiments, returns, and risk influence behavior (Endler and Magnusson 1976; Menkhoff et al. 2006).

Behavioral finance literature accepts that the function of individual utility (risk propensity, needs) guides economic decisions. For example, Miller (1999) stated that a norm exists in western cultures depicting self-interest as a powerful determinant of behavior. Self-interest is related to the concept of homo oeconomicus, also named by Posner (2003) as the human behavior to rationally maximizing one's own ends, necessary to satisfy needs.

On the other hand, the literature shows that human behavior cannot be reduced just to a self-interest-driven approach.

Our conceptual framework identifies the problem of sentiments as a behavioral determinant. In fact, it has been necessary to consider the ethical variable in addition to the utilitarian one. The former guided by altruism and disinterested personal return, oriented to the opportunity for the welfare of others (Jensen 1994), the latter strictly related to self-interest (Lovric et al. 2008). Also, we show the idea of a close connection between utilitarian needs, risk propensity and ethical values related to time preference. The following considerations focus on the variables chosen by us to build taxonomy.

4.2 Taxonomy Variables

We started by analyzing the concept of opportunity (individual or collective), defined as a future situation that the decision makers deem

desirable and feasible in risky conditions (Keh et al. 2002), but also as the presence of individual or collective situational benefits deriving from investments. To us, investment opportunity involves potential benefits (individual or collective) naturally evaluated through potential returns and risks (Saha and Holden 2014).

Regarding the relation between risk and opportunity, the literature is uniquely oriented. In example, Kendrick (2015) considers opportunity a hot topic in project management, especially when discussing risk. The opposite concept of risk would be opportunity, as mentioned above. Indirectly, risk could be described as the negative outcome of uncertainty (Olsson 2007). As a minimum, it may be assumed that opportunity is directly related to risk (Kendrick 2015).

From this assumption, both risk and opportunity variables were considered in the scaling model, to shape patience level of our investor types' taxonomy (Table 2). As regards risk and opportunity in investment, it is widely accepted that investment is similar to a project, defined by the Project Management Institute (PMI 2013) as a temporary endeavor undertaken to create a unique result. This is the result of individual or collective (business) motivation. A project might be risky, result driven and embedded in time. In the behavioral finance literature, the risk variable is intrinsically embedded in time. The perception of time elapsing and time preference has a significant impact on behavior in investment choices (Das and Teng 1998). The problem with both project and investment is evaluating risk versus opportunity and returns relative to time. This could strengthen the intrinsic connection between risk, opportunity and time.

In terms of investors' behavior, people generally tend to value immediate outcomes more than future results. However, in certain conditions, as explained below, they also much appreciate the latter (Drazen and Loewestein 1998), increasing the level of patience.

Using Gilovich et al. (1993) words: "*risk assessment becomes more conservative with shorter temporal distance*". As stated by Camerer et al. (2005) the affective system tend to motivate people to behave with short-term orientation to goals (shortermism); by contrast, the higher order cognitive functions prefers longtermism.

Let us assume that long-term investors enjoy benefits, considering the social challenges and long-term sustainable growth that patience implies. Filbeck et al. (2005) state that investment choices are increasingly more complex, with investors possibly becoming active or passive (Barnewall 2006).

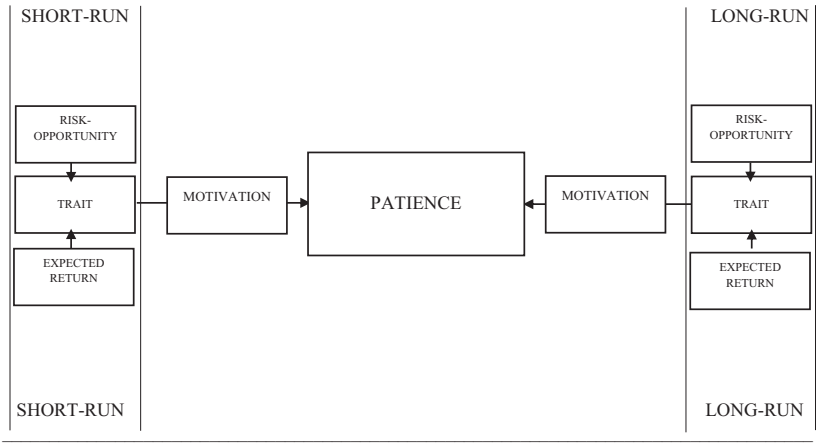

Fig. 1 Variables connections chart (*Source* Our processing (2018))

In view of the complexity of multilateral influences on motivation for investment (perceptions, emotions, values, traits, needs, propensity), we considered it important to correlate all the above variables as if connected.

We assumed that:

- Traits are behaviors' determinants
- Variables of risk-opportunity, expected returns and time preference, influence motivation through traits
- Motivation is a behavioral force influencing levels of patience in investment.

The examples in Table 2 define the full range of investors' behaviors, and Fig. 1 is a block diagram of the connections between the variables proposed.

4.3 A New Taxonomy Building

The traits of investor types described by Bailard et al. (1986): Guardians, Straight Arrows and Adventurers (Table 1), can be used to clarify the content of Table 2.

- The first (Guardians) are investors with risk-averse orientation, careful and concerned about their money. Guardians prefer to avoid risk and stick to the status quo, preserving their assets. They are not interested in volatility or excitement (lower level of expected returns and risk-opportunity). They lack confidence in their ability to forecast the future. They behave, both in the short- and long-run, in a disinterested way, exhibiting a medium level of patience.
- The second (Straight Arrows) describe the average investor, with a good level of balance between risk, opportunity and expected returns. We visualized two types of Straight Arrow traits: (1) higher level of expected returns and lower level of risk-opportunity. In both the short-run and the long-run they behave in a profit-oriented way. In the former case (short-run) the level of patience is lower; by contrast, in the latter (long-run), the level of patience is medium; and (2) the other type of Straight Arrow trait describes a higher level of risk-opportunity and a lower level of expected returns. Both in the short-run and in the long-run they behave in a mission-oriented way. In the first case (short-run), the level of patience is lower; by contrast, in the second case (long-run), the level of patience is higher.
- The third (Adventurers) are investors interested in accumulating wealth as risk takers. They are always willing to put everything on one bet, according to the rule "no pain, no gain". In the short-run they behave in a profit-oriented way; in the long-run they behave in a mission-oriented way. In the first case (short) they exhibit a lower level of patience, in the second case (long) the level increases.

In Table 2 we considered investors' behavior related to the objectives of their actions characterized by the traits mentioned above.

According to Hoffman et al. (2008), both financial and moral considerations influence investment decisions. So we must distinguish ethical/social and economic motivations of investors assuming that decisions could be made based on these. The former follows the line of judgment regarding actions right or wrong. The latter follows the choice of profit (Rivoli 1995). In both cases, to make a decision either way, ethical or economic, motivation is necessary.

At a personal level, "to be motivated means to be moved to do something. Anyone with no impetus or inspiration to act is characterized as unmotivated, whereas someone who is energized or activated toward an

end is considered motivated. So, the orientation of motivation concerns the why of actions" (Ryan and Deci 2000).

For this reason in Table 2 we related the investor types to behavioral objectives and their underlying motivation to invest (profit-oriented, disinterested, mission-oriented) through the time horizon. Profit, mission or disinterested orientation underline the "why of actions", or in our case the "why of decision" in the investment ambit.

The implications of Table 1 are illustrated by the methodology used to build the taxonomy related to a conceptualized behavioral scale (Table 2).

This setting offers a more comprehensive overview of "patient capital" suppliers, in addition to the existing literature. Given hereunder are our reasons for considering investors patient or impatient and who they are.

4.4 Patient Investors: Who Are They?

The new taxonomy describes an integrated typing of investors including the behavioral approach, with an explanation of investor types as shown in Table 2.

1. **Short-run private equities, active hedge funds** are featured by the Adventurer trait. Profit-oriented behavior in investment describes subjects with higher expectation of returns in terms of self-interest. The Adventurer trait reflects only interest in investing to achieve wealth (higher level of expected returns) as a risk taker (higher level of risk-opportunity). Their preference on the time horizon is pre-eminently based on the short-run.
   Because of the above and following the ethical aspects influencing motivation, we assumed that the expected immediate short-term returns would create a myopic situation (in long-run positive externalities) (Thorne and Saunders 2002). Someone would prefer gratification according to a "buy now" mentality, satisfying immediate needs out of self-interest or profit-oriented attitudes. We reflected that these subjects were oblivious of the responsibility to stakeholders for long-term social stability (Nevins et al. 2007).
   Private equity is a complex of funds, involving investors who invest in businesses directly. Deeg and Hardie (2016) argued that with private equity, exit is crucial to pursue returns. The aim is timely exit, highlighting the relationship of short-run time

preference for short-term performance to the relative high risk of losses if exit is delayed. Two different views exist as regards investing in private equities, namely short-run and long-run. For these reasons the level of patience moves along the scale from lower for short-run, to higher for long-run.

Recent years have witnessed an increased interest in **hedge funds** by different stakeholders. This type of investments tend to focus on derivatives, which involve dramatic risks of exposure (Ang et al. 2011). Deeg and Hardie (2016) pointed to different strategies for investing in hedge funds. Currently, the "activist" strategy is of interest. Active hedge funds involve buying equities to improve short-term returns at higher risk-opportunity. Their relative patience is lower.

2. **Insider traders** have the Straight Arrow trait (1), being profit-oriented (higher level of expected returns) in an informed way, mitigating risk-opportunity (lower level) of the investment. Academics have an interest in the amount of information insiders have in hand, and in the way they make profit using such information. Insider trading is widely recognized as the activity of buying and selling securities by subjects who have information not in the public domain. Psychologically, insiders' knowledge is similar to that of experts. The potential performance in terms of results, derived from being informed by a significantly wealthier source of information (Beach and Connoly 2005), is the real advantage of insiders compared to the rest, as experts versus novices. Insiders tend to gain higher levels of returns, but for them profitability is closely related to time, linked to the information they have, enabling them to make instant choices at low risk and higher expected returns. Their level of patience is lower.
3. Conversely, **non-profit donors and short-run philanthropists** are Straight Arrow (2) trait investors because they differ from the previous categorization of short-run mission-oriented behavior. They invest with lower or no expectation of returns, allocating funds to initiatives for the public good and quality of life, intrinsically embedded with higher levels of risk-opportunity. Generosity toward others is seen as positive morality (Ilchman et al. 1998). The moral variable influences choice in investment. Non-profit donors and philanthropists, with the aim of generous gifting for specific purposes, i.e. strategic missions, freely finance projects with

higher potential opportunity, risking money in probably "no-win situations" (Porter and Kramer 2002). Due to the shortermist preference, here the level of patience is lower.

4, 5. **Citizens and households in low-risk national bonds and account holders** have the Guardian trait. In risking to take opportunity, they exercise caution. Are not interested (disinterested behavior) in big earnings, and tend to preserve their assets, exhibiting lower levels of risk-opportunity and expected returns. Their Guardian trait makes them avoid risk and stick to the status quo, both in the short- and in the long-run. The level of patience is medium in both cases.

6. **State investment banks, long-run philanthropists, non-profit donors and sovereign wealth funds** belong to the Straight Arrow (2) trait. The long-term bias for Philanthropy (Martin 1994) by **philanthropists** and **non-profit donors** in the long-run, is due to their voluntary decision to finance high-risk projects without on limited returns, based on mission-oriented behavior. We attributed to them the Straight Arrow (2) trait because of their higher propensity for risk-opportunity and lower levels of expected returns. The underlying assumption is that an individual's ethical actions are a function of deliberative choice (Thorne and Saunders 2002). On the other hand, due to the statutory model of **State investment banks**, the deliberative choice to behave in a mission-oriented way, make it possible to take higher risk-opportunity with lower or no expected returns, as made possible by long-run policies. This is the case of SIBs on account of their role as development banks, mitigating intrinsic investment risk with long-term vision in a patient way. As stated by Deeg and Hardie (2016), **Sovereign Wealth Funds (passive),** with their saving model, are already the most significant institutional investors on the market. They have a very long time horizon, because they are used by governments to pursue geopolitical objectives (Helleiner 2009), balancing their mission-oriented behavior with lower expected returns and higher risk-opportunity. Precise definitions of SWFs vary among authors, but the term is generally used to describe state-owned pools of capital invested, also abroad (Helleiner 2009). The key difference between official reserves and SWFs is that the former are based on riskless assets such as sovereign bonds, while the latter may have in portfolio equities, corporate bonds, etc.

(Jen 2007). For all these subjects, the level of patience is relatively higher.

7. **Pension funds, insurance and passive hedge funds** exhibit the Straight Arrow (1) trait. They are focused on behaving in a profit-oriented way. In the long run they seek ambitious return targets, balancing hope for higher level of expected returns with lower risk propensity.

   Thus, **Pension Funds**, according to Deeg and Hardie (2016), in the long run mature higher level of returns. Their investment strategy is prudent and diversified, taking into account long-term philosophy, reducing risk.

   There are a multitude of types of **Insurance**. Each one is different, but in common they have the feature of protection. Insurances permit sharing risks and coverage to losses. Expected returns could be higher compared to the lower risk-opportunity in the long-run.

   Passive hedge funds are similar to active hedge funds, the difference being that the aim of the latter is to improve short-term returns with higher risk-opportunity, whereas that of the former is to focus on the improvement of long-run returns, reducing risk. For all these subjects, the relative patience is medium.

8. **Entrepreneurs, venture capitalists, business angels and long-run private equities** are characterized by their mission-oriented behavior related to a project, taking higher levels of risk-opportunity against higher levels of self-interest expected returns. The main trait of these investors is Adventurer.

   Over the years, researchers have given different definitions of **Entrepreneurs**. There is no unique definition, but they can be regarded as risk-takers and, as defined by Webster's Third New International Dictionary (1961) as "*organizers of economic ventures, especially those who organize, own, manage and assume the risks of a business or enterprise*". Palmer's view (1971) is related to the concept that the entrepreneurial function involves risk assessment and risk taking, tending to acquire the capability to be durable (Zappa 1957), pursuing interests in a farsighted way (Lumpkin et al. 2010). This assumption explains the mission-oriented behavior of entrepreneurs. The level of patience is higher.

   Venture capitalists and business angels are sub-sets of entrepreneurs. Typically defined as long-term professional investors, unquoted, risk equity financers in new firms where the primary

reward is eventual capital gain, supplemented by dividend yields (Wright and Robbie 1998). They are highly motivated to invest in high-risk businesses, i.e. Innovation enterprises, Start-ups, etc., their aim being to finance high-opportunity companies to secure profitability with relatively wide time preference. Our approach differs from that of Deeg and Hardie (2016) because they assumed that venture capitalists and business angels generally have medium levels of patience. Their vision is valid if we focus the reasoning on loyalty and engagement. Contrary, we focused the approach on motivation, believing that the level of patience provided by these subjects will be higher. This is probably due to their mission-oriented attitude, venture capitalist finance enterprises being too risky for the standard market. Conversely, business angels finance high risk enterprises from the start and during the growing process, also helping them with knowledge, contacts and experience. For these reasons we assumed that the level of patience is higher.
As mentioned in para. (1) concerning short-run and long-run private equities, the level of patience for these investors varies from lower in the short-run, to higher in the long-run. In this way the discriminant is the variable of time.

4.5 Critical Perspectives

A critical perspective on the taxonomy proposed points to a separation of altruism from self-interest in the patient approach to invest. Altruism and self-interest seem to be influenced by the same mission-oriented behavior. In fact, the behavior of subjects recognized by us as having higher levels of patience, is oriented toward pursuing a mission.

People or organizations motivated by altruism or self-interest to invest, are able to finance higher-risk projects in the long-run. This approach shapes patience regardless of the objective to make money for its own sake or otherwise. Thus, motivation is a behavioral force influencing the levels of patience in investment, and the mission becomes the objective of the action which causes individuals or organizations to invest through variables of risk-opportunity, expected returns and time preference.

Both altruism and self-interest are objectives influencing people and organizations. The former aims to do something "*not just for the money*" (Frey 1997), but also because of increased opportunity and risk, which

is characteristic of the Straight Arrow (2) trait. The latter, triggered by higher levels of expected returns for their own sake, is characteristic of the Adventurer trait, and typifies the mission-oriented behavior, offsetting the higher level of expected returns (typical of the profit-oriented behavior) with long-run time preference and higher levels of risk-opportunity.

By promoting the behavioral approach, altruism and self-interest objectives are influenced by the same mission-oriented behavior, shaping higher levels of patience in the long-run.

This contribution could advance the state of the art in the field of study. Also, it could help other investigations as a theoretical framework for further improvement in categorizing investors according to a behavioral approach able to identify the levels of patience applied to finalize investments.

5 Conclusions and Limitations

Assumed that traits are determinants of behavior, given that risk-opportunity, expected returns and time preference variables influence motivation through traits. Being motivation a behavioral force which influences the levels of patience in investment, the aim was to provide taxonomy for a wide range of variables across ethical and economic decisions in investment, highlighting the more patient and less patient types of investors.

Long-term investors around the world are highly motivated to pursue high opportunity at great risk. Long-term institutional investors are motivated by a sort of altruism, whereas private investors are motivated by mission orientation compensated by a self-interest approach. The definition of LTO represents the crucial assumption of "patience", but is not the only variable. In our view it is necessary to correlate time with the other variables shaping behavior by traits. The mission-oriented behavior related to LTO is the theoretical determinant of "patience". This idea led us to think that thanks to SIBs policy on National and Supra National Development Banks, it is possible to do the best for development "*not just for the money*" (Frey 1997).

Hence the intrinsic motivation of patient investors as assumed by Deci, manifesting itself when an activity does not bring remuneration beyond that for the activity itself (Deci 1971). For these reasons, we associated a higher level of patience to State Investment Banks,

Philanthropists, Non-profit Donors and Sovereign Wealth Funds in the long-run, as explained hereunder.

Ethical and economic decision-making may or may not conflict (Rivoli 1995). Where they do not we have the main attribute to the role of SIBs. As philanthropist or non-profit donors in the long-run, due to their intrinsic motivation (by statutory design), SIBs tend to invest in higher risk-opportunity projects with lower expected returns. In this perspective, the motivation to invest influences behavior, increasing the level of "patience".

To determine the level of "patience" the same approach was applied in building the scale for the other investor types.

The idea that mission-oriented behavior is an attribute of non-profit donors and philanthropists in the short-run, lowers the level of "patience". State investment banks, philanthropists, non-profit donors and sovereign wealth funds in the long-run, exhibit the same mission-oriented approach, involving a higher level of "patience". The same applies to entrepreneurs, venture capitalists, business angels and private equities which, being mission-oriented, feature a higher level of "patience". Being profit-oriented, long-run pension funds, insurances and passive hedge funds show a medium level of "patience" which are characteristic of short-run active hedge funds, private equities and insider traders with a lower level of patience. Disinterested citizens, households holders of lower-risk national bonds and account holders, have a medium level of "patience" regardless of time preference.

The taxonomy purposed exemplifies the types of investors who tend to invest in a patient manner or on an emotional basis, shaping the latter as impatient investors. The behavioral approach used in this paper suggests a new point of view for the literature, including SIBs, entrepreneurs and subsets thereof, because "*only entrepreneurs and institutions are able to turn long-term savings into patient capital*" (Lin and Wang 2017), to improve development for sustainable growth, managing risk with a long-term perspective.

The taxonomy purposed bases the assumptions just on a theoretical conceptualization. For further research, it could be interesting to validate the hypothesis with an empirical analysis. The validation it could be possible thanks to case studies or experiments, testing the theoretical framework.

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CHAPTER 8

A Nonlinear Approach to Assess the Risk–Reward Ratio Using the Machine Learning Technique

Pasquale Merella and Roberto Schiesari

1 Introduction

From a risk management perspective, the choice of a correct rating model that can carry consistent predictive information about the probabilities of default over successive time periods is of crucial importance. Both the risk premium and the credit costs are determined by the default risk and the firms rating will have a deep economic impact on banks as well as on the firms themselves more than ever before. Predicting default probabilities and deducing corresponding risk classification becomes ever more important for firms to operate successfully and for banks to clearly grasp their clients' specific risk class.

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There are strands of literature on the statistical and stochastic analysis of default probabilities (Chakrabarti and Varadachari 2004). One of them models default events by using accounting data whereas the other recommends using market information. Market-based models can be further classified into structural models and reduced form models. There exists a hybrid approach which uses accounting data as well as market information to predict probability of default. The market-based approach relies on the time series analysis of company market and accounting data. Unfortunately, time series analysis long enough to reliably compute variances in parameters is not available for most companies.

Moreover, most Italian firms are not listed and, therefore, their market price is unknown. This justifies the choice of a model for which only cross-sectional accounting data would be required. For this study, accounting data for bankrupt and solvent Italian companies were provided by the Aida database.

Based on statistical learning theory an alternative nonlinear separation method—the Support Vector Machine (SVM)—has recently been introduced into default risk analysis. The SVM yields a single minimum without undesirable local fits that ANN often produces. This property results from the minimized target function that is convexly quadratic and linearly restricted which ensures that the solution is not trapped in local minima. Moreover, the SVM does not need any parameter restrictions or prior assumptions such as the distribution for latent errors. The current literature on statistical learning theory has produced strong evidence that SVMs systematically outperform standard pattern recognition/classification, function regression and data analysis techniques (Vapnik 1995; Haykin 1999). The application of SVM to company default analysis is less evident in management science and finance literature.

This paper examines the applicability of this new technique to predicting the PDs of Italian firms from the AIDA database spanning the years 2011 through to 2016. The aim is to investigate (1) which accounting ratios are meaningful and are predictive of bankruptcy, (2) if a well-specified SVM model consistently outperforms the benchmark logit model in predicting PDs and, (3) if there is a significant positive linear relationship between expected returns and default risk.

In the following section we review literature whilst Sect. 3 gives a short introduction to the SVM for classification and also describes the AIDA database and the variables and ratios used in our study. In Sect. 4, we present the validation procedures, resampling techniques,

performance measures and the ratio selection methods. Furthermore, we analyse the empirical results, including the predictors related to bankruptcy, the sensitivity of SVM parameters, and graphical tools.

2 Literature Review

The probability of default is one of the most important risk parameters estimated in credit institutions, especially banks, and plays a major role in credit risk analysis and management.

Probability of default is even a key parameter for the risk analysis and management of commercial credits (Bierman and Hausman 1970).

Credit risk measurement and management has become one of the most important topics in financial economics. It is crucial to evaluate the credit risk associated with potential clients as well as with actual clients. Credit risk evaluation of (potential) clients is performed within credit scoring, which is a process (or statistical approach) for predicting the probability that a loan applicant or a client will default (Hand and Henley 1997; Berger and Frame 2007).

Banks have historically focused mainly on application credit scoring since granting loans is a vital part of their business. A qualitative approach dominated for these purposes up until the 1970s. However, this approach is associated with several obvious problems—in particular: subjectivity, inconsistency, inefficiency and incomprehensiveness. Since the 1970s, with the developments in information technology, a quantitative approach has prevailed, and statistical credit scoring models have been developed and enhanced.

The structural and reduced methods were popular to measure the credit default risk. The structural model aims are to provide an explicit relationship between the capital structural and default risk. Merton Model was the first structural model and has served as the cornerstone for all the other structural models. The Merton model is a structural model because it is using the firm's value to inform the probability of firms default. Following Merton's approach (1974), a firm will expect default only when the value of the assets goes below a threshold value, which is determined by its liabilities. If the value of a firm goes below a certain threshold, then the owners will put the firm to the debt holders.

These models help to overcome the deficiencies of the qualitative approach. Despite the fact that the quantitative approach may also be associated with several problems (development of models using historical

data, the assumptions needed to apply certain statistical methods do not hold etc.), credit scoring models have become a standard technique for credit risk evaluation and estimation of the probability of default, and according to Bailey (2004) are now one of the most popular models used in finance in general Chandler and Coffman (1979), Crook (1996), Thomas (2000) or Abdou and Pointon (2009).

Many authors have examined several possible realistic alternatives to predict customers' default. Seminal works may be considered Beaver (1967) and Altman (1968) who developed univariate and multivariate models using a set of financial ratios. Beaver (1967) used a dichotomous classification test using 14 financial ratios.

Altman (1968) used a multiple discriminant analysis technique (MDA) to solve the problem linked to the Beaver's univariate analysis. He examined 22 potentially helpful financial ratios and ended up selecting five ratios (working capital/total assets, retained earnings/total assets, EBIT/total assets, Market Value equity/BV of total debt, and Sales/Total assets). The variables were classified into five standard ratios categories, including liquidity, profitability, leverage, solvency and activity ratios.

A subsequent study by Deakin (1972) utilized the same 14 variables that Beaver analysed but he applied them within a series of multivariate discriminant models.

For many years, MDA was the prevalent statistical technique applied to the default prediction models and it was used by many authors as Edmister (1972), Blum (1974), Taffier and Tisshaw (1977), Bilderbeek (1979), Micha (1984), Gombola et al. (1987), Lussier (1995). However, in most of these studies, the authors pointed out that two basic assumptions of MDA are often violated when applied to the default prediction problems. Moreover, in MDA models, the standardized coefficients cannot be interpreted like the slopes of a regression equation and hence do not indicate the relative importance of the different variables. Considering these MDA's problems, Ohlson (1980), applied the conditional logit model to the default prediction's study. The practical benefits of the logit methodology are that it does not require the restrictive assumptions of MDA and allows working with disproportional samples. He chose nine predictors (7 financial ratios and 2 binary variables) to carry on his analysis.

From a statistical point of view, logit regression seems to fit well the characteristics of the default prediction problem, where the dependent

variable is binary (default/non-default) and with the groups being discrete, non-overlapping and identifiable. The logit model yields a score between zero and one which conveniently gives the probability of default of the client. After the work of Ohlson (1980), most of the academic literature, Gentry et al. (1985), Keasey and Watson (1991), Aziz et al. (1988), Platt and Platt (1990), Ooghe et al. (1995), Mossman et al. (1998), Charitou and Trigeorgis (2002), used logit models to predict default, even if studies show that empirical results are quite similar in terms of classification accuracy using MDA.

Instead, behavioural scoring models are focused on the prediction of the probability of default of actual clients. Particularly in the banking industry, prediction of the probability of default gained even greater importance with the introduction of the Basel II capital requirements framework in 2004 (see Basel Committee for Banking Supervision 2004). Within the Internal Ratings-Based Approach (IRBA), the Probability of Default (PD) constitutes one of the four fundamental parameters for the calculation of credit risk capital requirements, and, as it was mentioned in the beginning, one of the most important parameters in credit risk analysis and management.

Popular applications included empirical studies of default risk and rating migrations of bonds (e.g. Altman and Kao 1992; Carty and Fons 1994), and credit portfolio valuation (Gupton et al. 1997).

Recent studies have shown that Artificial Intelligence (AI) methods would achieve better performance than traditional statistical methods.

Since the beginning of the twenty-first century, due to the advanced technology associated with Big Data, data availability and computing power, most banks or lending institutions are renewing their business models default risk predictions, monitoring, model reliability and effective loan processing are key to decision-making and transparency.

In this new digital and Big Data era, transparency is necessary; it should be one that does not stand in the way of innovation but allows for transformation and progress. The terms associated with this field must be ethical, transparent, well known and clear. To contribute to these objectives, some strategic choices are necessary for the training of data experts on the use of machine learning and deep learning algorithms, and the limitations on their usage. In fact, although SVMs as a useful technique for data classification, is considered easier to use than Neural Networks, users not familiar with it, often get unsatisfactory results at first.

The general aim of Machine Learning is to devise computerized algorithms which predict the value of one or more response variables on a population each of whose members is characterized by a vector-valued feature variable with values in some finite dimensional vector space. The construction of the feature space should be based on its statistical relevance and on the economic meaning of the feature variables.

Compared with traditional statistical regression methods, Machine Learning and Classification Techniques are not as well known in the Finance industry and, for the moment at least, less used.

During the first decades of this century, machine learning became one of the most important branches of information technology and it influences an ever-increasing part of our life. Self-driving cars, recommendations on Google and spam filters are all products of machine learning. As the size of datasets increase more rapidly than the computation speed, it is a challenge to find algorithms that can still handle the available data efficiently.

The principle idea of machine learning is to use training data to let the computer develop a model that can make predictions about other data. Probably the best-known examples of this are linear and logistic regression. In this work, we will look at classification problems, where the goal is to classify our data points correctly, i.e. to put them in the "right" categories.

One of the most frequently used machine learning techniques is the so-called SVM. It belongs to the classification problems and is a supervised learning method. The goal of a SVM is to build a model, based on training examples, that assigns a category to each new example. In its simplest form, it separates two clusters of points by a gap, that is as large as possible.

The SVM technique came to the academic attention in the 1990s, in Vapnik (1995, 1997) when the idea of quadratic programming optimization took form and modern software was available for complicated computations. The SVMs approach is one of the new learning methods used in binary classification and it implements the following idea: it maps the input vectors into a high-dimensional feature space H through some nonlinear mapping, chosen a priori, where an optimal hyperplane may separate the two groups of subjects.

SVMs is a useful technique for data classification. A classification task usually involves separating data into training and testing sets. Each instance in the training set contains one "target value" (i.e. the class labels)

and several "attributes" (i.e. the features or observed variables). The goal of SVM is to produce a model (based on the training data) which predicts the target values of the test data given only the test data attributes. The main idea of SVM is to find the optimal hyperplane (line in 2D, plane in 3D and hyperplane in more than 3 dimensions) which maximizes the margin between two classes. In our case, two classes are *default* and *non-default*. We aim to find the optimal separating boundary to separate two classes ("events" and "non-events").

The concept of SVM is very intuitive and easily understandable. If we have labelled data, SVM can be used to generate multiple separating hyperplanes such that the data space is divided into segments and each segment contains only one kind of data. SVM technique is generally useful for data which has non-regularity which means, data whose distribution is unknown.

3 Methodology and Data Collection

The term SVM originates from Vapnik's statistical learning theory (Vapnik 1995, 1997), which formulates the classification problem as a quadratic programming (QP) problem. The principles on which the SVM is based, especially the regularization principle for solving ill-posed problems, are also described in (Tikhonov 1963; Tikhonov and Arsenin 1977; Vapnik 1979). The SVM transforms by nonlinear mapping the input space (of covariates) into a high-dimensional feature space and then solves a linearly separable classification problem in this feature space. Thus, linearly separable classification in the output feature space corresponds to nonlinearly separable classification in the lower dimensional input space.

Using SVM in credit scoring came as a natural step in statistics and finance and has the following history as a starting point: we have information about n input vectors: $x_i, i = 1, \ldots, n$ which represent companies and which contain financial indicators such as *Return on Assets (ROA)*, *Return on Equity (ROE)*, *Leverage ratio*, etc. Also, we have n indicator output vectors $y_i, i = 1, \ldots, n$ which give us information about whether the company is solvent or not:

$$y_i = \begin{cases} 1, & \textit{if } x_i \textit{ default} \\ -1, & \textit{if } x_i \textit{ nondefault} \end{cases}$$

More formally, given a training dataset of instance-label pairs (x_i, y_i), $i = 1, \ldots, n$ where inputs $x_i \in R^n$ and output $y_i \in \{1, -1\}^n$, we must find an unknown decision function $D(x) = sign\{f(x)\}$ that is based on the classifying (score) function $f(x)$. In the logistic the discriminant analysis case this is simply a linear function. In the SVM approach, the x_i define a space of labelled points which is called input space. The idea is to find a separating hyperplane which maximizes the margin of the two data classes. The margin is defined as the minimal distance between the hyperplanes which bound each class. Finally, by using the weights which define the separating hyperplane we can obtain the decision function for new observations.

We could consider the bounds, the separating hyperplane and the error in the following geometrical representation in (Fig. 1).

The points which are on the hyperplanes are called support vectors since they are vectors in an n-dimensional input space and because they support the position where the hyperplane lies. Whereas the other points are called non-support vectors since they are vectors and by removing them our separating hyperplane will not change its configuration. Moreover, as the name implies, the design of the SVM hinges on the extraction of a subset of the training data which serves as support vectors and which represents a stable characteristic of the data.

Formally, the hyperplane is represented by the following: $w^T x + b = 0$ where b is the bias or threshold, w is the weight vector and x is the data vector. The separating hyperplane will have the following properties:

$$(w^T x_i) + b > 0, if\ y_i = 1$$

$$(w^T x_i) + b < 0, if\ y_i = -1$$

The statistical problem is to construct a classification hyperplane (or hypersurface) and to obtain the classifying function $f(x)$. Indeed, using the classifying function $f(x)$ we could predict the class as $y = sign\{f(x)\}$. In other words, we want to find a decision function that may interpret new data given by the following: $f(x) = (w^T x + b)$. Starting with the linearly separable data case using the equations of the upper and lower bounds for the support vectors on both sides:

$$(w^T x_{upper}) + b = 1$$

$$(w^T x_{down}) + b = -1$$

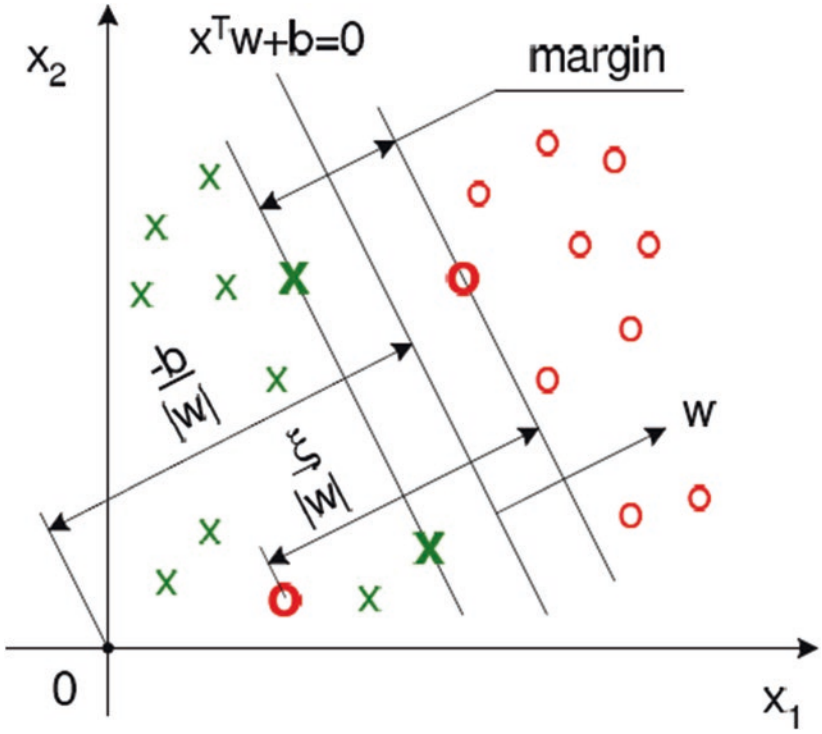


Fig. 1 Separation hyperplane in linear classification with SVM

By subtraction, we get the following:

$$w^T(x_{upper} - x_{down}) = 2$$

The width of the margin is given by the projection of a vector $(x_{upper} - x_{down})$ onto the unit vector which is perpendicular to the margin which leads to:

$$\frac{2}{\|w\|} = \frac{2}{\sqrt{w^T w}}$$

Therefore, the perfect classification hyperplane exists and can be derived from maximizing the margin $2/\|w\|$, or minimizing $\|w\|^2/2$ (Vapnik 1995). Because the data may be intermeshed into a low-dimensional

space, we map it into a higher dimensional space $x_i \rightarrow \Phi(x_i)$, to obtain separable data. Indeed, the transformation from the input space into higher dimensional Hilbert space $\{\Phi(x_i), y_i\}$ is then introduced in the SVM. Then, it is possible that the new training dataset becomes linearly separable. Generalize the pattern, we can write the classifying function as follows:

$$f(x) = \sum\nolimits_{j=1}^{m} w_j \Phi_j(x) + b \tag{1}$$

where

$$\Phi(x) = [\Phi_1(x), \ldots, \Phi_m(x)]^T \tag{2}$$

Because the hyperplane may not correctly classify all observations so that not all data points can satisfy the constraint condition, the slack variable $\xi_i \geq 0, i = 1, \ldots, n$ is introduced for the i-th data point and the condition is softened to $y_i\left\{w^T \Phi(x_i) + b\right\} + \xi_i \geq 1$. Obviously, the vector ξ_i represents the tolerance to misclassification errors on the training set which can be measured by the sum of all ξ_i. Thus, two targets exist: continue to maximize the margin and simultaneously minimize the misclassification $\sum_{i=1}^{n} \xi_i$. The penalty parameter $C > 0$ may be introduced to integrate the weights of two targets and we obtain a new target function as below.

$$\min_{w,b,\xi} \quad \begin{array}{c} \frac{1}{2}\|w\|^2 + C \sum\limits_{i=1}^{n} \xi_i \\ s.t. \quad y_i\left\{w^T \Phi(x_i) + b\right\} + \xi_i \geq 1 \\ \xi_i \geq 0, i = 1, \ldots, n \end{array}$$

This is the primal problem of the SVM. Its optimal solution $w*$, $b*$ and $\xi*$, can be used to construct the classification hyperplane $w^T \Phi(x) + b^* = 0$ and the classifying function $f(x) = w^T \Phi(x) + b^*$.

The corresponding dual problem of SVM can be derived using the Karush-Kuhn-Tucker conditions as follows.

$$\min_{\alpha} \frac{1}{2} \sum_{i=0}^{n} \sum_{j=0}^{n} y_i y_j \alpha_i \alpha_j K\left(x_i, x_j\right) - \sum_{i=0}^{n} \alpha_i$$

$$s.t. \sum_{i=1}^{n} y_i \alpha_i = 0$$

$$0 \geq \alpha_i \geq C, i = 1, 2, \ldots, n$$

Where α_i and α_j are Lagrange multipliers. Deng and Tian (2004) demonstrate that the dual problem is easier to solve than the primal problem. Then we can use the optimal solution α_i^* to obtain the solution of the primal problem. By substitution, the nonlinear classifying (score) function can be obtained:

$$f(x) = \sum_{i=0}^{n} y_i \alpha_i^* K\left(x_i, x_j\right) + b^*$$

where $K\left(x_i, x_j\right) = \Phi^T(x_i)\Phi\left(x_j\right)$ is called the kernel function. The SVM theory considers the form of $K\left(x_i, x_j\right)$ in the Hilbert space without explicitly specifying $\Phi(x)$ and without computing all corresponding inner products. Therefore, kernels are a crucial part of SVM which provide the flexibility of the high-dimensional Hilbert space for low computational costs. It is necessary to find an appropriate kernel function and the value of C parameter to solve the optimization problem of SVM. In this study, we choose the isotropic Gaussian kernel for the SVM:

$$K\left(x_i, x_j\right) = e^{-\gamma \left\| x_i - x_j \right\|^2}, \gamma > 0$$

In machine learning, the radial basis function kernel, or RBF kernel, is a popular kernel function used in various kernelized learning algorithms. In particular, it is commonly used in SVM classification. We believe that RBF Kernel is a reasonable choice indeed this kernel nonlinearly maps samples into a higher dimensional space so it, unlike the linear kernel, can handle the case when the relation between class labels and attributes is nonlinear. Furthermore, the linear kernel is a special case of RBF Keerthi and Lin (2003) since the linear kernel with a penalty parameter C has the same performance as the RBF kernel with some parameters (C, γ).

As mentioned before, there are two parameters for an RBF kernel: C and γ. It is not possible to know a priori exactly which couple of parameters are best for a given problem; consequently, we chose to make a model selection (regarding the parameters research). We aimed at identifying (C, γ) so that the classifier can accurately predict unknown data (in our work represented by the validation data). Note that it may not be useful for achieving high training accuracy (i.e. a classifier which accurately predicts training data whose class labels are indeed known).

A common strategy is to separate the dataset into two parts, one of which is considered unknown. The prediction accuracy obtained from the "unknown" set reflects more precisely the performance on classifying an independent dataset. An improved version of this procedure is known as cross-validation. The latter is the strategy we chose in our study using the k-fold cross-validation. More precisely, we first divide the training dataset into n subsets of equal size. Sequentially one subset is tested using the classifier trained on the remaining $(k-1)$ subsets. Thus, each instance of the whole training dataset is predicted once, so the cross-validation accuracy is the percentage of data which are correctly classified. Following this strategy, the cross-validation procedure can prevent the overfitting problem. In addition, we applied a "grid-search" on C and γ using cross-validation. We found that trying exponentially growing sequences of various pairs of (C, γ) is a practical method for identifying good parameters.

By using nonlinear kernel, we are faced with a trade-off choosing the level of parameters. The cost C implies a misclassification of cost on training data. A large C gives us low bias and high variance. Low bias because we greatly penalize the cost of misclassification. Large C makes the cost of misclassification high, thus forcing the algorithm to explain the input data more strictly and a potential overfitting. A small C gives us higher bias and lower variance. Small C makes the cost of misclassifications low, thus allowing more of them for the sake of a wider "cushion". The goal is to find the balance between "not too strict" and "not too loose".

Cross-validation and resampling, along with grid search, are good ways of finding the best C. The latter parameter in the nonlinear kernel is the gamma (γ). Gamma explains how far the influence of a single training example reaches. When gamma is very small, the model is too constrained and cannot capture the complexity or "shape" of the data.

Another step to take into account is scaling before applying SVM, which is very important because all kernel methods are based on distance. Hence, it is necessary to scale our variables as we did in our dataset.

3.1 Data Description

In our study, we used the professional database named AIDA which contains comprehensive information on companies in Italy, with up to

ten years of history. We started from the whole dataset about all Italian company with a balance sheet which is about 1.7 million of companies. We analysed the period from 2011 to 2016. First, we point out that it is recommended to avoid any bias from the great financial crisis 2008–2010, indeed we started our dataset in 2011. Then, we ended the period using the balance sheets data as of 2016 because we wanted to avoid any missing company data if considering 2017. The database contains solvent company as well as insolvent (*defaulted*) company. Each firm is described by a set of financial statement variables such as those in balance sheets and income statements. The data of the insolvent firms are collected two years prior to insolvency.

Following the SVM approach, we aimed to build two different sub-datasets, one for the training work and the other one for the validation procedure. Indeed, in order to calibrate a model, one needs the data for model training, which are chosen from 2011 through 2013, and validation data, which are selected from 2014 through 2016. Building the two subsets of our dataset, we followed the same approach: we selected all company with a real value for the revenues in the starting year.[1] The sample was about 940 thousand companies, then we set a size limit as follow: total asset size not less than 4.4 million euros and total revenues not less than 8 million euros. Those thresholds are common in previous studies. Then, we excluded all consolidated balance sheets data since we believe they are not significative.

In the end, we obtained a training dataset with 42,341 company composed of 25,068 solvent company and 17,273 defaulted company. On the other side, for the validating dataset, we obtained in whole 33,375 company divided by 24,750 solvent company and 8625 defaulted company. The difference in the numbers of company into dataset (training and validating one) may be related to a survival effect in conjunction with the economic recovery in Italy.

In an attempt to obtain a more homogeneous company sample we cleaned the database of companies whose characteristics were very different from the others. We set the same size limit on the total asset for the defaulted firm as well. However, we do not attempt to cover all firms in the database for our study because of the very different nature of some firms. Thus, in focusing on predicting the PDs of Italian firms we

[1] For the training dataset the starting year is 2011 and for the validating one is the 2014.

eliminated the following types of firms from our analysis: *Firms within small percentage composition of industry*—that is, we eliminated the firms which belong to the other part of the industries in insolvent and solvent databases, for example, financial intermediation and public institutions. *Smallest and largest firms*—that is, we excluded those firms which do not reach the size limit of their asset size mentioned before and those large firms which go bankrupt is usually very small in Italy. We further clean the database to ensure that the value of some variables as the denominator when calculating the ratios should not be zero.

Thus, in our study we used the following dataset: 15,907 of solvent firms and 2074 defaulted firms are chosen for the training dataset (period from 2011 to 2013) and 21,759 solvent firms and 1140 defaulted firms for the validating dataset. Both datasets are chosen and analysed in the following part. The bankrupt firms are paired with nonbankrupt firms with a similar industry and total asset size. Correspondingly, the predicted default probabilities in this study are only suitable for the Italian firms from main productive industry sectors such as constructions, manufacturing, wholesale/retail trade and real estate and finally with medium asset size.

In the (Fig. 2) we plotted the asset size distribution for the solvent (labelled "NOD") and the defaulted (labelled "DEF") firms as well in both training and validating dataset built as mentioned before.

The distribution of total assets can be regarded as the representative of the distribution of the firm size. We noticed that the distribution for solvent firms is more concentrated rather than the defaulted firms.

In our study, as mentioned before, we downloaded many financial statements variable for each firm in the whole dataset. In accordance with the mainstream approach in literature, we selected 17 ratios for the bankruptcy analysis.

Further the 17 ratios (more one for the asset size variable) we included a category response, labelled "Status" which records whether the firm went bankrupt within two years of the financial statements (in this case the value is indicated as "DEF") or not (in case of solvent firm indicated as "NOD"). There is also information on the industry distribution and on the year of the accounts. There are no missing values. These ratios can be grouped into the following four broad categories: profitability, leverage, liquidity, activity. Table 1 describes these ratios and how they have been calculated. For simplicity we have provided short names

for some ratios which capture the essence of what they measure. The variables applied to calculate these ratios are shown in Table 2.

The statistics calculated on the above ratios reveal that many of them are highly skewed and there are many outliers; this may affect whether they can be of much help in identifying the insolvent and solvent firms. It is also possible that many of these outliers are errors of some kind. Therefore, the ratios used in the following analysis are processed as below: if $xi < q0.05(xi)$ then $xi = q0.05(xi)$ and if $xi > q0.95(xi)$ then $xi = q0.95(xi)$, $i = 1, 2, \ldots, 17$. Where $q\alpha(xi)$ is an α quantile of xi. Thus,

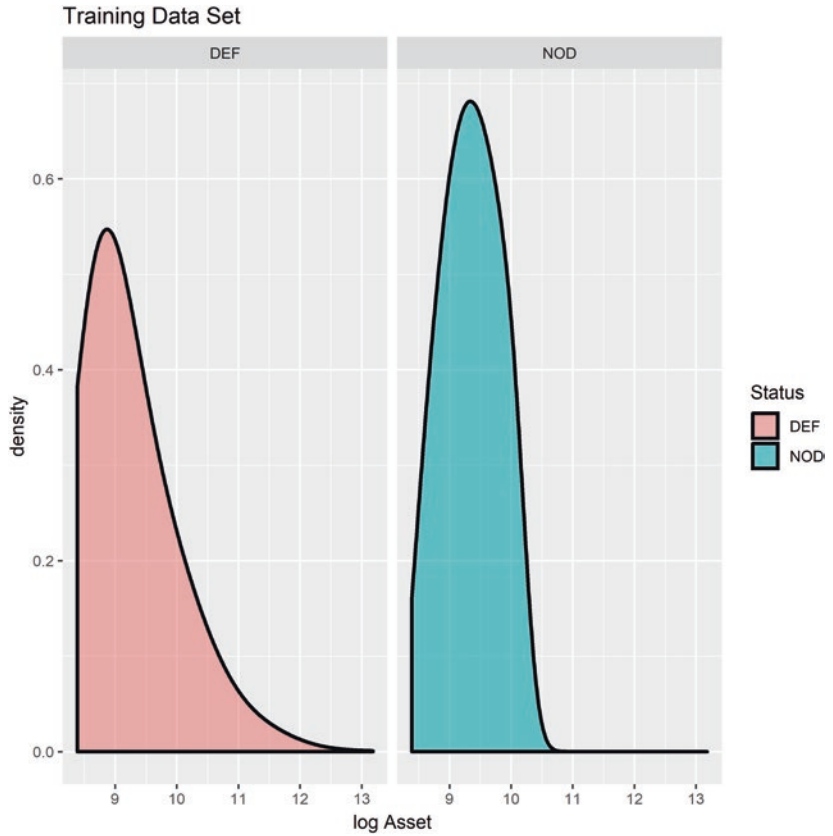


Fig. 2 Sample distribution of the asset size for solvent and defaulted firms (in log) (*Source* Calculations made by authors)

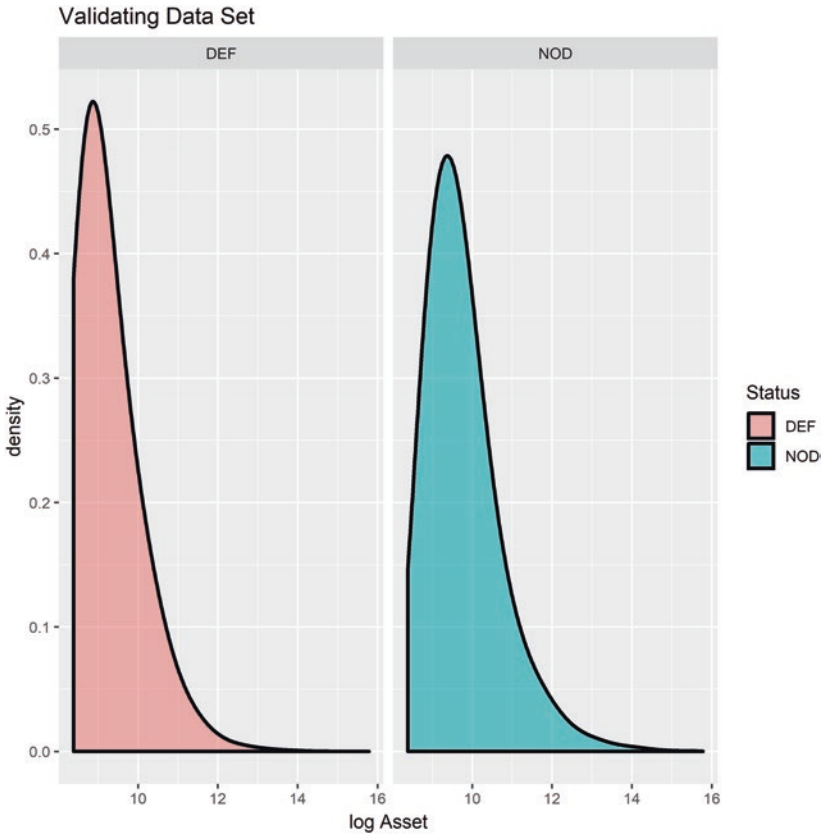


Fig. 2 (continued)

the discriminating results obtained from both the SVM and the logit model are robust and not sensitive to outliers.

In the following Tables 3 and 4, we summarize the descriptive statistics of 17 ratios for both insolvency and solvency sample.

We estimated the SVM model using the training data, and once the model form and parameters were established, we used the validating dataset to identify insolvencies amongst all the firms available during the period (2014–2016). Note that the predicted outputs for 2014 through to 2016 are out-of-time for firms existing in the previous three years, and

Table 1 Definitions of accounting ratios

Ratio	*Definition*	*Description*	*Category*
R1	EBIT/TA*100	Ebit on Total Asset	Profitability
R2	NI/EQUITY*100	Return on Equity	Profitability
R3	EBIT/SALES*100	Return on Sales	Profitability
R4	NI/TA	Return on Assets	Profitability
R5	EBITDA/TA	Ebitda	Profitability
R6	EQUITY/TA	Equity ratio	Leverage
R7	DEBT/TA	Debt ratio	Leverage
R8	NFP/EBITDA	Leverage ratio	Leverage
R9	EBIT/INTE	Interest Covered Ratio	Leverage
R10	(CA-INV)/CL	Quick Ratio	Liquidity
R11	CA/CL	Current Ratio	Liquidity
R12	WC/TA	Working Capital exposure	Liquidity
R13	CL/TL	Short term indebtedness	Liquidity
R14	TA/SALES	Asset Turnover	Activity
R15	INV/SALES	Inventory Turnover	Activity
R16	AR/SALES	Account Receivable Turnover	Activity
R17	CL/SALES	Current Liability Turnover	Activity

Source Authors

Table 2 Definitions of accounting ratios

Abbr.	*Variable name*
EBIT	Earnings before Interest and Tax (operating income)
NI	Net Income
SALES	Revenues
NFP	Net Financial Position
INTE	Interest Expenses
CA	Current Asset
INV	Inventories
CL	Current Liabilities
WC	Working Capital (CA-CL)
TA	Total Asset
AR	Account Receivable
EBITDA	Earnings before interest, tax, depreciation and amortization

Source Authors

Table 3 Descriptive statistics of 17 accounting ratios for the training dataset

	Defaulted ("DEF")						*Solvent ("NOD")*					
Ratios	*p25*	*median*	*p75*	*min*	*max*	*sd*	*p25*	*median*	*p75*	*min*	*max*	*sd*
R1	−1.5279	1.4969	3.2495	−15.2333	15.3347	5.7252	1.8050	3.9100	7.8600	−3.7600	20.1455	5.8062
R2	−43.0981	−1.2580	3.0344	−346.4586	61.5512	104.2234	0.7820	5.9955	16.9949	−38.2796	48.7683	17.7575
R3	−3.6356	2.3909	5.6371	−44.7873	23.0258	17.0199	1.1563	2.8795	5.8060	−3.0686	14.9628	4.3595
R4	−0.0324	−0.0013	0.0023	−0.1457	0.0831	0.0469	0.0013	0.0116	0.0425	−0.0460	0.1323	0.0421
R5	0.0018	0.0293	0.0531	−0.1211	0.1922	0.0553	0.0404	0.0692	0.1149	−0.0071	0.2393	0.0632
R6	0.0297	0.0820	0.1738	0.0079	0.4454	0.1197	0.1227	0.2367	0.3981	0.0232	0.6560	0.1834
R7	0.7605	0.8692	0.9328	0.4655	0.9784	0.1380	0.5197	0.6902	0.8227	0.2664	0.9482	0.1974
R8	−0.2048	5.6740	12.6015	−14.8578	30.4808	12.2163	−0.3691	1.7237	5.3656	−5.8055	15.5093	5.0082
R9	−0.9261	0.9943	1.5776	−14.4089	52.3036	7.9764	1.4592	3.7639	15.2295	−5.3003	15.2295	6.4484
R10	0.3990	0.6235	0.8928	0.1180	1.7184	0.3830	0.7157	0.9768	1.3146	0.3498	2.5182	0.5510
R11	0.8749	1.0457	1.3068	0.4359	2.5598	0.5336	1.0473	1.2557	1.6687	0.7799	3.1450	0.6149
R12	−0.0783	0.0316	0.1674	−0.3761	0.5537	0.2267	0.0330	0.1539	0.3126	−0.1466	0.5721	0.1951
R13	0.6273	0.8175	0.9535	0.3732	1.0000	0.2074	0.8110	0.9389	1.0000	0.5669	1.0000	0.1328
R14	1.0125	1.7311	3.8901	0.3238	15.8385	4.9534	0.5290	0.7265	0.9913	0.3141	1.5732	0.3403
R15	0.0695	0.2765	0.7608	0.0000	3.4722	1.1136	0.0285	0.1087	0.2155	0.0000	0.4534	0.1293
R16	0.3413	0.5605	0.9743	0.0411	2.9315	0.8092	0.2283	0.3356	0.4484	0.0647	0.7162	0.1694
R17	0.6580	0.9994	1.9307	0.2124	7.1392	2.0883	0.2753	0.3903	0.5433	0.1556	0.8828	0.1942

Source Authors

Table 4 Descriptive statistics of 17 accounting ratios for the validating dataset

	Defaulted ("DEF")						*Solvent ("NOD")*					
Ratios	*p25*	*median*	*p75*	*min*	*max*	*sd*	*p25*	*median*	*p75*	*min*	*max*	*sd*
R1	−4.8396	0.0206	2.7520	−68.4016	13.1538	13.3066	1.7800	4.0900	8.1600	−3.0070	19.9600	5.7698
R2	−19.5253	1.0847	16.3443	−240.3070	170.9838	94.3085	0.9470	6.4789	16.4300	−24.9652	44.3498	15.5064
R3	−33.5275	0.0989	4.7851	−320.2613	18.6419	91.4419	1.2653	3.2567	6.7126	−2.8760	18.7028	5.2562
R4	−0.0702	−0.0089	0.0015	−0.8060	0.0743	0.1666	0.0018	0.0149	0.0480	−0.0398	0.1365	0.0435
R5	−0.0243	0.0101	0.0433	−0.5614	0.1695	0.1099	0.0416	0.0717	0.1200	−0.0007	0.2396	0.0636
R6	0.0024	0.0564	0.1547	−1.6571	0.3937	0.3244	0.1436	0.2684	0.4515	0.0363	0.7222	0.2015
R7	0.7874	0.8894	0.9782	0.5123	2.5015	0.3095	0.4657	0.6533	0.7944	0.2107	0.9677	0.2107
R8	−5.7986	2.8531	11.1995	−37.7511	43.9535	21.1777	−0.5404	1.0977	4.6961	−5.1689	13.2765	4.5296
R9	−3.5701	0.1610	1.4259	−14.8726	4.5491	5.6774	1.4239	3.9551	21.5413	0.8219	66.6711	23.8454
R10	0.2905	0.5519	0.8482	0.0720	1.8013	0.4324	0.7184	1.0114	1.4523	0.3614	3.1740	0.7142
R11	0.7178	1.0263	1.3533	0.1936	2.9165	0.7194	1.0580	1.3113	1.8486	0.7188	3.8718	0.8103
R12	−0.1731	0.0173	0.1916	−1.4549	0.5582	0.3830	0.0377	0.1726	0.3450	−0.1609	0.6142	0.2119
R13	0.5649	0.8049	0.9491	0.3119	1.0000	0.2346	0.7917	0.9351	1.0000	0.4848	1.0000	0.1532
R14	1.2125	2.3893	11.9111	0.3369	67.0328	22.2835	0.5567	0.7819	1.1135	0.3177	2.5323	0.5379
R15	0.0664	0.3320	1.6176	0.0000	12.0238	4.0690	0.0256	0.1084	0.2197	0.0000	0.6773	0.1388
R16	0.3697	0.6212	1.4484	0.0547	11.6859	3.2451	0.2238	0.3305	0.4535	0.0708	0.8148	0.1882
R17	0.7534	1.3771	5.1601	0.2215	53.4367	16.1956	0.2652	0.3843	0.5534	0.1455	1.0272	0.2288

Source Authors

out-of-sample for all the firms whose data became available only after 2014. Such out-of-sample and out-of-time tests are the most appropriate way to compare model performance. The validation result set is the collection of all the out-of-sample and out-of-time model predictions which can then be used to analyse the performance of the model in more detail.[2]

Note that the training and validation sets are themselves a subsample of the population and therefore may yield spurious model performance differences based only on data anomalies. A common approach to overcome this problem is to use resampling techniques. Resampling approaches provide some related benefits (Sobehart et al. 2001). Thus, this paper also adopts a resampling approach for drawing subsamples for both the training and validation sets analogous to previous bankruptcy studies.

Repeated random sub-sampling validation is a method also known as Monte Carlo cross-validation which randomly splits the dataset into training and validation data. For each such split, the model is fitted into the training data, and predictive accuracy is assessed using the validation data. The results are then averaged over the splits. The advantage of this method (over *k*-fold cross-validation) is that the proportion of the training/validation split is not dependent upon the number of iterations (folds). The disadvantage of this method is that some observations may never be selected in the validation subsample, whereas others may be selected more than once. In other words, validation subsets may overlap. This method also exhibits Monte Carlo variation, meaning that the results will vary if the analysis is repeated with different random splits. In our study, we chose the process of repeating the 10-fold validation, repeated twice, which is useful to test the stability of the model. In our calculations the model was stable reaching similar test results.

Beside the estimating procedures, another important issue is the metrics introduced for measuring and comparing the performance of credit risk models. In our study, we chose different metrics such as Receiver Operating Characteristic (ROC) curve, Accuracy Ratio (AR) and Kappa statistics, Sensitivity (Confusion Matrix); but the one that we consider the most relevant in a classification estimate is Youden's *J* Index. Sensitivity is the true positive rate also called the recall. It is the number

[2]For an introduction to the validation framework see (Sobehart et al. 2001).

of instances from the positive (DEF class) which predicted correctly. Specificity is also called the true negative rate. The latter is the number of instances from the negative class (NOD class) that were predicted correctly. Often, there is an interest in having a single measure which reflects the false-positive and false-negative rates. Youden's J Index, which is $J = (Sensitivity + Specificity - 1)$ measures the proportions of correctly predicted samples for both the event and non-event.

Some previous studies used the Cumulative Accuracy Profile (CAP) curve, but according to recent evidence in literature, we preferred to use the ROC curve instead of the CAP curve.

Furthermore, the area below the ROC curve is called AUC (Sobehart and Keenan 2001). It can be interpreted as the average power of the test on default or non-default corresponding to all possible cut-off values. A larger AUC characterized a better classification result. A perfect model has an AUC value of 1, and a random model without discriminative power has an AUC value of 0.5. The AUC is between 0.5 and 1.0 for any reasonable rating model in practice. The relationship between AUC and AR is defined as Engelmann et al. (2003) $AR = 2AUC - 1$.

The ROC curve is formed by plotting False Positive Rate (False Positive over total Negative) over True Positive Rate (True Positive over total Positive). The ROC curve is useful because it provides a visual representation of the relative trade-offs between the benefits (reflected by TP) and cost (reflected by FP) of classification (He and Garcia 2009).

The latter metrics introduced before is the Kappa statistic (or value) which compares an Observed Accuracy with an Expected Accuracy (random chance). The kappa statistic is used not only to evaluate a single classifier, but also to evaluate classifiers amongst themselves. In addition, it considers random chance (agreement with a random classifier), which generally means it is less misleading than simply using accuracy as a metric.

4 Findings Discussion

In order to reach the highest performance for our model, we followed a process of predictor selection. Since we are facing a SVM model which is a nonparametric one, we adopted a validation procedure as illustrated before. There are two main methods for selecting the appropriate ratios (Falkenstein et al. 2000). The first is forward stepwise selection and the second is backward elimination. First of all, we calculate the variable

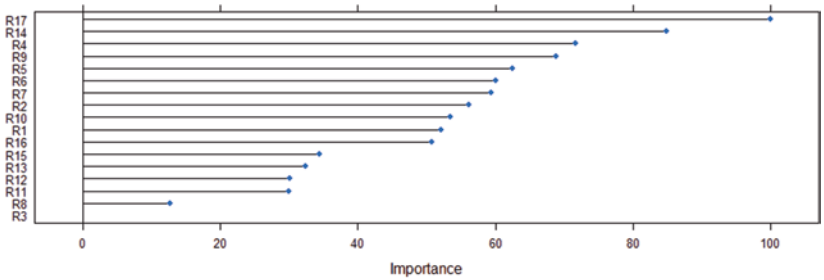


Fig. 3 The visualization of variable importance using the caret package in *R* (*Source* Authors)

importance using the caret package available for the famous software *R*.[3] In this step, each predictor will have a separate variable importance for each class. All measures of importance are scaled to have a maximum value of 100. Then, ROC curve analysis is conducted on each predictor. For two class problems as in our study, a series of cutoffs is applied to the predictor data to predict the class (DEF or NOD). The sensitivity and specificity are computed for each cutoff and the ROC curve is computed. Finally, the process is used to compute the area under the ROC curve. This area is used as the measure of variable importance as plotted in (Fig. 3) for all the 17 ratios.

From the ranking, we noticed that only the last two ratios seem less important respect than the others in order to find the best final model.

Then, in the last step, we used the recursive feature elimination (RFE) as a backward selection procedure. First, the algorithm fits the model to all predictors. This selection method searches the subset of features with minimized predictive errors. We aimed to reach a selection to identify which attributes are required to build an accurate model. The caret package in *R* provides a recursive feature elimination function (RFE), which can help automatically select the required features. Thus, we perform a backward predictor selection on the training dataset. The following Table 5 and Fig. 4 could represent the reaction of the model to predictor selection.

[3] See https://cran.r-project.org/.

Table 5 The output of the recursive feature selection

Recursive feature selection				
Outer resampling method: cross-validated (10 fold)				
Resampling performance over subset size:				
Variables	*Accuracy*	*Kappa*	*AccuracySD*	*KappaSD*
1	0.6626	0.3075	0.008029	0.01772
2	0.7687	0.5193	0.010939	0.02133
3	0.8186	0.6182	0.023333	0.04823
4	0.8457	0.6762	0.007687	0.01603
5	0.8888	0.7675	0.011277	0.02447
6	0.9128	0.8181	0.007492	0.01618
7	0.9277	0.8493	0.004944	0.0105
8	0.9344	0.8632	0.004764	0.01003
9	0.937	0.8688	0.005537	0.01169
10	0.9399	0.8748	0.004887	0.0104
11	0.9452	0.8858	0.00509	0.01078
12	0.9479	0.8914	0.006603	0.01394
13	0.9491	0.8939	0.005616	0.01187
14	0.9498	0.8952	0.005275	0.01115
15	0.9499	0.8956	0.00548	0.01157
16	0.95	0.8958	0.00533	0.01123
17	0.9511	0.8981	0.005836	0.01229

Source Authors

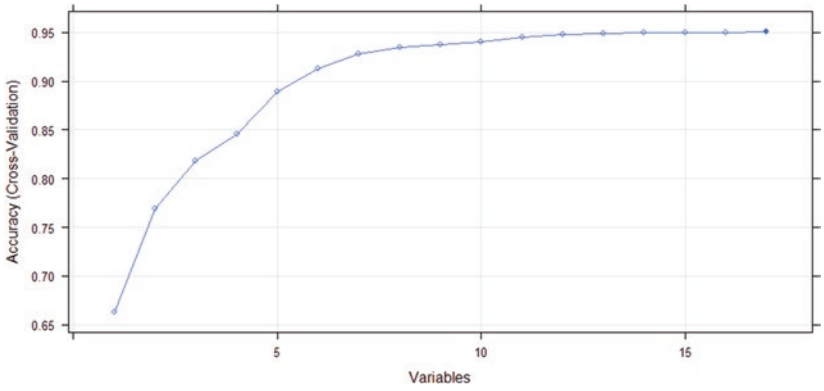


Fig. 4 The visualization of accuracy variation using the 17 ratios (*Source* Authors)

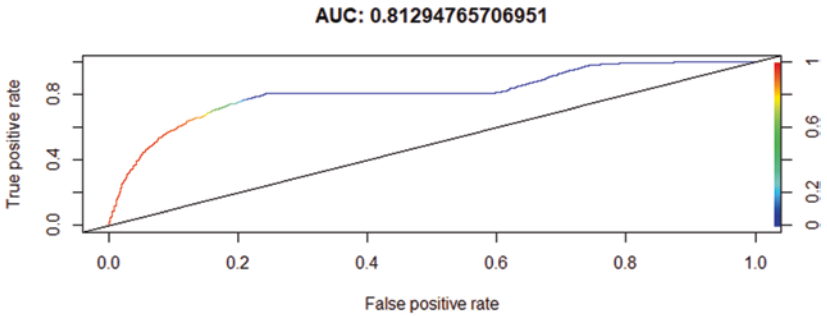


Fig. 5 The ROC curve for the SVM model for the validating dataset (*Source* Authors)

Table 6 The output SVM model for the training dataset

Support Vector Machines with radial basis function Kernel

17981 samples
17 predictor
2 classes: 'DEF', 'NOD'
Pre-processing: centred (17), scaled (17)
Resampling: Cross-Validated (10 fold, repeated 1 time)
Summary of sample sizes: 16182, 16182, 16183, 16182, 16182, 16184, …
Resampling results across tuning parameters:

sigma	*C*	*ROC*	*Sens*	*Spec*
0.01	0.75	0.89095	0.66954	0.99651
0.01	0.9	0.93522	0.67359	0.99623
0.01	1	0.9352	0.67408	0.99617
0.01	1.1	0.9355	0.67794	0.99629
0.01	10	0.94191	0.70881	0.99736
0.01	100	0.94471	0.73244	0.99805
0.015	0.75	0.93477	0.68421	0.99654
0.015	0.9	0.93523	0.68951	0.99667
0.015	1	0.93562	0.69048	0.99679
0.015	1.1	0.93574	0.69144	0.99692
0.015	10	0.94224	0.72713	0.99705
0.015	100	0.94943	0.74498	0.99793
0.2	0.75	0.94497	0.7411	0.99679
0.2	0.9	0.94452	0.74447	0.99711
0.2	1	0.94438	0.74688	0.99698
0.2	1.1	0.94425	0.74785	0.99686
0.2	10	0.94959	0.7686	0.99692
0.2	100	0.76617	0.73578	0.99277

ROC was used to select the optimal model using the largest value
The final values used for the model were sigma = 0.2 and $C = 10$

Source Authors

Table 7 Confusion Matrix for the SVM model

Confusion matrix and statistics		
	Reference	
Prediction	**DEF**	**NOD**
DEF	939	6054
NOD	201	15705
Accuracy: 0.7268		
95% CI: (0.721, 0.7326)		
No Information Rate: 0.9502		
P-Value [Acc > NIR]: 1		
Kappa: 0.1589		
Mcnemar's Test *P*-Value: < 2e-16		
Sensitivity: 0.82368		
Specificity: 0.72177		
Pos Pred Value: 0.13428		
Neg Pred Value: 0.98736		
Prevalence: 0.04978		
Detection Rate: 0.04101		
Detection Prevalence: 0.30538		
Balanced Accuracy: 0.77273		
'Positive' Class: DEF		

Source Authors

Using both procedures, the importance of variable and RFE leads to estimate a model with all of 17 ratios, even if you could eliminate the R3 ratio regarding the return on sales.

Using the SVM, we obtained the following results on the training dataset as reported in the following Table 5 and the ROC curve in the following (Fig. 5, Table 6).

The Accuracy Ratio (AR) calculated from AUC is 0.63.

Further, a representation of two-class classification performances, as in our study, can be formulated by a contingency table (named also Confusion Matrix) as illustrated later. The most frequent assessment metrics are Balanced Accuracy, Sensitivity and Kappa statistics.

The confusion matrix from SVM model estimated and validated is following Table 7.

We compared the above estimates and model performance with the evidence from the logit model in the following Tables 8 and 9.

Table 8 The Logit model estimates

LOGIT MODEL					
Deviance Residuals:					
Min	1Q	Median	3Q	Max	
−4.4941	0.0583	0.1449	0.2878	2.1426	
Coefficients					
	Estimate	*Std.*	*Error*	*z value*	*Pr*(>|*z*|)
(Intercept)	3.506388	0.940056	3.73	0.000191	***
R1	−0.38776	0.035459	−10.935	2E-16	***
R2	0.016693	0.002105	7.929	2.2E-15	***
R3	0.171289	0.022198	7.716	1.2E-14	***
R4	17.49132	2.884422	6.064	1.33E-09	***
R5	15.34933	2.195772	6.99	2.74E-12	***
R6	3.758894	0.87674	4.287	0.0000181	***
R7	−0.4473	0.803517	−0.557	0.57775	
R8	−0.02312	0.005637	−4.102	0.0000409	***
R9	−0.03003	0.009056	−3.316	0.000913	***
R10	−0.86451	0.330669	−2.614	0.008937	**
R11	−0.16003	0.362316	−0.442	0.658723	
R12	5.718121	0.66485	8.601	<2.00E-16	***
R13	3.097422	0.351535	8.811	<2.00E-16	***
R14	−0.90192	0.134461	−6.708	1.98E-11	***
R15	−4.02091	0.455115	−8.835	<2.00E-16	***
R16	−2.14509	0.360452	−5.951	2.66E-09	***
R17	−1.65576	0.377991	−4.38	0.0000118	***
–					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
(Dispersion parameter for binomial family taken to be 1)					
Null deviance: 12858.0 on 17980 degrees of freedom					
Residual deviance: 5458.4 on 17963 degrees of freedom					
AIC: 5494.4					
Number of Fisher Scoring iterations: 8					

Source Authors

Table 9 Confusion Matrix for the Logit model

Confusion matrix and statistics		
	Reference	
Prediction	**DEF**	**NOD**
DEF	320	477
NOD	820	21282

Accuracy: 0.9434
95% CI: (0.9403, 0.9463)

No Information Rate: 0.9502

P-Value [Acc > NIR]: 1

Kappa: 0.3018
Mcnemar's Test *P*-Value: < 2e-16

Sensitivity: 0.2807

Specificity: 0.97808
Pos Pred Value: 0.40151

Neg Pred Value: 0.9629

Prevalence: 0.04978
Detection Rate: 0.01397

Detection Prevalence: 0.03481

Balanced Accuracy: 0.62939

'Positive' Class: DEF

Source Authors

As exhibited in the table above, the SVM model shows a better performance predicting the default of a company. The model Logit has trouble predicting when a firm will default. This result is clearer if we compare the *J*-Index between SVM and Logit model. In the case of SVM, the *J*-Index is equal to 0.54 compared to 0.25 in Logit one.

5 Conclusion and Limitations/Further Steps

We used a discrimination technique, the SVM for classification, to analyse the Italian bankrupt company database spanning the years 2011 through 2016. The identifying ability of a nonlinear and nonparametric SVM is compared with that of the benchmark logit model with regard to main performance metrics. The evidence from empirical results consistently shows that a rating model based on SVM significantly outperforms the traditional linear parametric and logit model in predicting default probabilities of Italian firms out-of-sample and out-of-time. The sensitivity of the SVM to the penalty parameter C and kernel coefficient was also examined. We found that the discriminating ability of the SVM seemed to show better J-Index statistics and Balanced Accuracy in the confusion matrix than the same metrics in logit estimates.

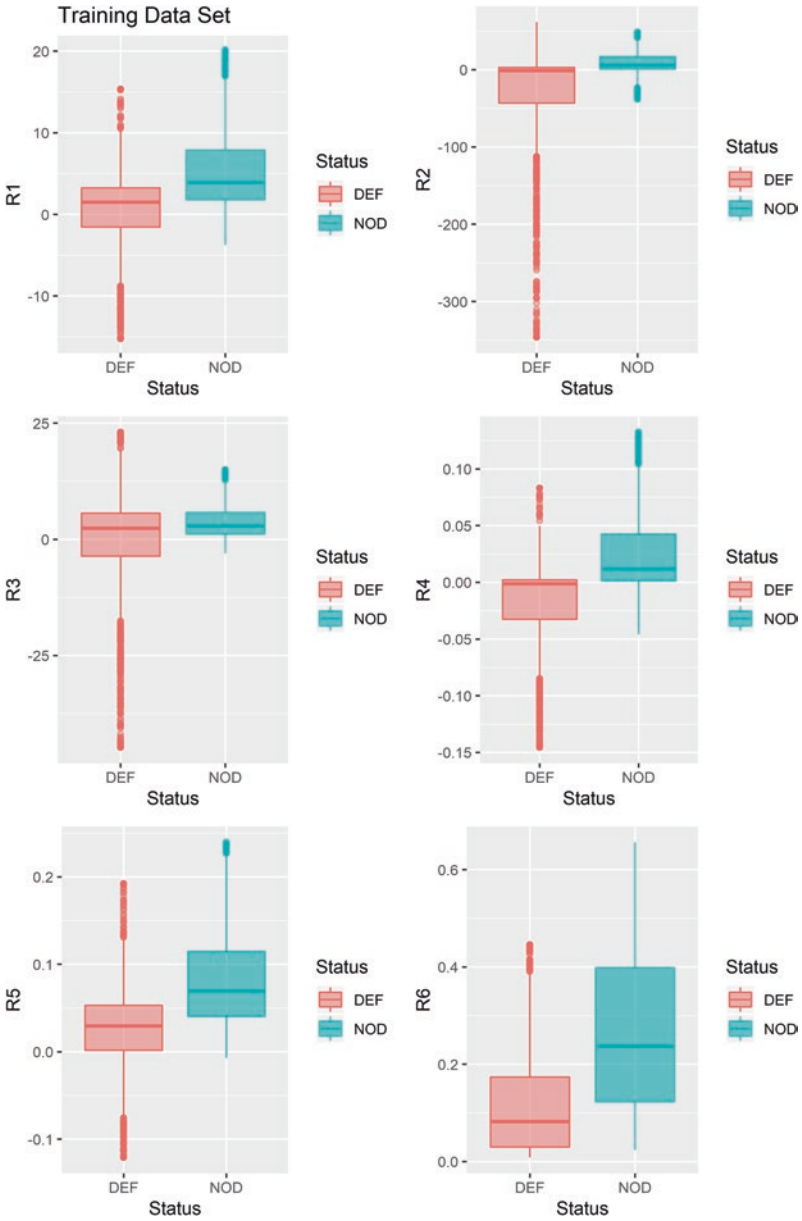
According to our empirical results we chose to retain all 17 ratios because they were powerful predictors of bankruptcy.

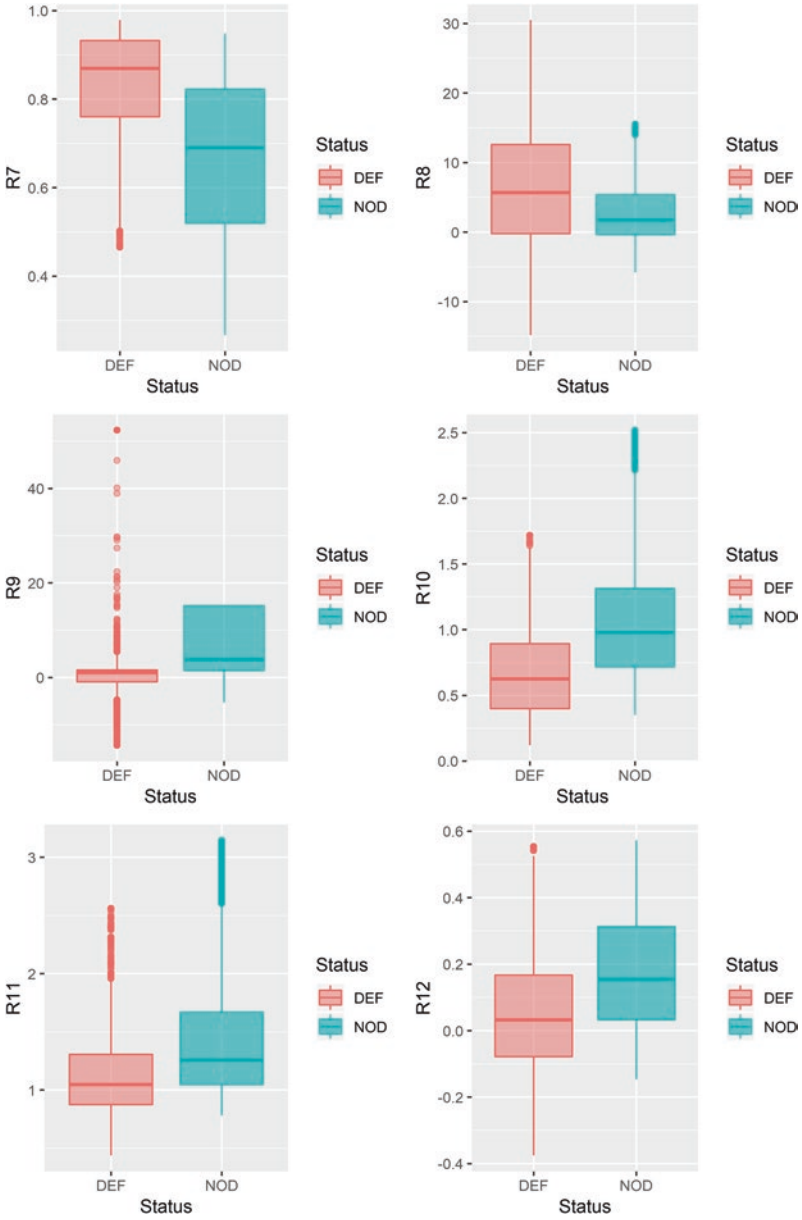
It turns out that activity and leverage ratios such as current liability turnover, equity ratio, asset turnover and return on assets play the most important role in predicting the default probabilities. Other results are also similar to previous research, e.g. that profitability and liquidity ratios also have important effects on the probability of default for Italian companies.

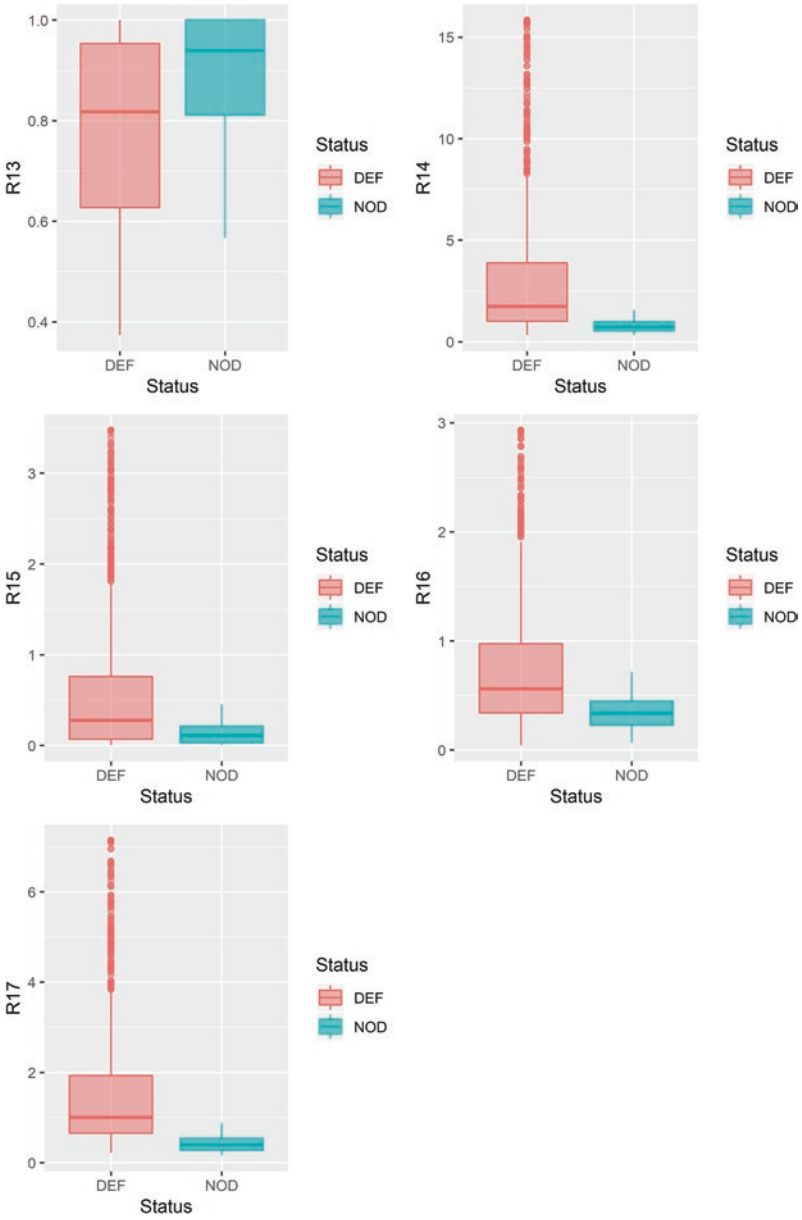
Further steps in this study field may consider a relation between the risk of default estimated with SVM and the expectation of return as predicted by the CAPM model, as an indicator of the risk–reward relationship.

Finally, international comparisons may be useful to validate the robustness of our results.

Annex




R7
1.0
0.8
0.6
0.4
DEF
NOD
Status
Status
DEF
NOD
R8
30
20
10
0
-10
DEF
NOD
Status
Status
DEF
NOD
R9
40
20
0
DEF
NOD
Status
Status
DEF
NOD
R10
2.5
2.0
1.5
1.0
0.5
0.0
DEF
NOD
Status
Status
DEF
NOD
R11
3
2
1
DEF
NOD
Status
Status
DEF
NOD
R12
0.6
0.4
0.2
0.0
-0.2
-0.4
DEF
NOD
Status
Status
DEF
NOD


R13
1.0
0.8
0.6
0.4
DEF
NOD
Status
Status
DEF
NOD
R14
15
10
5
0
DEF
NOD
Status
Status
DEF
NOD
R15
3
2
1
0
DEF
NOD
Status
Status
DEF
NOD
R16
3
2
1
0
DEF
NOD
Status
Status
DEF
NOD
R17
6
4
2
0
DEF
NOD
Status
Status
DEF
NOD

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PART II

Risk Management and Corporate Strategies

Preface

Risk is intrinsic to each company and, as it is strictly linked to uncertainty, it could lead to either negative and positive consequences, which in turn influence the decision-making process.

Recently, the global financial crisis has intensified the interest in how companies manage risks. Several external forces, including government regulators, credit-rating agencies, stock exchanges and institutional investor groups have strengthened the need to improve the effectiveness of risk oversight.

Theorisations about risk management have evolved from being an issue related to finance (value at risk, derivatives, etc.) or accountants (financial statement disclosure, etc.) to an issue regarding management control and management accountants, who play an important role for each company.

Accordingly, the risk management process is strategic and functional to firm strategy development and control and it is considered a key driver for value creation, competitiveness and profitability. Consequently, risks should be effectively assessed and managed through a process that involves all the company functions.

The track sessions fostered the debate on the relationship between risk, risk management and management accounting, strategy and control practices. That implied a reflection on how risk management is changing organisational and management control practices, how risk experts

interact with managers, how it increases the value of the firm and how it is related to accountability and responsibility processes.

Papers presented in this track and included in this volume feature both theoretical and empirical analysis, which adopt either qualitative or quantitative methodologies.

They deal with several topics. Alfiero et al. concentrated on the dynamics of board diversity, risk management and efficiency evaluation, providing evidence from European listed companies in the manufacturing sector.

Three contributions focused on the financial industry: Ali et al. provided an empirical analysis on Malaysian Islamic banks; Gamba et al. instead analysed the relationship between the management of risks and direct compensation, considering the insurance factor; and finally, Ranjbari et al. developed a case study analysis on an Iranian insurance company, analysing in particular the impact of risks deriving from the sharing economy.

Pellicelli et al. instead concentrated on the impact of risks on the product lifecycle and Bonadonna et al. analysed the consumers' perception towards food safety and defense.

The contribution of Mosca et al. deals with the adoption of an innovative framework for start-ups concerning the way they communicate with the external environment.

The risks coming from the environment are the cause of big threats for long and complex supply chains: this is the reason why Candelo et al. studied how to struggle against the climate change in the coffee industry.

And finally, Britzelmaier et al. provided a qualitative empirical analysis on the topic of risk management in SMEs, analysing with an interpretive case study the necessity to formalise practices effectively implemented in a medium-sized company.

CHAPTER 9

Board Diversity, Risk Management and Efficiency Evaluation: Evidence from European Listed Manufacturing Companies

Simona Alfiero, Massimo Cane, Ruggiero Doronzo and Alfredo Esposito

1 Introduction

The purpose of this study is to focus on the board diversity–performance relationship (Loden and Rosener 1991; Van den Berghe and Levrau 2004; Kiel and Nicholson 2003; Rose 2007a; Dahya and McConnell 2007), highlighting how the presence of women (Shrader et al. 1997; Carter et al. 2003; Adams and Ferreira 2009) and foreigners on boards (Ujunwa 2012; Peng et al. 2003) influences corporate performance, in terms of profitability efficiency (Luo 2003). Performance and risk management have a meaningful and positive relationship (Jafari et al. 2011).

Board diversity represents a significant corporate governance mechanism in order to achieve efficient management and monitoring within companies (Boone et al. 2007). As the EU Commission indicates, the

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diversity issue is of great importance in increasing the monitoring quality of both management and board.

Van der Walt and Ingley (2003) describe diversity in corporate governance as the composition of the board and combination of the different qualities, characteristics and expertise of individual members related to board decision-making and other processes.

This topic is of significance regarding normative perspectives—in fact some countries have recently enacted guidelines and/or mandatory regulation in order to increase women's presence on the boards of listed companies, i.e., gender quotas. But it is also of significance concerning managerial perspectives, i.e., gender and national diversity, which affect the decision-making process, improve economic results, increase media visibility and demonstrate commitment to social and ethical issues.

Theories like the *Agency Theory*, the *Stakeholders Theory* and the *Resource Dependency Theory* provide a comprehensive understanding of the connection between corporate governance, board diversity and corporate performance.

These include the relevance of a virtuous relationship with stakeholders, as proposed by both *Stakeholder Theory* (Donaldson and Davis 1991) and *Resource Dependence Theory* (Pfeffer and Salancik 2003).

The *Agency Theory* (Jensen and Meckling 1976) advocates that diversity is a main requirement for a fair and transparent decision-making process when measuring independence (Luoma and Goodstein 1999).

However, despite the extensive scope of studies, no consolidated theoretical framework has been made, nor has there been conclusive empirical evidence regarding how (or if) certain board features, concerning gender and national diversity, influence corporate performance.

The main purpose of this article is to provide new evidence about the relationship between board diversity and corporate performance.

Our sample covers the analysis of 451 European listed manufacturing companies for the year 2015. Unlike previous empirical studies, we have used the profitability efficiency as a measure of corporate performance.

In order to evaluate the profitability efficiency measurement, we have designed a set of scores, using the Data Envelopment Analysis (DEA) (Farrell 1957; Charnes et al. 1978; Färe and Lovell 1978) in a non-oriented Slack Based Measure—SBM model (Tone 2001).

A data logistic regression analysis (Logit) (Bajary et al. 2009; Vani 2001) was used to check whether there was a relationship between profitability efficiency scores and diversity management variables. We tested

the effect on corporate performance of the mandatory presence of women on boards, introduced by some European governments.

We took the *Critical Mass Theory* into account as an additional confounding factor.

To the best of our knowledge, this is the first combined application of a non-oriented SMB DEA model and logistic regression in order to evaluate the impact of diversity management on performance.

This paper is structured as follows: firstly, the theoretical background, then an explanation of data and methodology, results, and finally discussion and conclusions.

2 Theoretical Background

The connection between virtuous governance, board diversity and performance is covered extensively in literature (Adams and Ferreira 2009; Campbell and Mìnguez-Vera 2008; Gallego-Alvarez et al. 2010; Jackling and Johl 2009; Post and Byron 2015; Siciliano 1996).

Carter et al. (2003), however, found that dominant theories on corporate governance do not provide a solid or complete explanation of any significant impact of diversity on performance. In fact, Kiel and Nicholson (2003) suggest that, due to the multi-disciplinary nature of the topic, no single theory can provide a complete framework for the relationship between diversity and performance. Based on these findings, we have designed a multi-theoretical framework that incorporates insights from agency, stakeholder and resource-dependence theories.

Table 1 gives a brief description of the main theories of board diversity effects and performance expectations.

It is worthy of mention that board governance diversity led researchers to consider the connection between the level of diversity and a firm's economic results (Carter et al. 2010). This relationship between increased diversity and firm performance has gained wide acceptance in recent literature, and in fact, many previous empirical studies have attempted to test whether greater diversity on boards has a positive impact on a company's performance or value.

This literature maintains that heterogeneous groups conceive higher quality decisions (Robinson and Dechant 1997), create additional innovative solutions through cognitive conflict (Chen et al. 2005) and influence a firm's strategy (Miller and Triana 2009).

Table 1 The multi-theoretical framework

Theory	*Brief description*	*Board diversity approach*	*Performance expectations*	*Authors*
Agency theory	The interests of the owner and the manager are divergent. The manager has information that the owner doesn't have, which can create information asymmetry	A more heterogeneous board improves control because a wider range of views increases board independence. Diversity on the board can be a mechanism to reduce costs associated with agency problems	Profit is the main performance objective for the owner. Agency problems hinder the owner from achieving company objectives. Monitoring and incentive alignment are necessary to mitigate agency problems for the owner to achieve desired performance	Alchian and Demsetz (1972), Jensen and Meckling (1976), Fama and Jensen (1983), Jensen (1983), Mallin (2004), Clarke (2007), Tosi (2008), Hillman and Dalziel (2003)
Stakeholder theory	The manager is simultaneously seen as an agent of multiple stakeholders, instead of shareholders alone	Diversity can be understood as an important indicator of a firm's corporate social responsibility and a sign of a stakeholder-oriented firm. Greater diversity on the board allows more open government processes that ensure the incorporation of stakeholder interests	Managers need to reach a trade-off between the various interests of different stakeholders. Maximising profit is not the only corporate objective	Hill and Jones (1992), Näsi (1995), Carroll (1996), Clarkson (1998), Macey (1998), Jensen (2000), Freeman et al. (2010), Ibrahim and Angelidis (1994), Oakley (2000), Hillman et al. 2002
Resource dependency theory	The focus is on the relationship between ownership, management and company's environmental dimension, shifting attention to the outside	Diversity improves the quality of board decisions, contributing to enhancing the firm's decision-making capabilities. Problem solving empower creativity and innovation. Business performance benefits from different perspectives and experiences	Board members establishing external links increase critical resourcing, which leads to better performance	Gabrielsson and Huse (2004), Siciliano (1996), Voordeckers et al. (2007)

In fact, prior research (Perryman et al. 2016; Bear et al. 2010; Campbell and Minguez-Vera 2008; Smith et al. 2006; Bonn et al. 2004; Carter et al. 2003; Erhardt et al. 2003; Adler 2001) suggests that increasing numbers of women on boards are keen to improve their companies' economic results. On the other hand, there is another research stream that finds a negative relationship between the number of female corporate board members and a firm's performance (Akpan and Amran 2014; Darmadi 2013; Carter et al. 2010; Adams and Ferreira 2009; De Andres et al. 2005; Pelled et al. 1999; Shrader et al. 1997), while some research even found no relationship between the two variables (Rose 2007b; Randøy et al. 2006; Zahra and Stanton 1988).

Recently, the European debate on gender equality and promoting measures has focused on the role of introducing gender quotas that may break the glass ceiling—i.e., obstacles that women face to get top positions in business. According to the latest data published by the European Commission in January 2015, the average number of women on the largest listed company boards in Europe is about 20.2%. Compared to 2010—when the same figure was 11.9%—the increase is significant. Differences between countries are nevertheless very marked: in France, Finland and Sweden it exceeds 25%, whereas in countries such as Ireland or Portugal women do not reach 10% of total directors. The only country, albeit outside the EU, which comes to 40% is Norway, a pioneer in introducing gender quotas, followed, recently, by Italy. The increase recently observed in Europe, however, is due to enhancements focused in countries where a mandatory gender regulation has been introduced.

However, in addition to the effect of mandatory gender regulation, a confound investigation factor arises from *Critical Mass Theory* (Konrad et al. 2008). This theory suggests that when a certain threshold is reached (a critical mass), the impact of a subgroup (such as "women on the board") becomes more noticeable (Kramer et al. 2006). Kramer et al. (2006) argue that "a board with three or more women is more likely to experience the positive effects and contributions to good governance than a board with fewer women". According to Kanter (1977), having only one member of a demographic group can lead to tokenism. Tokens are considered to represent an entire demographic group (women) and are seen by the dominant group (men) as a stereotype. Based on critical mass, research into the relationship between female directors and performance might require a distinction between boards with one woman and boards that have reached a certain threshold. This

standardization counteracts the "tokenism phenomena", which implies that companies only include a few female board positions in order to satisfy external expectations (Torchia et al. 2011).

An additional diversity variable is the international board composition (national diversity). This variable is rarely investigated, and Heidrick and Struggles (2014) show that the percentage of foreigners on boards in Europe increased from 11 to 23% between 2007 and 2009. Empirical research demonstrates that national diversity is expected to gain importance due to globalizing tendencies. An increasing number of empirical research studies (Ujunwa et al. 2012; Ujunwa 2012; Rose 2007c; Randøy et al. 2006; Oxelheim and Randøy 2003; Peng et al. 2003) measure the positive influence of foreigners on boards and companies' performance. Oxelheim and Randøy (2003) only observe foreigners who are originally from the US, Canada or UK due to the planned adaption of the Anglo-American corporate governance system.

Darmadi (2011) examines the association between board membership diversity and financial performance on firms listed on the Indonesia Stock Exchange (IDX) finding that nationality diversity has no influence on firms' performance. Kim and Lim (2010) even report that foreigners on boards can have a negative impact.

Using the theoretical framework mentioned above, we have tested whether board gender and national diversity are linked to positive profitability efficiency results. These are the research questions:

RQ1 Are increased numbers of women on company boards in countries adopting a mandatory legislative framework positively related to higher profitability efficiency results?
RQ2 Are increased numbers of foreigners on company boards positively related to higher profitability efficiency results?

3 Data and Methodology

3.1 Data

The sample design is of 451 manufacturing listed companies from six European countries (France, Germany, Italy, Spain, Portugal and United Kingdom), selected for the year 2015. Information about financial data and board diversity variables was obtained from the AIDA database, publicly available corporate governance reports and financial statements.

Table 2 Data description

Country	*Companies (n)*	*Directors (n)*	*Women directors (n)*	*Foreign directors (n)*	*Total women directors (%)*	*Total foreign directors (%)*
France	77	659	172	57	26.10	8.65
Germany	92	913	154	94	16.87	10.30
Italy	69	545	116	25	21.28	4.59
Portugal	5	55	11	14	20.00	25.45
Spain	27	401	38	6	9.48	1.50
United Kingdom	181	2200	355	366	16.14	16.64

Companies presenting outlier variables were removed. Table 2 shows countries companies number and data about board composition.

In order to detect the mandatory gender regulation effect, we analyzed countries adopting a mandatory legislative regulation (France, Italy and Spain, $n=173$) separately from those that do not adopt a similar legislative framework (Portugal, United Kingdom and Germany, $n=278$).

3.2 Description of Variables

3.2.1 On Corporate Performance

In order to measure corporate performance, we relied on the profitability efficiency. Efficiency is the ratio of output to input for a given production unit under given conditions, while profitability efficiency is the company's ability to generate revenue and profit based on its current labor, assets and capital stock.

Outputs should be the key business drivers critical to business success and inputs should be the resources that lead to the key business drivers. This study uses Fixed/Total Assets and Costs of Employees/Operating Revenue as input resources, while outputs are ROE and ROA ratios.

ROE and ROA are indicators that reflect future profitability expectations. Effective risk management has direct implication on the earning performance of the company (Mohammed and Knápková 2016).

Table 3 Descriptive statistics of the sample dataset

% Women						
	Min	*Max*	*Mean*	*Median*	*SD*	*Gender quota target*
France	0.00	0.80	0.26	0.25	0.15	Yes
Italy	0.00	0.67	0.19	0.20	0.16	Yes
Spain	0.00	0.23	0.10	0.11	0.07	Yes
Germany	0.00	0.50	0.13	0.13	0.13	No
Portugal	0.00	0.43	0.25	0.22	0.14	No
United Kingdom	0.00	0.55	0.14	0.14	0.13	No
% Foreigners						
	Min	*Max*	*Mean*	*Median*	*SD*	
France	0.00	0.62	0.07	0.00	0.14	
Germany	0.00	0.50	0.09	0.04	0.12	
Italy	0.00	0.30	0.03	0.00	0.07	
Portugal	0.00	1.00	0.29	0.10	0.42	
Spain	0.00	0.13	0.02	0.00	0.03	
United Kingdom	0.00	0.83	0.14	0.08	0.18	

3.2.2 On Board Diversity

As proxies for board diversity, we relied on two variables: percentage of women and foreigners (Table 3).

3.3 Research Methodology

We followed a two-stage research design. In the first stage, we relied on a specific DEA model, selecting two inputs and two outputs in order to compute the relative profitability efficiency scores for each company (Decision-Making Unit—DMU) in the sample. In the second stage, the profitability efficiency score results served as the dependent variables and the board diversity features served as proxies for the independent variables.

In order to evaluate the effect of mandatory gender regulation, we divided the dataset into three parts: *all countries (A)*, *countries with mandatory gender regulation (B)* and *countries without it (C)*.

3.3.1 First Stage: Estimated Efficiency Scores

We computed the 451 companies' relative profitability efficiency, by relying on DEA. DEA is a non-parametric approach to measuring the

relative efficiencies of a group of peer units—DMUs. We relied on the non-oriented Slack-Based Model (SMB) (Tone 2001). The SBM identifies inefficiencies with a better discrimination power than the radial models CRS (Charnes et al. 1978; Färe and Lovell 1978) and VRS (Banker et al. 1984). It simultaneously accounted for the excess of inputs and lack of outputs, providing profitability efficiency scores ranging from 0 (minimum level) to 1 (highest level).

Therefore, we preferred the non-oriented SBM under the VRS frontier assumption, because it accurately discarded the effects of input and output approaches. Avkiran (2011) described the SBM as the best non-radial model where only semi-positive inputs are allowed, but where outputs can also be negative (Cooper et al. 2007). In our case, the input ratio variables are Fixed/Total Assets and Costs of Employees/Operating Revenue, and the outputs are ROE and ROA ratios, which are sometimes negative due to bad performance.

$$\begin{aligned} &\min \tau = t - \tfrac{1}{m}\textstyle\sum_{i=1}^{m} \boldsymbol{S}^{-}/x_{i0} \\ &\text{s.t. } 1 = t + \tfrac{1}{s}\textstyle\sum_{r=1}^{s} \boldsymbol{S}^{+}/y_{r0} \\ &t\,x_0 = X \wedge +\boldsymbol{S}^{-} \\ &t\,y_0 = Y \wedge -\boldsymbol{S}^{+} \\ &\wedge \geq 0,\ \boldsymbol{S}^{-} \geq \mathbf{0},\ \boldsymbol{S}^{+} \geq \mathbf{0},\ t > 0 \end{aligned} \tag{1}$$

Our dataset consists of n DMU with $X=(x_{ij})$ input $\in \mathbb{R}^{mXn}$ and $\Upsilon=(y_{ij})$ $\in \mathbb{R}^{sXn}$ matrices being Λ a non-negative vector in $\mathbb{R}^n$ being t is a scalar variable >0. The VRS model is placed by imposing a constraint on λ such as $\sum_{j=1}^{n} \lambda_j = 1$. The vectors $S^- \in \mathbb{R}^m$ and $S^+ \in \mathbb{R}^s$ represent the input excess and output shortfalls of the expression and are called slacks. Therefore, the efficiency condition is reached when $S^{-*} = 0$ and $S^{+*} = 0$ and there are no input excesses or no output shortfall in any optimal solution.

3.3.2 Second Stage: Relationship with Diversity Board

The profitability efficiency scores are taken into account as the dependent variable while the percentage of foreigners and women on board are the independent variables. Our dependent variable is continuous, but it does not range values that are from minus infinity to plus infinity, and consequently we shifted it into a dummy variable. Therefore, the dummy dependent variable is equal to 1 if the company achieves an efficiency score higher than the average, and 0 if it does not.

The technique analysis relies on the logistic regression (Logit) that, unlike linear models, is more suitable when the dependent variable is categorical. The logistic regression model is formulated as follows:

$$\text{Profitability Efficiency Score (PF)} = \beta_0 + \beta_1 \%_{\text{Women}} + \beta_2 \%_{\text{Foreigners}} + \mu \quad (2)$$

$$\text{Probability} = \text{Log}\,(P/(1-P)) = \beta_0 + \beta_1 \%_{\text{Women}} + \beta_2 \%_{\text{Foreigners}} + \mu \quad (3)$$

4 Results

The profitability efficiency scores are computed through (1) for each company (DMU). Only six companies reached the highest level, while 91% had an efficiency level ranging from ≤0.5, 3% had ≥0.75. The whole sector suffers from a lack of overall efficiency. The mean of profitability efficiency on SBM—VRS is 0.3014 (*A*). Countries adopting gender regulation quotas' average efficiency result is 0.3212 (*B*) while in those countries without gender regulation, it is 0.3295 (*C*). A closer look into slacks results provides the weight of fixed assets on total assets and ROE revealing, respectively, an excess and shortfall against the optimal value.

Regression of the profitability efficiency scores on various independent variables (% women, % foreigners) for the year 2015, based on the logit regression analysis (2) shows a chi-squared of 1.563 (*A*) with 2 degrees of freedom, thus revealing adequate goodness of the model adaptability. Within our two independent variables of concern, we identified a positive influence of women on corporate performance, with a coefficient of 0.003. However, we found a negative relationship between the presence of foreigners (−0.008) and corporate performance. So we reject RQ2. Our findings on national diversity are in line with the results of Eulerich et al. (2014) who identified a negative relationship between nationality diversity and corporate performance (Table 4).

The Logit regression analysis results (*B*) display a chi-squared of 3.162 (*B*) and a p-value of 0.206 thus indicating an adequate adaptability model goodness. Countries adopting a mandatory gender legislative framework regulation reveal a negative influence caused by women's presence, with a coefficient of −0.005. However, we found a positive relationship between women (coefficient 0.002) and corporate performance in countries without a mandatory gender regulation (*C*). Based on critical mass, results related to countries with a mandatory regulation show a negative relationship between female directors and performance

Table 4 Results of Logit regression analysis

	A	*B*	*C*
Women	0.003*	−0.005**	0.002
	(0.007)	(0.010)	(0.010)
Foreigners	−0.008**	−0.027*	0.005
	(0.007)	(0.018)	(0.007)
Constant	−0.49	−0.238	−0.865
	(0.158)	(0.264)	(0.207)
Descriptive statistics			
Chi squared	1.563**	3.162*	0.532**
p-value	0.458	0.206	0.767
n	451	173	278

**p*-value <0.25
***p*-value <0.90

even when women's participation on boards reached a certain threshold (coefficient −0.353). So we reject RQ1 (Table 5).

According to our research design, we observe that the mandatory gender regulation concerning women's presence probability effect (3) has a negative impact on corporate performance. In fact, the probability that a company reaches a high profitability efficiency score is greater when the presence of women on board is voluntary.

With reference to (*A*), a 10% increase of foreigners on boards leads to a reduction of 1.87% in a company's probability of achieving an above average efficiency level. This probability decreases further—reaching 3.69%—when 20% of board members are foreign.

Likewise, according to (*B*), in countries that practice positive discrimination for women, a 10% increase of female board members leads to a reduction of 1.23% in a company's ability to achieve an above average efficiency level.

This evidence enhances the decreasing trend of a further 2.44%, when the presence of women on boards reaches the 28% level.

With (*C*), an increase of 10% points enhances the efficiency results of a 0.42% probability and 0.85% when female presence reaches the 27% level.

5 Discussion and Conclusion

This research offers new insight into the relationship between board diversity and corporate performance measured through the profitability efficiency. Prior empirical research provides diverging results about the

Table 5 The probability influence compared to the percentage of foreigners and women on boards

A			
% foreigners on boards	0	10	20
Probability (%)	37.99	36.12	34.30
Difference (%)		−1.87	
			−3.69
B			
% Women in countries with mandatory gender regulation	8	18	28
Probability (%)	43.10	41.87	40.66
Difference (%)		−1.23	
			−2.44
C			
% Women in countries without mandatory gender regulation	7	17	27
Probability (%)	29.92	30.34	30.76
Difference (%)		0.42	
			0.85

influence of board diversity on corporate performance. In our study, we analyze gender and national diversity on boards and their influence on firm performance. The empirical analysis was conducted on 451 European listed manufacturing firms for 2015.

We mostly found negative effects of board diversity characteristics on corporate performance, especially regarding national diversity and, for those countries with a mandatory gender regulation, for the presence of women. Our findings may be explained by the fact that board diversity cannot only result in a competitive advantage but may also reduce communication, complicate decision-making processes, increase the risk of in-groups and out-groups and damage cohesiveness (Bassett-Jones 2005). Consequently, these negative effects may impair management quality and corporate performance.

Adams and Ferreira (2009) find a negative relationship between the diversity of the board and corporate performance due to over-monitoring carried out by women. Adams and Ferreira (2007) also observe that directors' greater interference in the decision-making process could give rise to communication difficulties among administrators. In this case, gender diversity, which is a new element within the board, may create

disagreement among directors, which could affect performance. Our research results are in line with Ahern and Dittmar's findings (2012) about mandatory women quotas resulting in lower company value. They also further confirm the fact that when companies are forced to designate women, in some cases, they rely on directors with no specific previous experience or special skills that are able to generate benefits. In fact, their operational limits create slow and unproductive decision-making that then has a negative impact on business performance. Consequently, it is necessary to promote women's presence not by external coercive measures (such as laws) but within companies relying on social, labor justice and professional skills.

This paper contributes to existing literature on board diversity and corporate financial performance by being the first study to use a combined application of DEA-SBM model and a Logit regression to evaluate the impact of diversity management on performance.

Furthermore, we analyzed empirically the effects that mandatory regulation, introduced with the aim of increasing board gender diversity, has on corporate performance. The results of this paper show strong economic and public policy implications, especially for stakeholders, directors and law makers (mainly market regulators and governments), although the research methods, designed for a specific sector, involve certain limitations.

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CHAPTER 10

An Examination of Factors Affecting Excess Liquidity, Evidence from Islamic Banks in Malaysia

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1 Introduction

Holding sufficient liquid asset as a percentage of total deposit is required to perform smooth bank operations and is also paramount for better macroeconomic performance such as effective monetary policy implementation and better financial stability as evident by the recent financial crisis (Delechat et al. 2012; Ghenimi et al. 2017). Moreover, the

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adequate liquidity is crucial against liquidity risk (Diamond and Dybvig 1983; Diamong and Rajan 2001), since liquidity risk can even lead to the insolvent edge if sudden and substantial withdrawal happens. In one hand, liquidity holding above the requirements is costly in terms of the bank-specific issues and the forgone financial intermediation, on the other hand, insufficient liquidity is also a reason for many malfunctions. In fact, surplus liquidity holding causes poor asset utilization, drags the competitiveness, and debilitates the growth prospect within the bank, moreover, in the context of overall economy, it impedes the development of the money market as well as the monetary transmission mechanism (Gray 2011).

The plausible reasons for banks to hold excess liquidity are the illiquidity of some sorts of loans, the cost of short notice sales, cash raising capacity in short notice, the fear of insolvency risk due to surprisingly large withdrawal, capital market imperfections (Delechat et al. 2012), the interbank market facility's thinness, and central bank liquidity option scarcity. Nonetheless, these are financial constraints which could be overcome by the central bank's market-based tools like market stabilization bill and reverse repo option besides open market operation for instance bond selling. Whereas, Islamic banks having excess liquidity issue is ordinary in studies (Al-Sadah 2000; Yousuf 2001; Khan and Ahmed 2001), also confronts additional restrictions, for instances the absent of short-term and long-term financing products i.e. *Sukuk* (Mohammad 2013; Hasan and Dridi 2010), the products alignment with Islamic jurisdiction due to the probability of reputational risk association, the problem of the risk transferring approach of Inah and Tawarruq and conservatism in risk-taking exposure, as well as the lacking in preference of equity-based products. Therefore, the question arises whether the excess liquidity with Islamic banks is self-enforced due to the required fulfillment issue of Islamic jurisdiction or the financial market constraints or even both?

As a relief to this problem, *Sukuk* is apparently the avenue for Islamic banks and financial institutions, *Sukuk* aligned with Islamic jurisdiction is inaugurated to play the double-edged game such as to control liquidity and finance the deficit budget (Boumediene 2015). To manage the surplus liquidity in some countries i.e. Malaysia, Pakistan, and Sudan use *Sukuk* Murabaha/Tawarruq as well as government investment issues (Rosly 2005; Aziz 2007). *Sukuk* is now gaining its momentum for liquidity risk management (Yanīkkaya and Pabuçcu 2017). Hence, *Sukuk* boosts the Islamic banking activities as it is used for investing liquid fund with an attractive return and low risk (Wilson 2008; Al-Salem 2009;

Bello et al. 2017). In fact, *Sukuk* is not only used to control liquidity but to use the fund in an optimal way and extend the size of the capital market (Box and Asaria 2005; Al Musallam 2006; Biancone and Radwan 2018; Al Manea 2006). Yet we do not know the effectiveness of *Sukuk* to mop up excess liquidity empirically. Therefore, this paper explores the determinants of banks' excess liquidity in Malaysia as this country is known as the Islamic finance hub (mentioned in the study of Wasiuzzaman and Tarmizi 2010) as well as the reliably comprehensive dataset is also available. In particular, this study examines whether the liquidity, defined by theory and empirical studies, can be predicted by bank and macro level characteristics. Of particular focus is whether the availability of *Sukuk* has any impact on the excess liquidity, as predicted by theory and Islamic scholars in some review papers (Kahf 1997; Ayub 2005).

The paper is organized as follows; Sect. 2 briefly provides the reviews of relevant theoretical and empirical studies in the excess liquidity context. Section 3 reasons the excess liquidity and hypothesis. Then Sect. 4 describes the econometric methodology, results, and findings, and finally, Sect. 5 concludes with policy implications.

2 Literature Review

Excess liquidity is the higher level of fund maintenance by the banks which is a drag on the bank competitiveness as banks and financial institutions need to forgo an optimal rate of return as well as opportunity cost of holding excess fund (Primus 2017). Regarding the macroeconomic impact, excess liquidity impedes the smooth monetary mechanism in the economy. Excess liquidity has been found as a problem in some developing countries such as Brazil, Russia, India, China, Barbados, Sub-Saharan Africa and Nigeria as well as Bahamas (Akinboade and Zachariah 1997; Maynard and Moore 2005; Saxegaard 2006; Primus et al. 2014). Central banks of high excess reserve economies are likely to have less leverage on the commercial banks to succeed their monetary objectives (Primus 2017) as tight liquidity is facilitating to that end.

Importantly, Islamic banks more than conventional ones are suffering from chronicle disease of excess liquidity which is a potential threat for them to grow rapidly and robustly (Khan and Bhatti 2008), since excess cash does not result in returns. Moreover, from the macro point of view, excess liquidity impedes the monetary policy implication. There have been quite a number of studies corroborating the notion of excess

liquidity with Islamic banks. In fact, Islamic banks maintain higher liquidity reserve perhaps due to unavailability of shariah-compliant products and market discipline (Opler et al. 1999; Iqbal and Mirakhor 2011; Beck et al. 2013). As a fact, Islamic banks hold 40% more liquidity than their counterpart conventional banks (Hakim 2002; Khan and Bhatti 2008). They further show rational reasoning of the absence of short-term and long-term Shariah-compliant products and services to invest. Relevantly, Samad and Hassan (1999) examine the liquidity risk in the banks from 1984 to 1997 in Malaysia and find that Islamic banks hold more excess liquidity than their counterpart. Scholars commonly agree that the reason for excess liquidity is the absence of short-term products, Islamic open market operations as well as the support from Central bank.

Similarly, Siddiqui (2008) finds that Islamic banks have higher liquidity in relation to conventional banks in Pakistan. Bashir (1999) conducts research on fourteen Islamic banks covering eight Middle Eastern countries over 1993 to 1998 and concludes that Shariah-compliant banks (Islamic banks) have more excess liquidity than non Shariah-compliant banks (conventional banks). Samad and Hassan (1999) finds that Islamic banks maintain higher liquidity ratio than conventional banks, hence, the study focuses on financial performance as well as liquidity of both Islamic and conventional banks from the year 1991 to 2001 in Bahrain. Similarly, for the case of Brunei, Hassan (2009) explores that excess liquidity is pervasive in Islamic banks. Moreover, Čihák and Hesse (2010) in his research mentions that Islamic banks usually keep more reserve with central bank compared to their counterpart. He further elaborates that Islamic banks maintain excess liquidity since they have limited access to interbank market and Shariah-compliant hedging instruments. Ali (2013) finds that Islamic banks hold more liquid asset than the supervisory authority and international standard's requirement. Above all, Excess liquidity is persistent due to lack of avenues for short-term parking and unavailability of last resort facility for Islamic banks.

Sukuk align with Islamic jurisdiction is inaugurated to play the double-edged game such as to control liquidity and finance the deficit budget (Boumediene 2015). To manage the surplus liquidity some countries i.e. Malaysia, Pakistan, and Sudan use *Sukuk* Murabaha/Tawarruq as well as government investment issues (Rosly 2005; Aziz 2007). *Sukuk* is used for liquidity risk management (Yanīkkaya and Pabuçcu 2017). However, *Sukuk* is likely to boost the Islamic banking

activities as it is used for investing liquid fund with an attractive return and low risk (Wilson 2008; Al-Salem 2009; Bello et al. 2017). Therefore, *Sukuk* can be used to balance liquidity and raise fund in an optimal way and extend the size of capital market (Box and Asaria 2005; Al Musallam 2006; Al Manea 2006).

A number of studies acknowledge the fact of the presence of excess liquidity in Islamic banks almost all countries where Islamic banks exist, on the other hand, Scholars support the usage of *Sukuk* for liquidity risk management particularly excess liquidity but unfortunately no empirical study is conducted to explore the impact of *Sukuk* on the excess liquidity in Islamic banks. This is perhaps because of no data availability and the absence of *Sukuk* in many countries. Therefore, this study is intended to check the alignment of expectation and practice of *Sukuk*'s role to eliminate the issue of excess liquidity.

3 Reasons for Excess Liquidity

Islamic banks hold excess reserve not because of their willingness to the fear of lower value in short notice sales as well as cash raising inability in short notice but because of their less available investment options and heavy dependence on demand deposit (Iqbal and Mirakhor 2011). Though having more liquid asset is good for non-financial institutions it is bad for the financial institutions (Myers and Rajan 1998). Banks and financial institutions maintain sufficient liquidity to safeguard against liquidity risk (Diamond and Dybvig 1983; Diamond and Rajan 2001). However, the plausible reasons for excess liquidity could be loans are illiquid, and the probability of insolvency due to large and sudden withdrawal. Excess liquidity in the bank might persist due to capital market imperfections (Delechat et al. 2012), the interbank market facility's thinness, central bank liquidity option scarcity, however, Islamic banks in addition to these issues, also faces other challenges, for instance the absent of short-term and long-term financing products i.e. *Sukuk*, the dilemma of whether the financing mode is Shariah-compliant or not linked with reputational risk, displacement effect of Inah and Tawarruq where risk-taking approach is transferred, conservatism in risk-taking exposure, as well as lacking in preference of equity-based products. However, the study limits its focus only on the effect the existence of short-term and long-term *Sukuk* on excess liquidity in Islamic banks since *Sukuk* can be used for the liquidity management (Kahf 1997; Ayub

2005), nevertheless, we do not have any empirical evidence to corroborate that claim so this study would gap with the empirical support.

3.1 Inevitability of Sukuk *in Islamic Banks*

Accounting and Auditing Organizations for Islamic financial institutions (AAOIF) defines that *Sukuk* (Islamic Bond) is a certificate of investment of same value of shares representing the ownership of the tangible assets of the company. Hence, *Sukuk* is structured in a way to hedge the liquidity risk in Islamic banks. Over the last few years, a good number of instruments such as *Sukuk* and other instruments have been evolved in Islamic finance industry to hedge liquidity risk and asset management (Ayub 2005). There are various types of *Sukuk* in the market, Ijarah is one of them and can be used as a tool for handling liquidity issue (Kahf 1997). Another type of *Sukuk*, Salam-based security is used by Islamic banks for liquidity management (Ayub 2005).

Presently, Islamic banks are increasing their Shariah-compliant liabilities by accepting Islamic deposit, so there is a growing need for the corresponding liquid asset such as Islamic bonds and bills (Wilson 2004). Wilson (2008) explains that *Sukuk* could be appropriately used as a tool for liquidity management by the financial institutions.

To ease the liquidity problem in Islamic banks, central banks of Islamic countries in the year of 2000 initiate *Sukuk* for investing (Awan 2009). Thus, financial institutions in Pakistan shows the fall of liquid asset (numerically 25% down to 17%) in the form of cash, bank balance and placements with other business firms from 2004 to 2006 and this happens because of issuing *Sukuk* by State Bank of Pakistan and other business organizations. Moreover, Akhtar et al. (2011) support the usage of *Sukuk* as a hedging instrument against excess liquidity risk. Therefore, Ismal (2009, 2010a) the availability and accessibility of *Sukuk* ought to be more for the easiness of Islamic banks.

As a result, Islamic banks with the opportunity to invest in *Sukuk* are able to manage liquidity more efficiently as well as can get a relatively higher rate of return with the additional benefits attached to *Sukuk*. Thus, *Sukuk* allows Islamic banks to liquidate when needed through selling them to get enough liquidity. This indicates the invested capital in *Sukuk* is always underemployment with a higher rate of return by Islamic banks rather than keeping them in the form of central bank reserve or cash yielding less or even no return.

3.2 *Our Research Hypothesis*

The continuous excess of liquidity by Islamic banks would lead them to a critical state of increasing unemployed and non-invested money and then lead to a situation of less revenue or even no revenue from liquid assets. Such circumstances would make Islamic banks not only less competitive with conventional banks but also unstable and unsustainable. We expect that issuance and availability of short-term and long-term *Sukuk* would relieve the pain of excess liquidity. Islamic banks having the option to invest their liquid asset in *Sukuk* purchasing can earn a lucrative return and also can convert into cash on the basis of depositor's withdrawal demand. In fact, among our research hypothesis there is the one that "the availability and issuance of short-term and long-term *Sukuk* lessen the surplus liquidity of Islamic banks" (Fig. 1).

4 Data and Methodology

We explore the impact of *Sukuk* on excess liquidity for a sample of 16 Islamic banks in Malaysia over a period from 2010 to 2015 with annual frequency. We drive variable data from the banks' financial annual reports and Bank scope database, and then all the data are transformed to natural logarithms (Details of data in Appendix Table 4). The excess liquidity is bank's cash and balance with central bank divided by banks short-term funding plus total deposit. This excess liquidity calculation reflects more sensitivity of banks and financial institutions to specific types of funding for instance deposit of households, bank and other financial institutions (Vodová 2013). While, calculating liquidity, we excluded banks portfolio

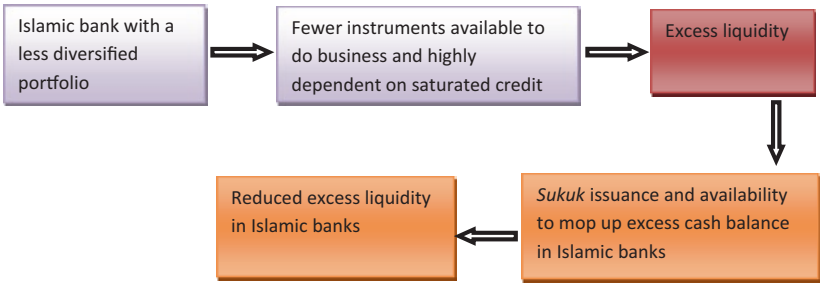

Fig. 1 A flowchart of our research hypothesis

investment available for sale. On the right-hand side of the equation, *Sukuk* is our main focus variable since our research question is to "investigate which factor affect excess liquidity in Islamic banks". The controlled variables in this study are i.e. return on asset (ROA), total asset, total capital ratio, banks' non-performing return on equity loan as well as capital adequacy ratio have been taken. Moreover, some macroeconomic variable i.e. inflation, money supply, and the per capita gross domestic product as an indicator for excess liquidity (Brana et al. 2012).

We analyze the notes part of balance-sheet in the financial reports, whereby, and by coming across banks financial portfolio investment, and under that category, we have taken only banks investment in *Sukuk* available for sale. *Sukuk* offerings were initiated in the year 2000 for Islamic banks "to invest their liquid funds in securities that provide some returns in contrast to zero returns from idle balances" (Awan 2009). To figure out the relationship between excess liquidity and *Sukuk* as well as other bank-specific and macroeconomic variables, we follow the below equation, and then we relate most relevant methodology to extrapolate our research question.

Equation: Generally, the statistical model of liquidity can be written as;

$$ELQ_{jt} = \alpha_1 + \beta_1 SUK_2 + \beta_2\, Bankcarachteristics + \beta_3\, Macroeconoic\ \ variables + \varepsilon \tag{1}$$

In Eq. 1, J refers to the banks and T is time, ELQ_{jt} (Liquidity) is the total amount of liquid asset in a bank divided by the short-term funding plus total deposits, while *Sukuk* is the banks' measurement of short-term and long-term investment in *Sukuk* by Islamic banks. Bank characteristic variables are bank size, bank asset, ROA, credit ratio, and non-performing loan (Aspachs et al. 2005; Kashyap and Stein 1995; Kashyap et al. 2002; Dinger 2009; Delechat et al. 2012). The macroeconomic variables are the per capita gross domestic product as an indicator for excess liquidity money supply, and inflation (Agénor et al. 2004; Saxegaard 2006; Brana et al. 2012). β_1 and β_2 are the parameters of primary interest and α_1 is the vector of other explanatory variables typically assumed to affect the liquidity i.e. profitability of a bank, bank's size

The model could be tested by using pooled ordinary least square, fixed-effect (FE), and random-effect (RE) methods. However, each method has some constraints and the selection of methodology depends on dataset (Cheng and Wall 2005). However, in our research, Hausman test was used to select either fixed effect or random effect estimator.

4.1 Empirical Analysis

We start our analysis by descriptive statistics for the 16 Islamic banks in Table 1 which shows that the standard deviation of excess liquidity is high implying that there is a high deviation from average and how different the Islamic banks in managing surplus liquidity, whereas, *Sukuk* has low standard deviation. From the skewness and kurtosis point of view, it is confirmed that the data is normally distributed among the sample size.

The correlation matrix in Table 2 explains that the existent correlation among the variables. Correlation coefficients mostly are below .80 which assures the probability of the presence of multicollinearity is very low. *Sukuk* is seen to maintain significant negative correlation with surplus liquidity which indicates that the availability of *Sukuk* in the market reduces the idle cash or liquid funds in Islamic banks (Fig. 2).

The graph shows that the trend of high liquidity is obvious in Islamic banks of Malaysia since the global financial crisis in 2008. This could be the same scenario for many countries with Islamic banks and that is the high liquidity phenomena (Table 3).

We first convert *Sukuk* data into log form then we conduct the regression using statistical package *SATA 14*, we present two models i.e. Random effect and Fixed effect. Both models provide us almost similar result with the same sign although we finally selected the fixed effect model based on the Hausman test result. The result shows that a negative sign for our main variable *Sukuk*. This finding is in line with the finding of Akhtar et al. (2011), "whereby he found that the cash balance and placement with the central bank of Islamic banks fallen down sharply immediately after *Sukuk* being offered in the market". As Islamic banks simply cannot invest in other interest-based contracts i.e.

Table 1 Descriptive statistics

Variables	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Skewness*	*Kurtosis*
ELQ	18.1217	10.6713	.39	60.99	.0004	.0003
ROA	.7033	.7126	−4.66	1.55	0009	.0005
NPL	2.3057	3.4875	1.54	23.23	0983	.9435
LTA	66.5507	17.3165	25.53	132.63	.0422	.4824
CR	14.8909	2.4434	11.07	25.30	.0235	.0244
SUKUK	.1735	.0898	.01	.35	.3755	.0145

Table 2 Correlation matrix of variables

Variables	*LLQ*	*ROA*	*NPL*	*LTA*	*CR*	*EL*	*ETA*	*GDP*	*M2*	SUKUK	*INF*
LELQ	1										
ROA	0.0194	1									
NPL	−.0542	.1029	1								
LTA	.2260*	−.0255	.1133	1							
CR	.5151*	−.1707	−.0268	.5510*	1						
EL	.3932*	.1122	.4603*	.4896*	.5635*	1					
ETA	.3963*	.1018	.4381*	.5039*	.5756*	.9990*	1				
GDP	.3218*	.1686	.0165	.6824*	.6815*	.4631*	.4785*	1			
M2	.3218*	.1691	.0172	.6812*	.6814*	.4635*	.4788*	.8698*	1		
SUKUK	−.3527*	.1132	.1382	−.5288*	−.4248*	−.2090	−.2177	−.6540*	−.6538*	1	
INF	−.1654	.0269	.0838	.0985	−.032	−.0605	−.0615	.1169	.1162	−.1297	1

***, **, and * denote significance at the less than 1%, 5%, and 10% levels respectively

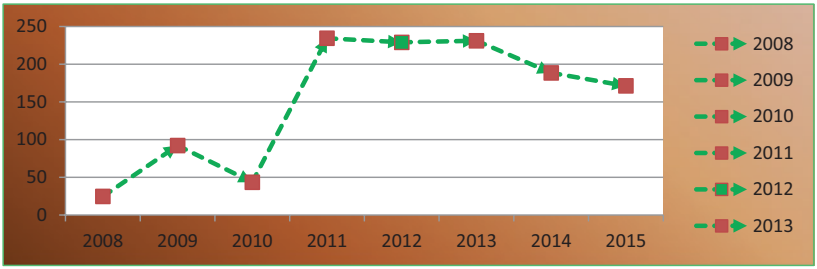

Fig. 2 Liquidity trend in Islamic banks (*Source* Bankscope database, INCEIF, Malaysia)

Table 3 Dynamic fixed and random effect model on the effect of *Sukuk* on the excess liquidity in Islamic banks

Variables	*1* *Fixed effect* *Ex liquidity*	*2* *Random effect* *Ex liquidity*
L*SUKUK*	−.4053542*	−.4542408**
	(.2481414)	(.1988722)
ROA	.7277453*	.7165016**
	(.3858453)	(.3563574)
NPL	.3512825	−.0035273
	(.3749336)	(.2402456)
LTA	−.2350351	−.1698898
	(.1612285)	(.1425104)
CR	1.371396***	(.3599547)
	(.394540)	(.3599547)
El	−6.424991	−7.307657
	(17.25919)	(8.144799)
ETA	7.666469	8.24917
	(17.25919)	(8.605411)
GDP	2.979413	1.075599
	(4.890396)	(4.239478)
M2	−3.103224	−1.169789
	(5.007746)	(4.345874)
INF	−.6778615**	−.5725848*
Constant	(.3298395)	(.3108599)
	−.0520897	.1008692
	(.2865258)	(.2635912)
Number of groups 16	*R*-Squared 0.4033	Prob > χ2 = 0.0000 Observations 76

Note Fixed effect model is select based on the Hausman test since we fail to reject alternative hypothesis of fixed effect model's preference

***, **, and * denote significance at the less than 1%, 5%, and 10% levels respectively

Non-Shariah-compliant products, and this makes *Sukuk* as one of the investments opportunities rather than keeping cash idle. The higher diversified types of *Sukuk* in the market the better in giving Islamic banks safer and secure platform to invest their available cash.

The ROA has a positive significant impact on liquidity; "the plausible reason could be that Islamic banks make less risky loans/financing, hence less provision for financing impairment that can lead to higher earnings" (Vodová 2013). Equity to the asset has been found to have a positive effect and the inflation has a negative effect on liquidity, which is similar with Bunda and Desquilbet (2003, May) however they concluded that inflation is insignificantly positive. Our analysis revealed that economic growth effect positively the liquidity which is consistent with Vodová, P. (2013), "in our opinion this could be due to that when the economic growth rate is high, banks tend to maintain higher liquidity buffer". The capital ratio in our findings reflected a significant positive effect on liquidity ratio which means that the banks with more capital have no choice to hold more liquidity due to the lack of Shariah-compliant products other than debt-based products. Lastly, the non-performing loan has a positive effect however seen to be having an insignificant impact on liquidity which is expected.

5 Conclusion and Research Limitations

That Islamic banks have been suffering from chronicle disease of surplus liquidity which impedes them to grow profitably (Mansoor Khan and Ishaq Bhatti 2008) is a common phenomenon. Therefore, excess liquidity puts a drag on competitiveness which works as "sand in the wheels" on the path of Islamic banking progress. Moreover, the excess liquidity, the less efficient and ineffective use of assets, and therefore lowering earnings, is persistent in Islamic banks due to some unique reasons, such as lack of Shariah-compliant product i.e. *Sukuk* to park liquid asset, inability to use equity products due to stress of capital charges, displacement effect of Inah and Tawarruq products forcing Islamic banks to adopt conventional debt-financing products and the risk appetite nature of Islamic banks towards business risk i.e. true sale Murabaha leaving the banks with no new avenues for diversification. To this end, this study only focuses on the effect of *Sukuk* availability in the market on the excess liquidity of Islamic banks.

The finding interestingly shows that the *Sukuk* has a significant role in mopping up the excess liquidity of Islamic banks. In other words, the increasing availability of *Sukuk* in the market would reduce the burden of excess liquidity as well as accelerate the competitiveness for Islamic banks. Therefore, from the policy implication perspective, the availability and issuance of *Sukuk* should be increased in the financial market so that Islamic banks with Shariah-compliant mind-set are capable to generate higher earnings, and thus, the overall market liquidity is likely to be improved. Regarding the limitation of this study, this is a single country study and small-time period dataset, a widespread empirical study is needed to corroborate the claim of this study.

Appendix

Table 4 Variable definitions and data sources

Variables	*Definition*	*Sources*
ELQ	Excess liquidity is bank's cash and balance with central bank divided by banks short-term funding plus total deposit	Annual report of respective bank
SUKUK	Islamic bond available in the bank for investment purpose	Annual report of respective bank
ROA	Return on Asset	Bank scope database
NPL	Non-performing loan	Bank scope database
LTA	Loan to Asset ratio	Bank scope database
CR	Credit ratio	Bank scope database
EL	Equity to liability ratio	Bank scope database
ETA	Equity to Asset ratio	Bank scope database
GDP	Gross domestic product	World bank database
M2	Money supply	World bank database
INF	Inflation	World bank database

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CHAPTER 11

Going Beyond Formalization: Effective Risk Management in a Medium Company

Bernd Britzelmaier, Chiara Crovini and Giovanni Ossola

1 Introduction

Since 2008, the global crisis has revealed significant new problems in risk assessment and management, caused by the increasing uncertainty derived from a demanding environment. Risk management is a transversal process to each company and has a strategic importance because it helps managers set and possibly achieve the objectives of their companies. So why is there a lack of sensitivity in adopting a sound risk approach, especially in SMEs?

Why, despite all the literature regarding the importance of having an adequate internal control system, are there still cases of bankruptcy and scandals?

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One of the most important reasons lies in the fact that the management of risks in some realities, especially in those very small, is seen as a burden and a final objective itself.

SMEs represent an important reality in the entire economic system. They are crucial in promoting economic growth at the international level and their vitality helps reduce the unemployment rate. Therefore, stability and prosperity of SMEs assume systemic value for all countries (World Trade Organization 2013).

In many countries, there is no regulatory or institutional code of risk management: SMEs do not usually adopt a formalized risk management process. But in some cases, there is no need to formalize this process or to implement the ERM systems.

This research represents a preliminary descriptive and interpretive case study. An Italian medium company was identified, as it is a family business founded in the 1940s. This company was chosen also because it has been through different generational passages and represents the best example of how the integrated and holistic approach in managing risks is put into practice.

This paper has been motivated by the need to understand from which point of view it is necessary to restart analyzing the topic of risk management in SMEs and to suggest a new perspective that could lead managers and owners of small and medium enterprises to improve their risk attitude. In particular, there will be the necessity to concentrate on the human being and his personality and to consider risk management as an integral part of decision-making.

This paper supports the idea that in a medium enterprise (family firm) it is not necessary to formalize the risk management process with written procedures. However, the management or family owners should hold all the information flows, be able to influence the management dynamics and manage all the events in a holistic way.

In addition, it is also essential to manage the company in a forward-looking way with an effective planning process. Therefore, it is fundamental that the risk management process coincides with already existing processes and integrates perfectly with the company management.

The paper is organized as follows. The literature review about the concept of risk and uncertainty, risk management process and decision-making in SMEs is presented in the second paragraph. The research methodology and data collection are stated in the third section. Findings and discussions are in the fourth section. The final paragraph instead deals with the conclusion, limitations and future developments of the research project.

2 Literature Review

2.1 Risk and Uncertainty: The Importance of Managing Risks

It is necessary to present the theoretical background about the topic of risk and uncertainty in order to show the central role that risk management has acquired over the past few decades.

Starting from the topic of risk, Bernoulli in 1738 proposed to measure risk with the geometric mean and to minimize risk by spreading it across a set of independent events (Bernoulli 1954).

The concept of risk has been the subject of careful and important studies in the general economic field since the beginning of the twentieth century (Willet 1901; Fisher 1919; Hardy 1931).

Knight (1921) was one of the most important scholars and distinguished between risk and uncertainty with respect to the nature of decisions made in a company. He associated generating economic profit with making entrepreneurial decisions under uncertainties. This uncertainty is complex because it cannot be reliably hedged unless it is reducible to risk. In his opinion, the mathematics of probability that is used for risk calculations may lose relevance. Fast-and-frugal heuristics, on the other hand, provide robust strategies that can perform well under uncertainty. Therefore, risk and uncertainty are strictly linked to the topic of decision-making (Mousavi and Gigerenzer 2014).

In the business administration field, the research of Oberparleiter (1955), Chapman and Cooper (1983) and Sassi (1940) was particularly important. The common element of all these studies is that risk can be the possibility of economic or financial losses or gains, as a consequence of the uncertainty associated with pursuing the course of an action. But more specifically risk is considered an adverse eventuality.

Risk has consequences in terms of economic performance and professional reputation, in addition to environmental and social considerations. Despite the underlying element of uncertainty, it is often possible to predict risks and to set in place systems and design actions to minimize their negative consequences and maximize the positive ones (Kaplan and Mikes 2012). Those risks that arise from disorder can be controlled through better management and governance. This way, businesses that adopt a risk management strategy and adequate planning and programming are more likely to survive and grow (Amaduzzi 1961; Brusa 2012).

Therefore, the concept of risk is not unique but depends on the situation in which the company operates, on the uncertainty every company might face and on the consequences of certain events. Furthermore, risk is inherent to and part of the existence of every company (Bertini 1987; Ferrero 1987).

Uncertainty and negative consequences were also discussed by Ferrero (1987). He stated that there are two kinds of uncertainties: objective and subjective. The former is linked to the unknown in an absolute sense and they depend on the knowledge and the environment that surround the company. Subjective uncertainties instead can be dominated by the management because they are linked to insufficient information and to the informative system of the company.

Risk management theories evolved in particular after the COSO Report (1992) and its updated version (2004, 2017), elaborated by Committee of Sponsoring Organizations of the Treadway Commission. The movement toward enterprise risk management (ERM) (COSO 2004) has shifted the focus to a more holistic appreciation of risk. It highlights that appropriate risk-based controls need to be put in place to help ensure that organizational objectives are achieved (Soin and Collier 2013).

Several researchers concentrated on the definition of the risk management (RM) process and on the ERM, by analyzing all phases and activities (Brustbauer 2016; Henschel 2009). In particular, COSO Report underlines that the risk management process has eight components interrelated with the management process of the company. These components are the following: internal environment; objective setting and Risk Appetite Framework (RAF); event identification; risk assessment; risk response; control activities; information and communication; and monitoring.

Consequently, the risk management process can be seen in a strategic way, because it is functional to the development of the company strategy and control (D'Onza 2008; Coso Report 2004). Therefore, it deals with planning, organizing, directing and controlling resources to achieve given objectives when unexpectedly good or bad events can happen (Head 2009) and it also provides a link between organizations and the external environment in which they operate. In addition, risk management is the key driver for value creation, competitiveness and profitability (D'Onza 2008).

The research of Michael Power (2004, 2007, 2009) presents a different and critical approach toward risk management because he raises a number of issues, also concerning the role of management accountants, that are of particular interest for management accounting and control researchers. Two elements are particularly relevant: the side effects of risk management and the relationship between risk management and uncertainty. Power argues about the 'risks of risk management' and the emergence of 'secondary' or 'defensive' risk management.

He suggests that: 'experts who are being made increasingly accountable for what they do are now becoming more preoccupied with managing their own risks' (Power 2004).

Power states that this 'culture of defensiveness' (p. 14) can be seen in the 'individualization' of risk by various professionals—whereby, experts are becoming preoccupied with managing their own risk which necessitates reflexive behavior (Beck 1992; Giddens 1990). Further side effects include blame avoidance (Hood 2002), fear of sanctions, legalization and the re-drawing of (organizational) boundaries that arguably may lead to a re-enforcing of the 'box ticking' culture.

In terms of risk management and uncertainty, there have been substantial developments in organizational practice that focus on risk management and issues of governance, but the impact of risk and uncertainty has not been fully explored. Managers have always faced uncertainty, which is a central feature of any organizational setting. Power (2007) underlines that when uncertainty is organized, it becomes a risk to be managed. The range of uncertainties deemed in need of management has significantly increased and includes threats such as operational risks, reputational risks and strategic risks. Therefore, the new wave of risk management can be regarded as a defensive reaction to an increasingly demanding environment.

There emerges the need for an 'intelligent' risk management which is not control obsessed but based on knowledge and on risk appetite framework, an impoverished concept that may lead to board failure and that should be redefined and enforced (2009).

2.2 Risk Management in SMEs: The State of the Art

As regards SMEs, they have little guidance on how best to manage risk and where to turn to for advice. Over the past few years few guidelines, representing conceptual frameworks, have been published. Some of them

represent Corporate Governance Codes for Unlisted Companies (OECD 2006; ecoDa 2010; OECD 2015) and in 2009 the International Organization for Standardization (ISO) elaborated ISO 31000:2009 about Risk Management and in 2016 ISO published a practical guide for SMEs about how to implement risk management.

The literature reveals that risk management in SMEs is still in an early phase of development and is rather fragmented (Verbano and Venturini 2013; Marcelino-Sádaba et al. 2014). Despite that, several national and international studies highlight the immaturity with which companies and, in particular, SMEs face risks (Britzelmaier et al. 2015). This approach can derive on the one hand from the lack of familiarity, the fear of change and additional costs that the implementation of a risk management system could result and, on the other, from the actual lack of awareness of the benefits that an integrated risk management system might have, not only in terms of prevention, but also as regards the opportunities (Hiebl 2013; Thun et al. 2011). Most unlisted enterprises are owned and controlled by single individuals or coalitions of company insiders (e.g. a family). In many cases, owners continue to play a significant direct role.

Good governance in this context is not a question of protecting the interests of absentee shareholders (agency theory: Jensen and Meckling 1976). Rather, it is concerned with establishing a framework of company processes and attitudes that add value to the business and help ensure its long-term continuity and success, by satisfying the stakeholders' needs (stakeholder theory: Freeman 1984).

Furthermore, many SMEs face resource constraints (Jarillo 1989). Consequently, existing resources need to be used with care as erroneous decisions will have more serious complications than they would in large businesses (Amelingmeyer and Amelingmeyer 2005).

Therefore, risk management would better cope with these resource constraints (Smit and Watkins 2012) and deal with the issues of survivability and growth (Islam et al. 2008).

Vargas-Hernandez (2011) underlined that a further motivation to support the implementation of risk management in SMEs is to protect innovative projects, which are fundamental to gain competitive advantage and succeed in the market, but necessarily involve risky decisions and activities.

Many other studies focused on the role of risk management in SMEs and on the risk attitude of those companies (Gao et al. 2013; Mutezo 2013; Gilmore et al. 2004; Hollman and Mohammad-Zadeh 1984).

Some researchers instead concentrated on specific kinds of risk in SMEs and how they are managed (Poba-Nzaou and Raymond 2011; Sukumar et al. 2011).

Furthermore, research on the most effective procedures of risk management in SMEs was conducted (Henschel 2010), even if it is still at a very early stage (Rautenstrauch and Wurm 2008). In particular, Henschel (2010) identified the missing integration of the identified risks into business planning as the main problem. According to him, this integration is needed to determine the complex risk position of each company, which is also influenced by the firm size.

In other studies, Islam et al. (2008) and Islam and Tedford (2012) aimed at identifying potential risks existing within the SME infrastructure, by developing and testing a strategic risk management framework. This model consists of five steps: identification of disturbances (undesirable events and setbacks), identification and classification of root causes, classification of origins of disturbance, risk assessment and risk handling and monitoring and control. The research findings suggest that SMEs encounter disturbances in the areas of production, safety and business operation. These studies also highlighted a lack of systematic RM strategies among the SMEs surveyed.

McCarthy (2000) explored how entrepreneurs think about risk and deal with it in the strategy formation process, and demonstrated that risk-taking propensity is subject to change, depending on the business development. McCarthy and Block et al. (2015) underlined that entrepreneurs should be considered in their own uniqueness because with learning organizational context and history, they influence the development of a sound risk approach.

As regards risk assessment, Herbane (2010) underlined that this task represents a daily activity, but it has a tacit and implicit nature rather than being formalized in planned risk analysis. Risk framing is a result of the owner's personal experience and knowledge derived from being part of informal networks.

2.3 The Decision-Making Process in SMEs

In psychology, decision-making is considered a cognitive process resulting in the selection of a belief or a course of action among several alternative possibilities. Every single choice, which may or may not prompt action, is based on the values and preferences of the decision-maker, but

also on explicit or tacit knowledge. The decision-making theory, which is based on the initiative of Herbert Simon, has developed since that time. Simon in 1960 pointed out the need to understand decision-making as a process. Several analytical methods and techniques were used in detecting opportunities, searching and developing alternative solutions to solve problems.

The decision-making process, which can be more or less rational or irrational, can be also regarded as a problem-solving activity that culminates in a solution deemed to be satisfactory (Guo 2008; Frensch and Funke 1995).

The approach to decision-making in SMEs may differ from the goal-driven, planned and 'rational' decision-making commonly associated with large firms (Child and Hsieh 2014; Ogarcă 2010; Wilson and Nutt 2010). One of the reasons for this difference could be the greater information scarcity (Buckley 1989). Another is that SMEs tend to be characterized by individualized leadership (Abotsi et al. 2014). The significant role played by individual decision-makers in SMEs means that their personal characteristics and interpretations are highly likely to affect their strategic decisions, including those on internationalization (Nielsen and Nielsen 2011). The combination of individualized leadership with informational constraints suggests that SME decisions may tend to be based on personal hunch and be a response to unplanned developments to a greater extent than those made in multinational enterprises, despite the growing recognition that intuition can inform the strategic decision-making of larger firms as well (Elbanna 2006).

The ability of owner-managers or entrepreneurs of SMEs to obtain information inputs through network attachment can impact on the implementation and effectiveness of their strategic decision-making process (Child and Hsieh 2014; Jansen et al. 2013).

Therefore, even in this context, there emerges the need for the decision-making process to acquire great knowledge about the specific decision in order to face the uncertainty and the consequent positive or negative effects that could derive.

Several researchers analyzed the decision-making style of the entrepreneurs, depending closely on their personal characteristics, personality and intention (Ferreira et al. 2012; Musso and Francioni 2012; Gudonavičius and Fayomi 2014; Ürü et al. 2011). These studies also refer to risk propensity, as a psychological disposition of individuals to show varying degrees of risk-taking or risk-avoidance behavior (Papadakis et al. 1998).

This element is considered to be a relevant factor influencing organizational processes and outcomes and it is a crucial variable for the decision-making (Nahavandi and Malekzadeh 1993; Gupta 1984).

Studying the decision-making process may help managers and owners of SMEs in particular make more quality decisions, which have a direct and effective impact on the success of the company itself, in terms of competitiveness, internationalization and value creation over the long period.

3 Methodology and Data Collection

3.1 The Fieldwork

Company Alpha can be defined as a medium-sized company and it was established in 1947. The firm is a family business with a long history. The company management has changed over time because of the evolution of the business and changes in the ownership structure, due also to family conflicts which have led to the current management.

The production has also evolved because in the immediate post-war period the company started making iron products (garbage pallets, washstands and the structures to support bidets).

In the 1950s the business was oriented toward household products always made of iron such as pans and vegetable mills. In the 1970s with new materials (Blurex Steel) and new technologies, production moved to pizza trays, with new shapes in addition to the rectangular one.

In the 1980s the production expanded to other bakery equipment with a new Teflon material, while in the 1990s, it concentrated on the non-stick. And gradually the company abandoned the pans and fryers.

Over a period of seventy years, production has evolved based on the demand of the market: the company has always produced what people need and needed. But at first there were no technological and advanced market analyses, therefore very often needs were perceived by the entrepreneur, who talked directly to consumers, wondered what was needed in their homes and imagined how the market would evolve. His children today say that the father's intuition was essential to perceive the needs of consumers. They say they were lucky because in Italy there is only a small Neapolitan producer.

The change in production was linked to structuring and expansion of the company: if the early days were entrusted to small artisans, then

Table 1 Main economic and financial data of Company Alpha

Year	*Sales*	*EBITDA*	*Profit/loss*	*Assets*	*Net assets*	*N. employees*
2013	18,310,911	1,028,713	158,560	16,972,722	7,909,421	77
2014	17,596,331	888,873	53,170	19,051,866	7,962,594	80
2015	17,718,728	436,118	−391,731	18,901,579	7,570,858	83
2016	20,197,430	1,084,373	256,283	21,776,212	8,267,144	93
2017	15,232,700	495,519	−167,644	18,864,617	8,099,500	93

Source Data extracted from Aida database

production in the Seventies shifted inside and therefore the company had to equip itself with technical means and bigger spaces.

In any case, they were the first in Italy to produce these products and today they are the leader in Italy and in Europe.

Company Alpha is situated in the North–west of Italy and today it has on average eighty employees, organized into functions.

This company has been concentrating on new investments in new technologies and R&D in order to innovate the product itself and the process. In fact, both assets and capital solidity have increased over the past few years. However, considering the need to diversify the production, the company has decreased its economic performance.

Table 1 shows the main economic and financial data of the company.

3.2 Data Collection and Research Design

Our considerations were obtained from the data and materials collected from only one organizational context. Due to the richness of the data, the resulting mono-site case (Ahrens and Chapman 2006; Scapens 1990) justifies itself by the following reasons. The case helps to understand a well-known phenomenon in a medium enterprise (Chua 1986; Scapens 1990; Ahrens and Dent 1998; Lukka 2007). Thereby, it can help modify what we are supposed to know about risk management. Further, this intrinsic case (Stake 2006) sheds light on the mobilization of a phenomenon within a national context.

This analysis has the aim to answer the two research problems mentioned in the Introduction:

- *Research Problem 1*: Is that an obligation for a medium enterprise to adopt a formalized risk management process, often difficult to implement because of its business organization and activity?
- *Research Problem 2*: What is the role of a risk mindfulness, consciousness and appropriate approach leading to the development of existing processes to integrate the management of risks therein?

Ideally, ethnographic studies should include longitudinal examinations in order to develop frontline proximity that can help researchers make sense of the data (Ahrens and Chapman 2006; George and Bennet 2005; Miles and Huberman 1994; Yin 1994). This study covers the period between 2015 and 2017.

The primary data source for this study was face-to-face interviews, but information was gathered also via direct observations, meeting attendance and archival sources, such as Aida database (Eisenhardt 1989). Therefore, according to Olsen (2004), Blaikie (1991) and Jicks (1979) a 'within method' triangulation was implied to gather data from different sources in order to confirm the same conclusion (Chiucchi 2012).

Therefore, this is a theory-oriented case study (Chiucchi 2012) that with this preliminary description aims at introducing further developments, through interviews and meetings with the company Alpha.

As a primary source of information, the author conducted ten interviews with the entrepreneurs, which varied in length between thirty and forty minutes. The interviews were recorded and then transcribed for the analysis.

The semi-structured interviews were organized by the author by considering the aims of the research and previous literature review. In particular, the interviews were divided into two different parts: the firmer about general information regarding the business management and the company itself; the latter was more specific about the risk management approach.

The three coordinates used to build the specific part of the interviews were: (A) business management and decision-making process, (B) definition of risk and uncertainty, and (C) the risk management process and relationships with customers, suppliers, competitors and institutional entities.

Our considerations about this case can be generalizable at a theoretical level (Lukka and Kassanen 1995) but not empirically (Yin 1994). They would contribute to the knowledge about the organizational practices to manage risks and the role in fostering the development of a

risk culture among SMEs. This formalization of these insights provides important groundwork for understanding the emergent phenomena and a basis for further studies.

4 Findings and Discussion

4.1 Risk Management in Company Alpha

From the interviews with family members, emerged that Company Alpha has no ad hoc risk management function, despite its size, because of the scarce financial resources available and because standardized procedures would burden the business management, which must be flexible and adapt to rapid changes of the external environment.

All those who work in the company deal with particular aspects of business management and related risks.

Also due to regulatory obligations, the management is particularly attentive to aspects such as sustainability, innovation and product quality. Therefore, risk management is performed mainly because it is linked to compliance with regulatory disposals.

The owners are mostly responsible for managing risks, but so is the quality manager.

As regards the decision-making process, the family members argued that all strategic and business decisions are taken by family members, after consulting their sales representatives. Then there are more operational decisions that employees can take independently.

Everything is always shared and family members work closely with their employees. The owners, having an operational role, are very close to the employees and they are inevitably involved in the various information flows, which are constant and direct.

Suppliers are particularly demanding, especially for aspects related to the safety of their products as they operate in the food industry. They often conduct audit inspections of their plant and they are attentive to aspects such as compliance with safety, environmental and sustainability requirements.

Company Alpha does not have any insurance policy to transfer its risks. In addition, risk analysis and management are not formalized in procedures and in a specific process also because they carry out attentive planning and they constantly monitor the evolution of their business. The planning activity is carried out over a period of three years and

periodically an analysis of the deviations is made to understand if it is in line with the achievement of the objectives.

Then there is constant communication with employees about the objectives and intentions of the owners. Turnover is monitored daily, marginality once a month and the analysis of costs is made once a year together with the creation of price lists.

Certifications and regulatory requirements oblige to carry out management review every six months (analysis of company aspects and indexes). This activity is carried done more carefully today because, even if at first it was seen as a burden, it has become a reflection of the corporate culture.

Therefore, it is fundamental to underline the growth and maturity of the corporate mentality, also thanks to the compliance with regulatory requirements and the continuous improvement of the quality standards for their customers and suppliers.

Risk management in Company Alpha is perfectly integrated into other processes and it is closely linked to the decision-making process.

4.2 New Perspectives in Managing Risks in SMEs

This case study helps answer the first research problem (Is that an obligation for a medium enterprise to adopt a formalized risk management process, often difficult to implement because of their business organization and activity?), because it underlines that despite the size of the company, a risk management function or process is not formalized and the firm does not think that it is necessary to weigh down the business management with standard procedures.

If we consider the research of Power, McCarty, Block et al. and Herbane the problem for these researchers is that many SMEs do not integrate the risk management process in their business because there is little knowledge about the potential benefits, there is a lack of a developed risk attitude and behavior. It is a matter of mind-set, managers' personality and history of the company.

However, in this case study, the entrepreneurs show a profound knowledge of their business and a well-developed risk mindfulness. And, from the interviews there emerged that the bigger and structured the company is, the more developed the risk analysis is.

Afterward, by trying to suggest an appropriate way of thinking to find a solution that might lead SMEs to consider risk management as fully

integrated in the business, it is important to analyze what COSO Report (2004) states in the Executive Summary: *Limitations in managing risks can result from the fact that human judgment in decision making can be faulty. Decisions on how to respond to risk and establish controls need to consider the relative costs and benefits, breakdowns can occur because of human failure, such as simple errors or mistakes, controls can be circumvented by collusion of two or more people, and management has the ability to override ERM decisions. These limitations may prevent boards from achieving the entity's objectives.*

Consequently, there emerges that risk management activities are strictly related to strategic decision-making.

The new perspective for the improvement of managers and owners' risk attitude and for the integration of the risk management process in the business of every SME is to start analyzing the way decisions are made. Decision-making is the process of choosing the best alternative to achieve individual and organizational objectives (Guo 2008).

Therefore, as the entrepreneurs argued in the interviews, this process is inherent in all managerial functions and is closely related to the planning function. People responsible for setting and achieving certain objectives are also responsible for managing the related risks.

By considering the findings of this interpretive case study, the similarities between the model elaborated in 2008 by Kristina Guo for health care managers, called DECIDE, and the steps of the risk management process of the COSO Report (Fig. 1) can be effectively observed.

As also indicated by the members of the family business, defining the problem and setting the objectives is the first step in both processes. It is important to establish the risk appetite and the way decisions could be made. Afterward, every manager should consider the possible choice to make and identify events that could generate risks. Thirdly, there emerges the need to make the choice and respond to the risk with appropriate actions. The final step of both processes consists of evaluating and monitoring the solution. It is not enough to just decide. It is crucial to evaluate the decision made and actions implemented and to investigate 'what could go wrong'. This step helps prevent, minimize and overcome all possible adverse consequences. Feedback is important because it provides information related to the decision or risk response. Feedback helps a manager find out whether the decision or control activities led to the intended results, even if unintended consequences may have occurred. Information and communication are always present during these processes.

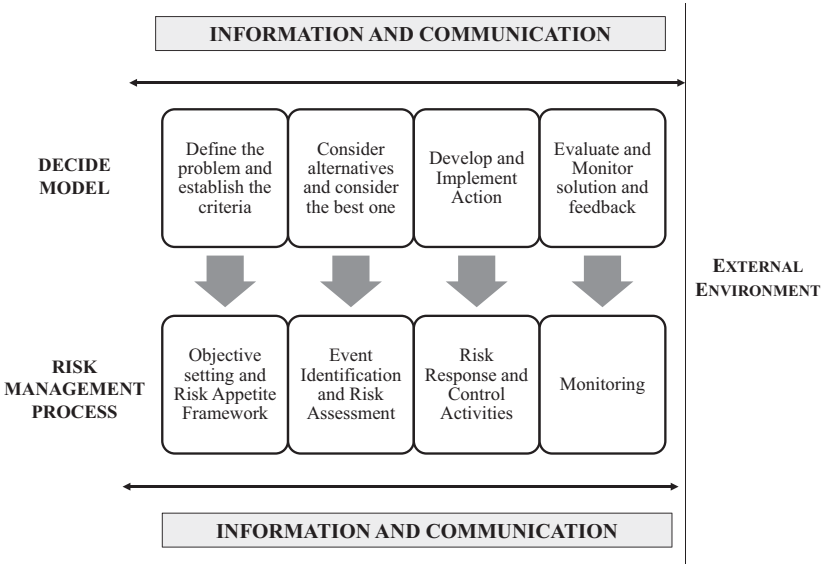

Fig. 1 Risk management process and decision-making model: a comparison (*Source* Elaborated by the authors)

Furthermore, improving knowledge, the risk appetite and the awareness of how decisions should be made means implicitly to start developing a risk consciousness, which can be translated into a sound risk approach. Moreover, corporate culture, values and ethics play a fundamental role in each company because they represent the internal environment that can affect the business management.

To answer RP2 (What is the role of risk mindfulness, consciousness and appropriate approach leading to the development of existing processes to integrate the management of risks therein? Are they more beneficial than having procedures related to a separate and specific process?), the case-study analysis highlights that corporate culture, values and ethics play a fundamental role in this company because they represent the internal environment that affects the business management. Consequently, internal and external environment continuously interact and this relationship influences the business system of each company.

Therefore, in SMEs it is fundamental to develop first risk mindfulness and consciousness, and then an appropriate approach. Only in those

businesses in which the risk approach is well implemented, this process can be improved and formalized. As a consequence, formalization starts being important when the size of the company grows.

5 Conclusion and Limitations/Further Steps

This research underlines that it is important to understand why in most of SMEs risk procedures and control activities are not implemented. There is no need to further underline the importance and the role of the internal control system and risk governance because other researchers did. The real problem is to understand from which point of view it is necessary to restart analyzing again this topic and to suggest a new perspective that could lead managers and owners of small and medium enterprises to improve their risk attitude.

To solve this problem, the solution might be to start concentrating on the human being and on how decisions are made and implemented, and then determine how managing risks should be integrated into those decisions.

Furthermore, it is fundamental to consider that a preliminary and, often unconscious, risk analysis is conducted while making the decision. Therefore, by starting to improve the awareness, responsibility and sensitivity to risks, managers and owners would improve their knowledge about their company and about the risk appetite framework. Only after passing this step, then we could talk about procedures and control activities to be implemented and about the formalization of this dynamic and transversal process.

Risk management, as an integral part of the organizational decision-making process, enables the small and medium-sized company to be resilient and agile in all its activities by dealing with consequences of unforeseen events.

Integrating risk management means adopting ways to enhance and improve the managerial processes that already exist.

As stated by Mikes and Kaplan (2015), effective risk management 'depends', as it is contingent on the organization's context and circumstances. In addition, the effectiveness ultimately depends less on the guiding framework but rather on the people that set up, coordinate and contribute to the risk management process, which acquires a behavioral perspective (Wright 2018).

Furthermore, the risk management process cannot be stable over time (Falkner and Hiebl 2015) as it depends on the life-cycle stages or particular situations (i.e. generational succession in family businesses or buy-out to non-family members) that each SME has experienced. Consequently, continuous improvement of this process, in line with quality management theories, is fundamental.

Therefore, in most SMEs the risk management process should be seen as fully embedded into the business management. According to Power (2009), the focus should shift to the concept of Business Continuity Management (BCM), by concentrating on the 'going concern' assumption and on the need to strengthen the peculiar flexibility of these companies and improve their organizational resilience. It is not possible to consider each process separately from another, as it is would prevent managing a company as a whole entity, perfectly integrated into all its components with the only aim to survive over the long period, by satisfying the stakeholders' needs.

Additional empirical research, regarding in particular the implementation and control of risk management in SMEs, is needed in order to shed more light on the difficulties small and medium enterprises face and in order to identify practical strategies to help these companies.

Multiple-case studies in particular would better fit into this framework because it is fundamental to validate and test theories and concepts analyzed in this study.

As regards practical implications, professionals, as business consultants, play an important role. Gooderham et al. (2004) found that when SMEs are faced with serious competition, firms often use their accountant's advice to try to attain a competitive advantage. The use of an external accountant may mitigate the problem of limited internal resources within the family firm (Barbera and Hasso 2013) because it is not a matter of resources but rather the services that accountants provide that might help a company create value over the long period (Penrose 1959).

For owners and managers of SMEs, a better understanding of the decision-making process and the potential benefits of having a risk-oriented mind-set provides the basis for improving the risk appetite framework and therefore enhancing the setting of organizational objectives.

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CHAPTER 12

Between Climate and Social Changes: How to Struggle Against Adverse Conditions in the Coffee Industry

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1 Introduction

It has been argued that global food systems are undergoing a rapid transformation, which considers farmers, exporters, retailers, big players and the changing attitudes of customers (Chiputwa et al. 2015). All these drivers have a strong impact on global and integrated supply chains, in which the average effort concerns the attempt to empower

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the weakest stakeholders, who represent at the same time both the most critical and the least business-focused ones (Candelo et al. 2018). These weakest stakeholders actually are, despite their economic resources and their scarce possibilities for enhancing their technological knowledge, the starting point of the overall supply chain. They are responsible for the raw materials' volumes and quality, and they often represent the milestone for the global and local players' success (Pfeffer and Salancik 2003; Hwarng et al. 2005; Pettit et al. 2010; Li et al. 2017).

Especially, this situation, together with the necessity of empowering those critical stakeholders, is valid in the so-called luxury food markets (Chiputwa et al. 2015), among them, coffee. Furthermore, the coffee industry presents peculiar characteristics and complexities in the configuration of relationships among companies and their stakeholders (Cerutti and Büchi 2018). It is a business with a complex, long and peculiar value chain whose sustainability and responsibility have been exposed to critics, especially in regard to its strong link to some of the poorest areas of the world, where coffee is cultivated (Potts 2003; Blowfield and Dolan 2010; Valkila et al. 2010).

Nowadays scholars' and managers' attention has been focused on the supply chain upper lever because of its peculiarities, its growing opportunities for the developing countries, and its risks for roasters. The aim of this research is to analyze the business risk concerning the provisioning of the key raw material (coffee beans) by the roasters, which is emerging in the industry and, therefore, threatens it.

Indeed, in recent years many authors have analyzed the coffee industry and the great changes the sector is facing. One of them, in both the short and long terms, is climate change, which heavily influences the equatorial areas of the world (Masters et al. 2010; Davis et al. 2012), tightens and moves the lands of coffee cultivations.

This specific risk concerns coffee famers, but it threatens to strongly and negatively impact the whole industry since the quantity and the quality of the roasted coffee depends on them (Bongase 2017).

According to these considerations, the present research aims to answer the following question: (RQ1) Can a roaster reduce the negative impact on coffee coming from the climate change business risk by leveraging farmers and their potential?

In order to respond to RQ1, a conceptual framework based on a literature review over climate change as a business risk in the coffee industry is being provided.

For this purpose, a focus on the role that a roaster can have upon the upper level of his supply chain as well as his negotiation strategies has to be carried on. Thus, besides the literature review, interviews with roasters' managers allow to choose a representative country in which climate change is impacting the coffee cultivation and the economy of the population as a whole.

A case analysis based on the Ugandan coffee industry and the impact of climate change on it represents a further step in answering RQ1. Uganda is one of Africa's major coffee exporters, and, through the National Development Plan (UCDA 2015), its government has aimed to reach 60 million coffee bags by 2020, starting from four million in 2014.

Obviously, Uganda is strongly affected by the above-mentioned risk and its consequences, and its economic and political situation is rapidly evolving (Bunn et al. 2015).

Results from the analysis will show that the business risks concerning climate change represent a real threat affecting coffee quality and quantity, and this is a real risk that a roaster has to face. Furthermore, both the literature review and case analysis reveal that concrete actions can be implemented to protect crops and local farmers' incomes and quality of life.

In particular, these actions need to be carried on with a strong roaster commitment, since its international power and its negotiation skills. The Uganda case demonstrates that a roaster must exploit their potential as a main actor throughout their supply chain to concretely protect the quality of the finished product and increase its profitability in the long term.

Therefore the overall objective of the research is to understand how it is possible to limit the risks connected to a complex supply chain like the one for coffee.

The present paper is divided into four main parts. The first paragraph aims to scientifically analyze the literature related to climate change in the coffee sector. In particular, the research highlights the risks that could affect the quality and quantity of coffee production and the impact on the population traditionally dedicated to its cultivation. The second goal of the literature review is to identify, among the main areas of the world affected by climate change, those which build a significant case history for the research.

Then follows a paragraph dedicated to the methodology, with the Uganda case study analysis, that answers the research question. Data analysis and discussion close the construction of the case, highlighting the most effective actions for risk management and proposing concrete

solutions dedicated to the areas of the planet that are threatened both in business and at the level of a humanitarian emergency.

Conclusions, limitations of the research and future steps of analysis close the paper.

2 Literature Review: Impact of Climate Change in the Coffee Industry

Coffee is one of the most traded raw materials in the world as an object of international trade (Davis et al. 2012). The first producer and exporter is Brazil, followed by Vietnam and Colombia. Moreover, for some African countries such as Uganda, Ethiopia, Burundi and Rwanda, coffee is the main source of revenue and international trade (DaMatta et al. 2018).

The economies of countries whose revenues come mainly from the coffee sector are threatened by climate change taking place in the world. The main causes of these climate changes are the use of coal, oil and other elements that increase the presence of CO_2 (carbon dioxide) in the atmosphere. CO_2 and methane, in turn, cause the greenhouse effect (Bongase 2017; Masters et al. 2010).

Some fundamental considerations are needed to fully understand the influence and consequences of the greenhouse effect on the coffee sector.

Most coffee is produced from two species: Robusta coffee accounts for 30% of global production, and Arabica coffee accounts for the remaining 70% (Bunn et al. 2015).

Coffee plantations live about thirty years, but their life span can last for up to 50 years (Bunn et al. 2015). This element is important for understanding the true impact that climate change can provoke in this kind of farming.

Climate and temperature are key factors that affect the life, productivity and quality of coffee. In this regard, ongoing climate changes in the world are considered real problems for many reasons. Coffee requires specific environmental conditions that are slightly different depending on the variety. But all varieties of coffee have in common these needs: an equatorial climate and high humidity.

The average temperature required for Arabica coffee crops ranges from 15 to 24 degrees Celsius, with precipitation of about 2000 mm per year and an altitude between one thousand and two thousand metres

above sea level. Coffee Robusta crops need a temperature between 24 and 30 degrees Celsius, precipitation of about 2000 mm per year and an altitude of about 800 metres above sea level (Bongase 2017).

Climate change is expected to increase average temperatures and will change precipitation levels, too, leading to the disappearance of entire coffee-producing areas and the appearance of other areas potentially suitable for such cultivations (Bongase 2017) in other parts of the same country or in different countries.

First of all, the increase in temperature caused by climate change raises the possibility that the coffee plants get sick, as some types of fungus become more resistant to high temperatures and new types of diseases develop and damage the plant (Jaramillo et al. 2011). The consequence in the short term is lower productivity, while in the medium and long term it will be the development and use of new remedies, probably in the form of chemicals. The coffee plant could thus become less healthy or otherwise less natural and different (for quality, flavour, weight, other). In any case, this component of the supply chain will have to incur higher costs.

A further change caused by the greenhouse effect is the reduction in the proper areas for coffee cultivation all over the world. For example, in the main producer countries, Brazil and Vietnam, this reduction may be significant. On the other hand, in parts of East Africa and Asia there may be an increase in the availability of suitable areas, but it is not secondary to point out that these areas are partially forested (Bunn et al. 2015). This means that an investment would be necessary to make coffee cultivation possible.

Which component of the supply chain or, more generally, which stakeholder will support these costs?

Furthermore, since the coffee varieties on the market have a narrow genetic base and a narrow climatic range (Bunn et al. 2015)—and, therefore, similar needs—changes in temperature or climate act negatively on most coffee plants. The plants may take up to decades to overcome the stress caused by changes, to adapt to new conditions, and ultimately to return to maximum productivity and quality (Eskes and Leroy 2008).

The altitude of the land is a further fundamental element for the cultivation of coffee. This essential production factor makes it very complex to move agricultural crops.

Moving a cultivation to a different altitude means having to wait for the time necessary for the ideal biodiversity (animal and plant) to recur.

An example of the complexity of this crop is the fact that the water in the soil should be the right level for each stage of growth of the coffee plant (Camargo 2010). The decrease in rainfall or the displacement of different soils could alter this balance, decreasing or changing the quality and characteristics of the crop.

Coffee producers would suffer from the relocation of the crops to the most climatically suitable areas, because they should migrate to preserve their work. Therefore farmers will be faced with only two alternatives: to lose their jobs or emigrate to maintain them (Baca et al. 2014). Besides, the changes to be made to the land to suit the needs of coffee may cause damage to the entire ecosystem (Laderach et al. 2009).

In East Africa the areas that are today suitable for coffee cultivation could suffer a strong decrease in the future. In Uganda it will become possible to cultivate Robusta coffee (the main source of revenue for the country) only at high altitudes (Bunn et al. 2015), with damage and inconvenience to the farmers but with a cost advantage because these areas are not covered by forest (while others are).

It appears that the displacement of the cultivation of coffee (or other raw materials) does not necessarily generate the same result, especially as farmers change (i.e., people with different experiences undertake this activity for the first time). The success of the agricultural sector is tightly dependent upon people, traditions, and skills: experienced farmers are a source of competitive advantage. This is an additional trouble for the farmer and a risk for the roaster.

Alternatively, an opportunity for East African countries may derive from the progressive decrease of highly productive areas in Brazil and Vietnam: if stakeholders (roasters, policy makers, governments, investors) could deliberate to invest in them (Bunn et al. 2015).

The displacement of crops, the work to adapt new lands, the time required for the new plants to grow, the greater need to irrigate plants, and the possible difference in the final result cause an increase in costs at the highest levels of the supply chain.

The lower productivity in terms of quantity and quality of coffee can therefore generate lower profitability and a greater need to manage the risk arising from it, even for some decades, particularly due to the periodic drought that manifests itself in areas where there are many coffee plantations (Killeen and Harper 2016). It is reasonable to infer that the lower productivity of the areas currently cultivated with coffee can lead to a price increase. Otherwise, the farmer will have less ability to make

investments in both production and innovation as well as have potential problems with supporting his family. There are at least two logical consequences: the indebtedness and the abandonment of the traditional work.

Climate change could therefore have devastating effects, from the human point of view, upon people who, in some areas of the world, have few alternatives for subsistence (as mentioned above).

According to Vega et al. (2003), about 70% of the world's coffee is produced by small farmers, comprising over 20 million families (about 100 million people) (Pendergrast 1999) who depend on this production for subsistence. It promises to be a real humanitarian emergency. For example, in countries such as Uganda (which mainly produces Arabic coffee), climate change is decreasing the area that is cultivated with coffee (Jassogne et al. 2013).

The good news is that coffee sales in the world are increasing, because of both current consumption and future increases in the global population. It seems that by 2050, two and a half times the amount of land that today is used for growing coffee will be needed for coffee production (Bunn et al. 2015).

From the roasters' point of view, one of the financial instruments used to mitigate the risk caused by climate change is comprised of specific insurance products linked to climatic events. The limit of this method lies in the fact that temperature and rainfall data of some areas of the world are not accurate or even available (Bongase 2017).

In addition to the financial methods for risk management, the roaster also uses completely different solutions, with the aim of guaranteeing and increasing the sustainability of the upper level of the supply chain.

The roaster, depending on the geographical areas of interest, works with the aim of mitigating the risks related to coffee production and the farmer. Coffee exporters and non-profit organizations are the subjects that directly carry out projects in the territory together with the roaster. Uganda, whose economy is closely linked to the export of coffee (DaMatta et al. 2018) and whose production is threatened by the effects of climate change, is a case study of scientific interest.

3 Methodology Design

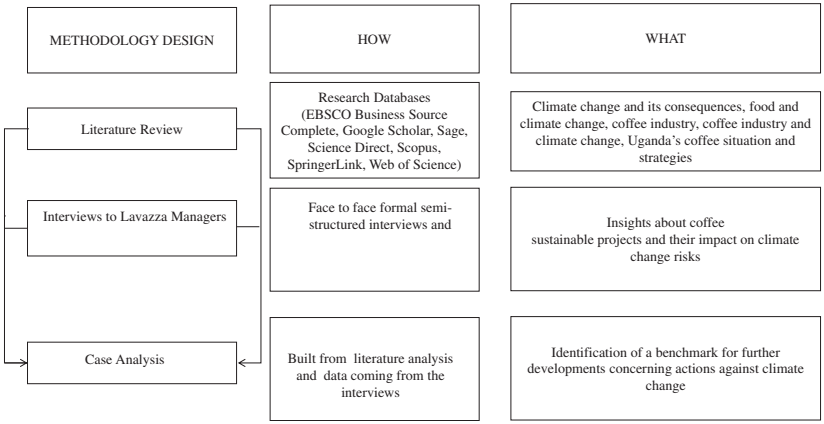
In order to answer RQ(1), the literature review analysis proves that climate change nowadays represents a common and contemporary problem (Cerutti and Büchi 2018). It is not about something that will

happen in the future, but it is something that has several effects today. Furthermore, climate change is heavily affecting cultivations in the equatorial part of the planet, places in which coffee cultivations seldom represent the biggest source of livelihood. This is the reason why the literature review represents the first element of the present paper's methodology and then moves to the case analysis, which consists in the screening of one country, Uganda, and a deep analysis of a leading Italian roaster, Lavazza, sustainable project carried on together with a retailer named Sucafina and the Kahawtu Foundation.

Going deeper, in the interest of data triangulation (Stake 2013; Yin 2003), formal semi-structured interviews (Russell 1988) were conducted with sustainability managers and risk management consultants at Lavazza in order to gather information about the aims of the sustainable projects and the achieved results.

First, the case analysis represents a further step for answering RQ(1), and it results from both the literature review and the interviews since, as already stated by Yin (1994), the case studies are a good way to discover "how" questions. They are appropriate when sample behaviours cannot be manipulated by the researchers and, eventually, when contextual conditions are relevant to the phenomenon under study. Second, Lavazza's internal material and documents have been used in analyzing Uganda and the first output of the Fondazione Lavazza's sustainable projects

Table 1 Methodology design



adopted there. Moreover, one case analysis (Eisenhardt 1989; Eisenhardt and Graebner 2007; Dyer and Wilkins 1991) has been conducted to gather deeper information about an emerging trend.

Authors have developed an analysis on Uganda as a sensitive coffee producers' country, since this country has been treated as a very important place to cultivate coffee, as already stated above.

Data have been gathered in multiple occasions over a period of 6 months, starting in March 2018.

The case study has as its background the literature review of academic publications and databases (i.e., EBSCO, among others) conducted over developing countries by focusing on the coffee industry.

The following Table 1, summarizes the research design and shows triangulation among the sources.

4 Data Analysis and Discussion

4.1 Uganda: Behind the Coffee Cup and Before the Climate Crisis

Uganda is Africa's largest Robusta producer, accounting for 7% of global Robusta exports. Furthermore, Uganda is one of the top coffee producers in Africa, accounting for approximately 2.5% of global coffee production. Coffee is also the most important export crop in Uganda, because 85% of the coffee grown in the country is Robusta, which is indigenous to Uganda, while the rest is Arabica (Chiputwa et al. 2015).

The cost of production is low since farmers use their family to cultivate coffee plants, and plant outputs are low and vulnerable as a result of climatic issues and drought periods. If compared to the other parts of East Africa, Uganda contains a relatively efficient supply chain that also represents a long-term basis of competitive advantage, even though this is not the only element necessary for strong future growth.

Uganda's coffee comes from 1.7 million smallholder farmers, who represent the highest population of coffee farmers in the world. Uganda's farmers are dispersed across the country and generally grow coffee as part of a diversified portfolio of food and cash crops. Farm sizes are extremely small and have been growing smaller as parents divide their land holdings between their children. One peculiarity to underline is that most farmers are not organized in groups or cooperatives but instead sell their coffee to local collectors, who aggregate volumes for delivery to exporters (UCDA 2015).

Concerning the repercussions of climate change, in coffee year 2014–2015, the interest in these issues started to grow since they have several direct effects on coffee plants: higher temperatures, more frequent and extreme weather, and shifting seasons that will negate the efforts put into increased production and productivity. According to annual coffee industry reports (i.e. UCDA 2015), Uganda's associations feel the need to mitigate the effects of climate change through good agricultural practices (GAPs), such as mulching, growing shed trees, digging trenches to control soil erosion, harvesting rain water for irrigation and applying fertilizers. Also, the country itself is addressing its efforts and several resources in finding good answers to this urgent risk.

For instance, from the policy and strategy point of view, the year 2014–2015 was particularly interesting because the government approved the National Coffee Strategy (NCS), which was developed through stakeholder contributions. The NCS specifies the emerging issues and challenges, especially of adapting to climate change. This requires efforts in first developing and increasing the institutional commitment that is at the forefront of placing Ugandan coffee in the international market.

Furthermore, a programme called "The Plant Health Management Program" has been thought to develop solutions for ensuring healthy coffee and cocoa plants to maximize productivity. The programme aims at managing and mitigating the harmful effects of pests, diseases, weeds and the changing climate as well as ensuring proper plant nutrition.

On the other hand, despite what is said about periods of drought, sometimes climate change causes an excess of rain, above normal, which results in floods. Any slightly sloping land may be eroded, and consequently the top soil, which has organic matter, is lost, and soluble nutrients, like nitrogen and potassium, are lost through leaching, causing a high soil acidity, which is not a good condition for the cultivation of coffee.

4.2 Lavazza and Its Sustainability Projects: Inside the Sustainable Development Goals and Against the Climate Change Risk

In 2011 Lavazza strategically decided to go further than its business responsibility towards the environment, community, customers, and stakeholders as a whole by developing a formal company stakeholder responsibility (CSR). It is based on an awareness of all the aspects of the

business and its impacts throughout the value chain by legitimating the power of local smallholders and cooperating with them to achieve more effective and efficient social and economic outputs. CSR was formally set up as a business function within the organization through the identification of a CSR manager who had to pursue a specific duty: to structure the CSR in order to involve the entire organization's business functions and primarily embed the value chain and the partners (Cerruti and Büchi 2018). From a set of strategic reasons, CSR has evolved to an integrated and systemic function of cooperation, partnership development and life cycle assessment that focuses on value creation for the business and the community. What said has during the last five years evolved, leading Lavazza's managers to the concept of sustainability, which for Lavazza is not only a goal; rather, it represents a point of departure of a virtuous circle, which can lead to savings—thanks to innovation processes—and larger investments that can converge on further innovations.

Sustainability projects have been defined by Giuseppe Lavazza as "creative, characterized by scalability, global, circular and, a property of the whole system" (Nembri 2015).

Issues to emphasize include the implementation of sustainable contributions to activate projects tailored for the empowerment of key stakeholders in particular geographical areas, where conditions do not support agriculture. Especially, given that the coffee industry sees a dramatic increase in consumption (every 10 years about 20 million more coffee bags are required by the market), sustainable and responsible practices become even greater challenges for players.

In order to meet this trend in growth effectively and efficiently, Lavazza, among various players, appears to be highly involved in responding with an increase of productivity rather than other unsustainable choices (such as deforestation or over-exploitation of lands, without concern for local communities). It is clear that sustainability is firstly based on economic advantages that benefit the firm and the local farmers at the same time in a win-win situation. Without providing smallholders and local farmers with economic autonomy first, it is, in fact, very difficult to refer to environmental and social sustainability.

Within sustainability, every empowerment project appears to be characterized by stronger ownership and engagement of the communities through partnerships, meaning that only actual needs referring to work and smallholders' life conditions are considered as priorities and pursued in cooperation. Moreover, projects are set up according to the

institutional peculiarities of and relationships with governments of each country, since equatorial countries represent the high-level supply chain of Lavazza's business and strategy.

Concretely, the main projects of empowerment vary from the most renowned, such as Tierra and Coffee and Climate to others carried out in Brazil, Uganda, Ethiopia, Tanzania, Haiti, the Dominican Republic, India, Vietnam, and Indonesia. The Fig. 1 shows the projects and the 2015 UN Sustainable Development Goals that Lavazza could reach.

As it is easy to understand, Lavazza considers it fundamental to find solutions for the climate issues (yellow columns), since they represent a big threat not only for the environment, generally speaking, but a scary problem for the business itself. Furthermore, as stated by Lavazza's sustainability managers and risk management consultants, climate change does represent a medium to long term risk. This kind of risk is considered, nowadays, important above all for the sustainability unit, since its repercussions will become urgent in terms of the quality and quantity of green coffee in the future. This means that this risk is not present among the 20 most urgent risks that comprise Lavazza's risk management model, since it refers to the firm's current strategic plan, which is planned until 2021.

On the other hand, it is clear that the impact of climate change on coffee cultivation will affect the whole coffee industry in the future; this issue should be considered to be fundamental today, not tomorrow.

4.3 The Sucafina Project: Supporting Coffee-Growing Communities Through Sustainable Farming Practices

The considered case is increasing productivity and improving the quality of traded coffee is one of the objectives of companies involved in coffee buying, processing and exporting amidst growing competition to gain direct access to coffee farmers. With funding from Lavazza and co-funding from Sucafina, the Kalungu Cherries Project has been implemented since 2017 in the Kalungu District, Uganda. The project's scope covers the three sub-counties of Lwabenge, Bukullula and Lukaya town council.

The main goal of the intervention is to help 6000 coffee farmers understand and adopt some sustainable and productivity-enhancing practices. The results of these interventions will not only improve the social and economic conditions of coffee farmers' communities, but also lower the risks associated with climate change. The project consists of the

-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
I) TIERRA 2 Brazil Iambarì		X		X									X				
II) TIERRA 2 Kilimanjaro		X		X													
III) INDIA 2 India Karnataka	X	X	X					X									
IV) TIERRA 3 Ethiopia C.A.F.E		X		X	X					X			X				
V)IDH Sustainable coffee program		X						X									
VI) OXFAM Cafè Hispaniola		X		X	X					X							
VII) CARCAFE' Colombia, Meta				X				X	X				X				
VIII) VERDAD Y VIDA Guatemala, Alta Verapaz	X			X	X					X						X	
IX)APP Indonesia																	
X) SUCAFINA Uganda		X		X		X	X	X			X		X		x		
XI) ICP MINAIS GERAIS Brazil, Minais gerais								X					X				
XII) ICP TRIFINIO Guatemala Honduras El Salvador				X								X	X				
XIII) ICP Tanzania regional				X				X					X				
XIV) ICP Building coffee farmers Alliances Arabica		X															X
XV) XVI) ICP San Martin, Perù		X			X						X		X				
XVI) ICP Indonesia Sumatra		X			X							X					
XVII) Coffee and clima				X									X				
XVIII) SAVE THE CHILDREN India, Calcutta		X	X							X						X	
XIX) NEW PROJECTS Cuba, Indonesia, America & Africa																	
XX) OLAM VIETNAM Dak Lak, Vietnam				X		X							X				

Fig. 1 Lavazza projects and SGDs (colour figure online) (*Source* Adapted from Lavazza internal material)

following activities: implementing capacity building programs in GAPs, harvesting and post-harvest handling (PHH) practices as well as farming as a family business (FaaFb). Other interventions include financial inclusion through village savings and loan associations (VSLAs) and crop diversification. The project targets 6000 farmers who are to be aggregated into the so-called producer organizations (POs) and into some depot committees (DCs).

More deeply, the main goals are about:

a. Enhancing the skills, knowledge, and competencies of 6000 smallholder coffee farmers aggregated into POs and DCs
b. Increasing coffee yields by training 6000 coffee growers in a given set of GAPs, including environmental protection and mitigation, to address challenges of climate change
c. Supporting smallholder farmers to become sustainable entrepreneurs, competitive and independent.

Among the expected results (summarized in Fig. 2), the main goals that directly concern climate change are about the training concerning practices against climate change and in favour of more efficient coffee growing. Those practices are called GAPs, and they concern:

- the aggregation of 6000 farmers into 200 POSs and into 12 DCs;
- the creation of 200 demonstrations for training the POs;
- GAPs training for all the farmers involved;
- an increasing of GAPS adopted practices (at least 60% of farmers were expected to adopt the 70% of GAPs); and
- an increasing number of coffee yields per hectare (up to 539 kg of green per hectare).

At the end of March 2018, data concerning the goal to reach against the coffee climate repercussions showed the following situation:

- A total of 1924 farmers have been reached (female–786 and male–1138) with the aim of attracting a total of 3900 by the end of December 2018.
- A total of 59 lead farmers have been trained, 11 females and 48 males. 11 out of 59 are young people. It has used the GAPs and the farmer field school (FFS) methodology. GAP sessions were

Goal	Description
Farmers 'training	Implementation of GAPs and grouping farmers into POs and DCs
Access to inputs	Providing of two clonal coffee nurseries with good quality seedlings
Access to finance	Development of effective and efficient business management practices and systems.
Access to markets and information	Implementation plan for establishing full traceability of coffee is in place.

Fig. 2 Sucafina projects' expected (*Source* Lavazza internal documents)

organized and focused on fertilizer applications in 59 producer groups in order to provide information about the various fertilizers and their application rates (such as Urea, Calcium Ammonium Nitrate, Di-Ammonium Phosphate and a combination of Nitrogen, Phosphorus, Potassium).

- The so-called *Demo gardens* have been established (three of them have been carried on). In addition, GAP trainings were delivered to the POs for spreading modern farming methods for controlling pests and diseases. A total of 27 farmers (female–18 and male–8) out of the 75 targeted attended.
- A total of 52 representatives from 5 DCs participated in trainings in harvesting and post harvesting handling practices (13 females, 39 males, and 10 youth).
- Concerning the collection of production data for estimating yield increases, staff are in the process of collecting baseline information on the number of productive trees per farmer per acre. This information will be incorporated in the baseline study report that will be finalized and shared at the end of quarter three (Q3).

The data above show that the project is, little by little, reaching its purposes, despite it is never easy to involve in long terms goals people who, by nature and culture, are characterized by some vulnerability factors, such as poor education, complex and instable political and economic conditions, market and pricing instability, reduced trading capabilities and negotiation power, asymmetry of information, climate change and a sort of lack of business continuation (Candelo et al. 2018). Furthermore, the training and the agriculture practices are

teaching farmers how to exploit the ground despite main threats like climate change and, by consequence, poor soil conditions.

Climate change is, for the famous roaster, a considered and important issue even though, as stated, it is not considered among the most urgent risks that must be coped with. Climate change, in fact, is considered an element of a "monitoring internal scorecard" with which Lavazza board members and their consultants are evaluating factors that can affect future coffee costs and prices.

5 Conclusions and Field Analysis Implications

The literature review and the case analysis have basically confirmed that climate change is nowadays perceived as a long-term risk, even though it is urgent to rethink the strategic plan in order to insert it in. In particular, every player who has to cope with a long and complex supply chain, as a roaster does, should improve actions through which training its critical stakeholders in order to protect them and their raw material from climate risk. The main challenges follow below.

- Loss of information about local farmer registration: it represents a considerable waste of time
- Delay in defining some project KPIs: it is mainly due to staff turnover, community mobilization, re-planning and streamlining implementation, which took a bit of time, delays in project commencement due to late release of funds
- Delay in training farmers and the difficulties of reaching them through the local staff
- Peculiarities of raw material (in this case, coffee cherries) and its reaction to current drought periods which needs more training concerning the adoption of climate smart solutions, like soil and water conservation, agroforestry, and soil fertility management
- Difficulty in financing farmers because of the high risk they still represent
- Characteristics of the local soil and the territory that, as in the Uganda case, represent one of the major causes of low production in the face of growing demand.

Furthermore, the training on fertilizers and herbicides requires that farmers receive further training in the safe use, handling, and disposal of waste.

Eventually, climate change risk has many consequences for different issues and several levels of the same supply chain; it is more, because we are talking about something that impacts firms' strategies whereof consequences will be in the medium and long terms. Managers have to insert this kind of risk in their risk management models if they do not want to be late in defining tomorrow's strategies.

To conclude, it is possible for a player to act in order to beat a risk coming from the external environment, even though this risk apparently derives from an issue which cannot be handled by a single firm. The coffee industry teaches that it is possible to lever on critical stakeholders, even though they present themselves as weak, to face the environmental problem.

The limit of the research is the analysis of a single country, Uganda, and its specific case history. Thus, the next step could be to apply the suggested actions and plans to larger areas of the world.

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CHAPTER 13

Direct Compensation and Risk Management: A Key Study from the Insurance Sector

Valter Gamba, Francesco Venuti, Canio Forliano and Mattia Franco

1 Introduction

The most recent developments in the non-life insurance business have resulted in insurance companies paying more attention to their clients, more efficient management of claims, quicker settlement and greater effort to preventing risk.

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An interesting evolution of non-life insurance business strategies can be seen in assessment and repairs processes. When a policy-holder makes a claim against an insurance policy for a loss or damage, the insurer can decide to repair, rebuild or replace the property or offer a cash settlement, under the policy's terms and conditions.

In order to provide these services, many insurance companies have started building strategic networks directly with building companies, garages for vehicle repairs or service centres for household goods and specialist suppliers. Insurance companies need to find reliable contractors that will repair, rebuild or replace the policy holder's property as quickly and cheaply as possible, and to the best quality possible.

Over the last decade, new companies in countries like Spain, France, Portugal and Brazil have specialised in the management and repair of claims for homes, businesses and communities. This process is much less developed in Italy and many insurance companies still provide cash settlement, with higher costs and increased risks of fraud.

Only recently, new companies have emerged in the insurance market—including Italian—that specialise in offering insurers integrated management of the assessment and repair process, reducing costs and risk. This business can most certainly be considered risk prevention.

This paper examines ***Turin Insurance Services Opere*** (**TIS**) which is an Italian company founded in 2016, that offers a complete service of managing and preventing claims. It has innovative solutions ranging from traditional skills to innovative processes and modern risk management systems.

The methodology adopted is an explorative qualitative case study (Baškarada 2014; Baxter and Jack 2008; Yin 2003) as described in the next paragraph.

2 Analysing the Literature

For years, people's and companies' attention has been focused on the risks they are exposed to as well as being influenced by multiple changes due to a strong economy, fast technological change and political-governmental instability. This phenomenon sparked development of prevention issues which caused insurance applications to rise. Consequently, insurance companies offer services represented by taking on risk against compensation (c.d. "*award*") weighed against the probability of those

events taking place which those risks refer to.[1] This work presents a thorough examination of issues connected to a particular type of risk i.e. the ***insurance risk***[2] and given the importance of its role, insurance companies issue specific contracts. In fact, insurance companies have their own "*risk management*" (Calliano 2012) centre whose main role is to identify various stages of recognising, assessing and problem-solving issues that could "damage" their business. In fact, unlike normal corporate risk, insurance risk is more complex. This is due to the natural correlation and involvement created between a third party and the insurance policy's main objective which is to protect it. There are also technical-financial aspects to bear in mind that complete the picture, for example, inverting the financial cycle, portfolio policies and the enormous items on the financial statement (Gismondi and Di Gregorio 1997). In the following paragraphs, research into insurance risks and their management will be examined in detail using key arguments and tools that support this study.

2.1 Key Risks and Their Management

One important role is covered by two key risks (Hull 2015) which affect significant decisions for insurance companies. The first is ***moral hazard*** or ***moral risk*** (Teale 2016) and it comes from an asymmetry of information among individuals that results because individual actions cannot be observed and checked (Holmstrom 1979). This problem is also linked to the fact that policyholders pay less attention to reduce the risk of harmful event. For example, people insure their cars to protect themselves against theft and fire, so consequently they are less likely to be "*careful*" and they do not take preventive measures like antitheft systems, because

[1] See this for a more economical concept: C. de Ferra, *L'assicurazione: nozioni, concetti, basi matematiche*, Etaslibri, 1995, who considers "[…] *l'assicurazione come una cessione del rischio da parte di un soggetto più debole a un soggetto più forte. Il contraente, soggetto debole, si libera di un rischio cedendolo alla Compagnia di assicurazione, soggetto forte, ed in cambio versa il premio*".

[2] From a legal point of view, the doctrine highlighted that the risk makes up « *elemento essenziale del contratto di assicurazione* » (Pothier 1842). In fact, considering the Code, article 1895 of the Civil Code recognised « *Inesistenza del rischio* » sottolinea che "*il contratto è nullo se il rischio non è mai esistito o ha cessato di esistere prima della conclusione del contratto*".

possible damage will be covered by the insurance company. Another example is when a person buys health insurance and expects more assistance than before. So, the fact that people are insured, encourages them to lower their guard and, at the same time, to use the insurance services available more than necessary. The insurance literature has often discussed this phenomenon, identifying moral hazard as every deviation from correct human behaviour that may pose a problem for an insure (Heimer 1989; Pauly 1968). In other words, the moral hazard is defined as *post-contract opportunistic behaviour* because it shows itself once one is safely insured. There are, however, certain measures to manage this risk like the deductible or reduction in fees following steps taken to reduce the risk (e.g. installing a burglar alarm). The aim of these measures is to make the interests of the insured the same as the insurance company's.

The second risk is ***adverse selection*** (Giampaolino 2013) which, unlike the moral hazard, is a *pre-contract opportunistic behaviour* due to the fact that: before concluding an insurance policy contract, people have private information that allows them to see their future more clearly compared to information data and that the insurance company has on file. A practical example is when an insurance company is not able to distinguish good drivers from bad and offers the same bonus to both with the probability of attracting more bad drivers. In the same way, if it cannot distinguish between healthy and unhealthy people and offers the same bonus on both their life insurance, it will probably attract unhealthy people, too.

Adverse selection cannot be completely overcome, but companies try to acquire information about potential clients, in order to minimise risks and manage them in the best way. Therefore, during the pre-contract stage of life insurance, the person is asked to have a physical check-up by an authorised doctor. Alternatively, before offering car insurance, the company will try to get as much information as possible on the person's driving habits as well as collecting information on the driver, like accidents. They will make annual changes to the no claims bonus reflecting this and yet another way of managing and limiting the risk are the compulsory collective policies (e.g. RCA) (Hull 2015). So, both these two risks—moral hazard and adverse selection—derive from an information asymmetry i.e. one of the two parties of the contract has less information than the other.

2.2 *The New Way of Managing Risk*

Over time, insurance companies have had to face increasing numbers of extreme cases like earthquakes, tsunami and natural disasters, etc. These events are considered very expensive with the risk being that insurance companies suffer significant losses. Consequently, the derivatives market has developed a series of products to cover natural disasters. The most popular are the "catastrophe bonds" (CAT) (Aase 1999; Carpenter 2007; Hull 2015). By transferring insurance risk, CAT is an alternative to traditional reinsurance. They offer a solution of potential cover against infrequent and serious events, by transferring the risk from the reinsurer's financial statement to the capital market.

In practice, they are bonds issued by a special purpose vehicle which is controlled by the insurance company and that pays higher than usual interest rates. In exchange for this additional interest, the policy holder runs the risk of losing interests, capital or both should a natural disaster occur as the funds are transferred to the risk originator as set out in the reassurance contract.

Last, but certainly not least, it is important to underline how the concept of insurance is much greater from an economic/social point of view and can be seen in one or more policy holders' needs to transfer the risks of a negative event to an economically stronger one (e.g. insurance company). This is to avoid economic—but not only—consequences which would be unsustainable for the insurer after the event.

3 Objectives and Methodology

This study focuses on explaining "*how*" and "*why*" the evolution in the insurance business in Italy has led to new companies offering sophisticated products tailor-made for clients.

This particular case was chosen as it is the first—and only, for the time being—to reposition itself strategically in order to offer new insurance services in the "non-life" sector.

Realistic and complete understanding of the evolution of the business would have been impossible without taking the players' strategic moves into account and which would, ultimately, affect the market with new products and services. So careful and methodological research was carried out and organised into the following consequential phases:

a. Discussing the current environmental scenario and the market where businesses offer insurance cover (and not);
b. Analysing the obligations and environmental conditions currently in force;
c. Identifying actions already put in place by those operating in the market and selecting one or more cases to analyse.

While cases were being identified for analysis, **TIS** came to the fore. Operating in the insurance sector, it offers innovative services designed to positively influence risk management within the insurance sector, both from the insurer's[3] point of view as well as the claimant's.

A careful analysis of the business was then carried out including a detailed check of their internal and external documents as well as a series of interviews with directors and area managers.

This line of investigation was deemed suitable in order to provide answers to the questions asked earlier.

3.1 In Context: The Insurance Business (Summary of Data)

The legal definition of the insurance business is described in the article 1882 of the Italian Civil Code as: "*Insurance is the contract whereby the insurer, against the payment of a premium, is obliged to repay, within the agreed terms, the damage caused to the insured party by an event, or to pay a capital or an annuity upon the occurance of an event affecting the human life*".

So, insurance cover can be due to cover of different risks, summed up in these two macro categories:

- Damages: car, protection of estate against damages to one's property (home, business) or caused to third parties (general civil liability)
- Life.[4]

[3] As we will see later, this reorganisation of the business makes a contribution to containing corruption and fraud, which today is on average higher compared to other similar markets in the EU.

[4] There are also multiple products covering pension/social security? Issues in this branch.

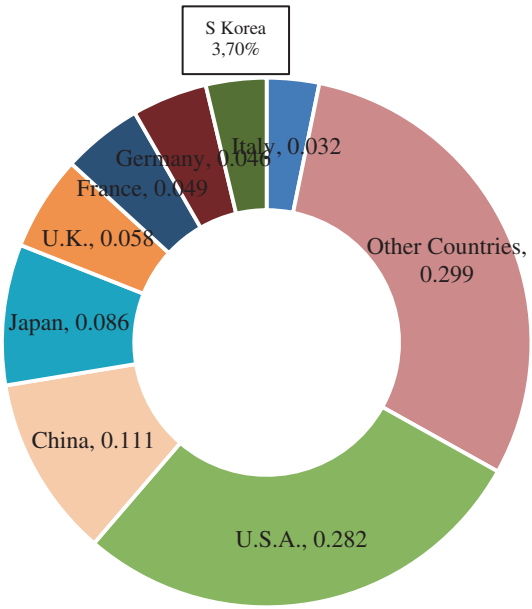

Fig. 1 Quantitative data of the worldwide insurance sector (*Source* Own elaboration)

Quantitative data of the worldwide insurance sector (Fig. 1)[5] highlight how the overall value of insurance premiums totals 4330 billion Euros and the Italian market is in 8th place worldwide and 4th Europe wide. Even though its market share dropped from 3.4 to 3.2% compared to 2016, it is still worth mentioning.

Even more impressive is the data comparing premiums paid when measured against the Gross Domestic Product. Italy reports 7.6% (down from 8% in 2016), following Great Britain (9.6%), France (9%) and Japan (8.6%) with an average premium of 2355 Euros per inhabitant compared to 3732 Euros in the US.[6]

So, it is possible to see the importance of the sector to the Italian economy excluding—at least for the time being—considerations about cost of the premiums compared to other industrialised countries and development of the insurance market. There is a total of 213 Italian

[5]This data has been processed from source Swiss Re (Sigma n°3/2018—data 2017).

[6]Great Britain €3.373, France €3.050, Japan €2.932 and Germany €2.379.

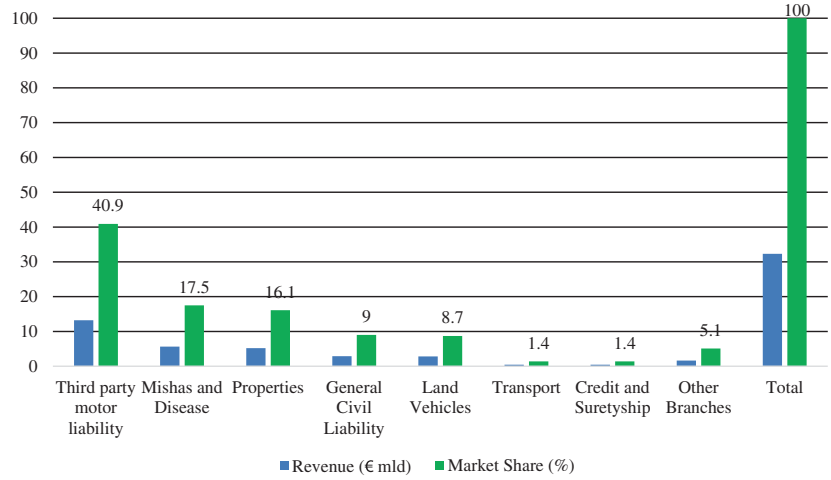

Fig. 2 Premiums of Italian direct portfolio (*Source* Own elaboration)

insurance companies or foreign companies with offices in Italy and they operate mostly in the damages branch[7] and have a total of 46,558 employees.

Lastly, in order to better understand the composition and performance of the two sectors mentioned previously (life and damages), see below a summary of the data.[8]

3.2 Damages Branch

Premiums attributable to the Damages Branch total 32.3 billion Euros, broken down as shown in Fig. 2.

Costs for compensation (claims costs) total 20.2 billion Euros and the sector's net profit amounts to 2.4 billion Euros with a profitability indicator (ROE) of 9.7%.

[7] 124 companies, compared to 57 in the life branch, over 25 *mixed* companies and 7 insurance companies.

[8] Data 2017, This data has been processed from source Ania (National Association of Insurance companies).

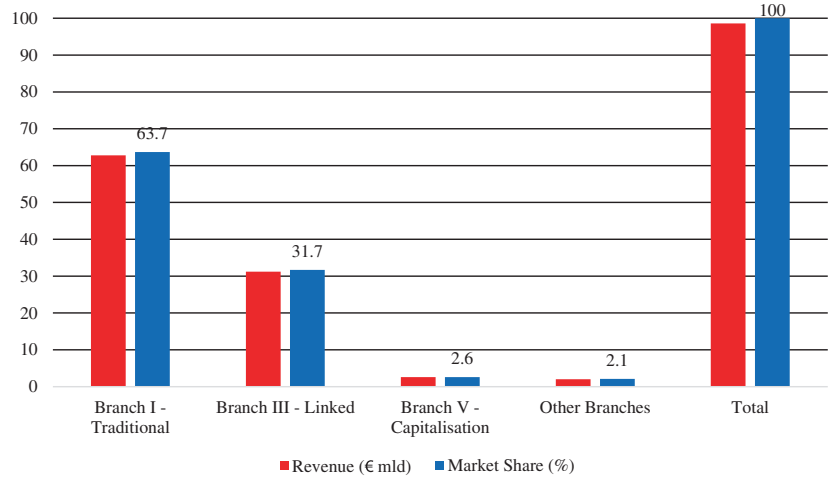

Fig. 3 Premiums of Italian direct portfolio (*Source* Own elaboration)

3.3 Life Branch

The life branch highlights income from premiums at 96.6 billion Euros broken down as shown in Fig. 3.

Claims costs come to €71.2bn and the sector's net profits totals 3.5 billion Euros with a profitability indicator (ROE) of 10.0%.[9]

In conclusion of this analysis of the insurance sector, it is interesting to note how and where the clientele buys insurance products and the different distribution channels available.[10] In fact, a policy in the damages

[9]The life branch income trend tends to be stable, compared to the fluctuating positive and negative trends between 2008 and 2012. The same considerations of trend can be made about the damage branch.

[10]The Single Register of insurance and reinsurance intermediaries (RUI) has these categories:

Section A: Agents (19,728 physical/natural people and 8985 companies).

Section B: Brokers (3894 physical/natural people and 1670 companies).

Section C: Direct canvassers of insurance undertakings (4359 physical/natural people).

Section D: Banks, financial intermediaries as per article 107 of the Consolidated Banking Law, stock brokerage companies and Poste Italiane S.p.A.—Services Division of Bancoposta (496 companies).

branch is normally purchased via an agent,[11] whereas a policy in the life branch is normally purchased from a bank.[12] These different channels used for selling products is understandable given that many consumers are more inclined to turn to a bank or credit sector to buy a product with financial features, compared to one where it would be necessary to assess—maybe with an agent—how to make a situation go back to the way it was before the accident.

The evolution of the economic and legal scenario.

Nowadays, businesses and agents working in the insurance sector must face a double challenge requiring two parallel issues: changes to their economic scenario and the evolution of current legislation.

With this economic scenario in mind, it is important to highlight how the concept of inclusive growth[13] has deep roots in the Italian market, where even (and especially) insurance companies managing risk must take into consideration:

- Taking on a greater role in welfare;
- Offering welfare to as many customers as possible thanks to its services;
- Providing solutions to increase welfare even to people with little money to spend;
- Changing their mind-set and think differently about their products and services on the market;

Section E: Collaborators of the intermediaries registered under sections A, B and D conducting business outside the premises of such intermediaries (176,991 individuals and 12,553 companies are included)

Others: residents abroad (8211 subjects).

[11]Agents have 76.3% of the market, brokers 9.3%, direct sales 8% and over the counters at banks 6.1% and others.

[12]61.3% of the market, compared to financial consultants 15% and agents 13.9% and others.

[13]The European Commission defines Inclusive Growth "*[…] strengthening people's participation through high rates of employment, investing in skills, beating poverty and modernising the job markets, training methods and social security in order to help people to be ready for change and succeeding in building a united society. […] the objective is to guarantee everyone access and opportunity all their lives.*" Taken from one of European Strategy 2020s three priorities beyond Intelligent Growth and Sustainable Growth.

- Using technology to increase information, contain risks and, consequently, reduce costs, with the aim of being able to implement what was listed above.

The current evolution of this legislation will certainly lead to radical changes. In fact, the Insurance Distribution Directive[14] includes a harmonisation of norms concerning the distribution of insurance products, outlining procedures that prevent the sale of products sub-standard to consumer needs. These procedures include the obligation to make information leaflets available, monitoring processes to assess the needs of the purchaser of the product/service both before sales and after sales—for example, during renewal of the insurance policy.

Additionally, sanction mechanisms are such that they restrict sales or the seller's responsibility—support between agent (if present) and insurance company– in case of sales of inadequate products.

Summing up then, the new business model (Fig. 4) that those operating in the sector should adopt will certainly be linked to offering tailor-made products for the client as they will have to be bear in mind the following factors (in addition to legal obligations).

3.3.1 The TIS Case Study

Turin Insurance Services Opere, also known as TIS Opere, offers alternative compensation services in Italy, the EU and further afield, concerning accidents for insurance purposes. The services are designed for insurance companies, but exclude those that deal with freelance workers registered in professional associations, who need specific qualifications or skills and are natural persons.

In insurance terms, "alternative compensation services", generally means all those issues concerning ordinary and extraordinary maintenance and repairs of private and public buildings, industrial complexes

[14]Directive 2016/97/UE of the European Parliament and Council on 20th January 2016 regarding insurance distribution, and IVASS issued the regulations on 2nd August 2018: Regulation outlines dispositions regarding insurance and re-insurance distribution (applicable from 1st October 2018), Regulation regarding information, advertising and creating insurance products (applicable from 1st January 2019) and Regulation outlines the procedure of imposing administration sanction and dispositions (applicable from 1st October 2018).

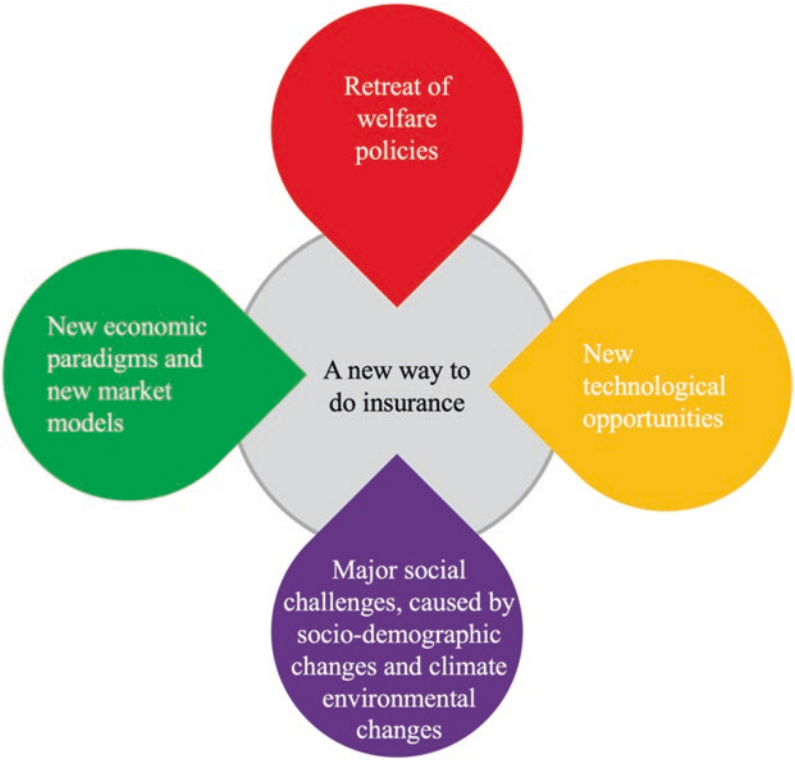

Fig. 4 The new prospected business model of insurance companies (*Source* Own elaboration)

as well as any type of contracting, from the transfer and repair of goods damaged in an accident, clean-up work for insurance company's clients and bringing the situation back to what it was before the accident.

TIS Opere is part of the TIS Group which is currently made up of three companies, each one specialised in its own area of business (Fig. 5):

- TIS settles claims and carries out assessment;
- TIS Opere is specialised in restoring property, alternative compensation services and all associated areas;
- TIS Innova deals with IT systems and processes.

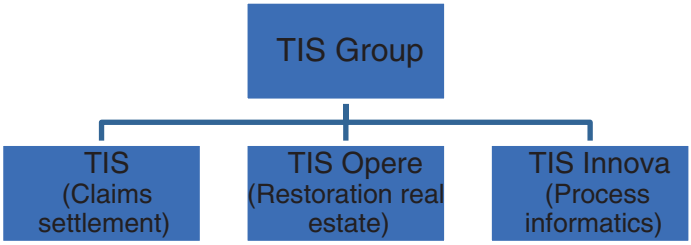

Fig. 5 TIS's organisation chart (*Source* Own elaboration)

The TIS Group—and especially TIS Opere which this business plan is concentrating on—came from a partnership of two Piedmont businesses—Atena and Progea. They carried out inspections concerning settlements and investigations into damage of material and capital assets e.g. managing claims, investigations, surveys, settlements and data processing and statistics, as well as damages caused by adverse weather conditions, i.e. damage branch (no cars).

3.3.2 The Business Currently Offered

Insurance companies use TIS Opere's product/service which completes and integrates the TIS Group in the claim management process (damage branch), but mostly in the settlement phase.

Alternative compensation services bring together different needs and aim to satisfy the needs of everyone involved in the process—the insured, the insurance company and maybe the agent and surveyor.

Basically, the business idea is the opportunity to offer insurance companies an integrated and complete service when managing the settlement process which starts with reporting the accident. However, it reflects and covers a wider phase of assessment and follow-up which consists in offering and carrying out specific action advised by professional assessments designed to prevent further accidents and/or reduce the impact. So, TIS Opere's business is basically made up of two integrated and closely linked "areas":

a. Specific management of alternative direct compensation.
b. Prevention, monitoring, assessment and follow-up of client (i.e. the assured).

Fig. 6 The different phases of claims management (*Source* Own elaboration)

The strength of this business consists in valuing the know-how of the assessment professionals' network which is strong and very active in the tradition of the companies which founded the TIS Group. This strength comes from the professional standards which naturally lead to skillfully and rapidly identifying the risks and potential problems in, for example, a building. This leads to offering an effective service of risk "prevention", through suggesting preventative and restructuring measures. In fact, the settlement surveyor is a professional with expert knowledge both from a technical point of view as well as having a legal background in the field of private, insurance and criminal law.

Claims management is currently dealt with in different phases (Fig. 6):

1. When the accident took place i.e. the phase the event took place which is the subject of the insurance cover.
2. Reporting the accident is the phase when the insurance company is told about the accident and undertakes to manage it. The report made be made at an agency or contact centre, depending on how each insurance company is structured and the type of accident. The case is then given to the settlement office, following the first administrative and routine checks.
3. Assessing the claim is the phase when the case proceeds to checking the extent of the damage caused by the accident. The evaluation must quantify the damage due, which could be summed up as:
   a. Material damage, concerning things.
   b. Physical damage (temporary or permanent), affecting people. Additionally, damage to people can be:
      i. capital, as in reduction of capacity to produce earnings (damage through loss earnings)
      ii. biological (or damage to health) if they affect the damaged subject's psychological or physical integrity.

4. Settlement, that makes up the conclusive phase of the management process where the company approves settlement for the damage suffered. Settlement can be in favour of the client if it is insurance against fire, theft, illness or in favour of third parties.

The length of the entire claims management process can vary a lot and the time involved between when the claim is made and its settlement basically depends on two determining factors:

a. the specific characteristics of the claims.
b. the efficiency of the settlement issue.

So, the claim assessment and settlement process is handled by the adjusters, whose objective is to define the final amount that the company will have to pay the client i.e. an estimate of the costs that the company will have to charge in its quantification (c.d. "final cost") of the reserves concerning a claim should it not be settled before the end of the year it happened.

Two possible alternative organisational models can be identified based on the structure of the settlement network:

- the agency settlement model, where the agency has a fundamental role throughout the settlement process, representing the link between the reporting phase and the phase when the company pays compensation. Focused on the agency, this model gives the client a favourable impression of the quality of the service;
- the claims inspector model, where the settlement phase is carried out centrally within the company. This model lets the company provide a very high level of efficiency and monitoring of the entire process.

In the damage branch, accidents are classified based on the damage:

- in cases of simple accidents, settlement is completed following extremely standardised criteria and procedures, with the objective of making the entire processes as quick as possible as well as effectively combining the company's needs to contain costs with those of the client's need for a quality service;

- in cases of complex accidents, settlement cannot have standardised characteristics typical of simple claims, but the settlement department's ability to manage the entire process becomes fundamental. This should be accompanied by an assessment of the damage that attempts to find a balance between correct management of complex profiles valued of the claim with the need for a rapid service for the client.

So, one of the determining factors is rapid response of the situation to make it as it was before the accident, both for the individuals (e.g. difficult situations at home) as well as companies (e.g. businesses having to close) and an investigation not limited to an estimate (and settlement) of the damage, but also direct control over the clean-up work in order to spare insurance companies from fraud in the real value of the compensated damage.

The TIS Group and especially TIS Opere offers its own at least partial idea of business and review and of the processes mentioned earlier, trying to combine and respond to the needs of the different actors involved:

- CLIENT (**Rapid reimbursement and information on the state of the claim**)
- INSURANCE COMPANY
  - **Contain overall cost of claims**
  - **Contain management of cost of claims, reduction of time for settlement**
  - **Know the phenomena in their quantitative aspects**
- ADJUSTER (**Improve quality and processes automation?**)

The tendency that has come to light in the insurance business is the evolution of the concept of "claims management": from simply accepting the "bureaucratic process" to a comprehensive and complex "client service". In the simple vision of "bureaucratic process", attention is mostly given to rigorously respecting contractual obligations and regulatory constraints. Whereas the client service approach is more much focused on a professional service with extra value, designed to help clients from the moment the accident takes place right through to the conclusion of the procedure, being aware of the possibility of further development after settlement, which can be defined as the "follow-up" phase.

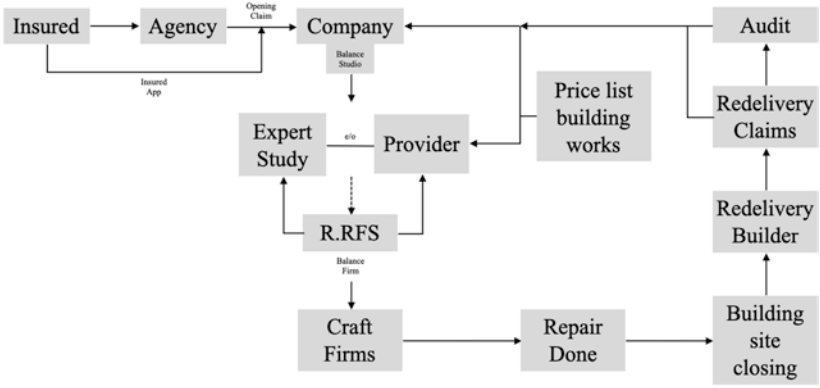

Fig. 7 Structure of the processes built by TIS (*Source* Own elaboration)

The analysis of the reviewed process—offered by the TIS Group—can be seen in Fig. 7.

This model allows for enough flexibility to include putting the company evaluator and/or the insured in touch in real time via a **Provider** and a digital platform **(TIS Builder—via TIS Innova)** that collects and assembles the information. This leads to a quick analysis of the insured's needs and rapid action to put the situation back to its original state (before the accident).

On **TIS Builder,** the insured or company evaluator, uploads images of the place where the accident happened, the relevant technical data (action needed, decoration, measurements, etc.…), fills in the specific notes for the type of site (the insured's needs and specifications, traffic limits, lifts present, etc.), allowing **TIS Opere** to process the metric calculation in real time, and plan the repairs.

The platform[15] also shows the progress of the works of all parties involved in the process.

[15] All the different phases of the work are recorded—from the request for action—to the end of the work: correspondence between the parties, the costs of each phases in the progress of the work, etc.…, and with the aim of identifying the result of the action and after careful analysis and extract statistic data, assisting in putting into place any corrective and specific measures aimed at achieving continuous improvement and especially for future similar action.

The online platform offers a complete service, namely **TIS REPLACE** which can search TIS Group's many suppliers for household appliances (if it had been damaged in the accident) and find one which is immediately available at the best price. The platform is also able to manage any possible economic differences (e.g. deductible) to be paid by the insured. The insured can also choose to replace the goods with something of similar characteristics (e.g. size of TV) and ask for an upgrade by paying the difference.[16]

In conclusion, this business can be set up by negotiating contractual terms with the insurance company where rules covering claim settlements are established. These could include, for example, a possible deductible, conditions of a property or goods, delivery and installation costs etc.… everything necessary to define an ad hoc contract to meet the insured's needs.

3.3.3 Developing the Business

Thanks to the experience gained in its current climate together with new legislation and development which will affect the current market and bring revolutionary change to it, the TIS Group is fully aware of the insurance areas it will develop (Fig. 8):

- ***Increasingly tailor-made***, thanks to technology which helps liaise with insurance companies and the client's banks;
- ***Preventing claims***, not only is a claim non-transferable from client to insurance company, but it means costs for all concerned, including the company;
- ***Provide diverse and customised services,*** which are, however, connected to the insurance business by origin and kind.

There is a desire to create value in relationships between insurance companies, intermediaries, agency networks and clients, whereby obtaining thorough and detailed client profiles, so as to be able to offer them a more customised and suitable service, demanding to know the client's needs before signing up for a policy.

[16]The service covers the delivery, installation and configuration of goods based on the Insured's needs, allowing him to save time and receiving specialist consultancy when purchasing.

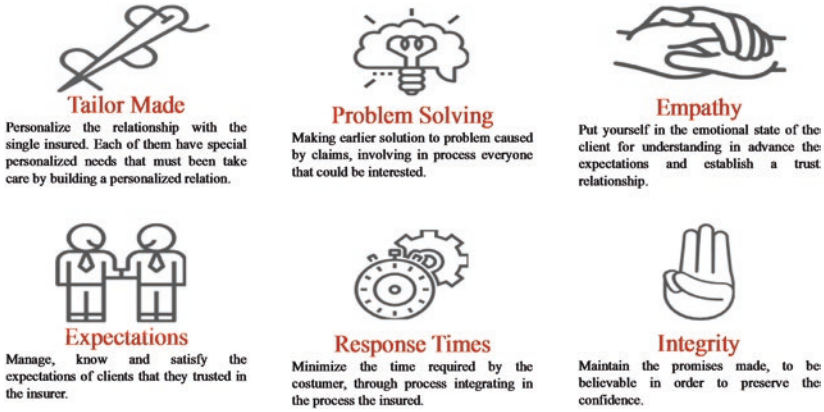

Fig. 8 The six assumptions on which the business is based (*Source* Own elaboration)

The only conceivable solution is to revise one's own strategy and put particular emphasis on the client's insurance needs, remembering that insurance must be the tool for that end.

The TIS Group's aim is to reach these objectives, offer pre-screening analysis before signing a policy and useful in acquiring information in order to prevent accidents and favour new insurance services.

So, the TIS Group's product provides, for example, a pre-screening analysis of policies for cover against possible risks associated with buildings and it is possible to carry out three different pre-screenings at varying levels:

1. Check up base

Buildings are inherently prone to risk: walls, gas and electric installations and supplies, fittings, multiple design features, other buildings nearby, geographical position and other variables.

There are many differences and variables that could positively or negatively influence the economic prejudice following an accident and its ability to stand it (e.g. severe weather conditions, fire, etc.…).

The building could even be the origin of the accident. Careful assessment of static-time and dynamic situations (current state), would result in producing data useful for **creating preventative actions and/or assessments concerning risk of accident.**

2. Advanced check ups

Building content (gas, electric supplies and installations, household goods, furniture, etc.) are also accident-prone risk factors as well as being subject to risk.

The insured amount does not always represent the real risk in economic terms.

Careful pre-screening helps identify expensive contents that could be subject of greater prejudice as well as being subjective (e.g. paintings, rugs, personal photographs etc.)

3. Complete check ups

They report information concerning the people who live in the buildings and who use the contents.

This is different from the accident risk due to different behavioural habits of e.g. a single person, a couple, a couple with children, a household including older, disabled people, pets etc.

The prejudice they suffer is different following an accident, which could be passive or active depending on the causes of the accident.

Household members have their own behavioural data and their relationships for commercial, financial, insurance purposes are frequently differentiated.

This information helps insurance companies understand their clients better in order to win their loyalty, pre-assess risks and assists them in developing new and additional products and services.

Pre-analysis is made up of assigning different coefficients to every response resulting from tests carried out and making up an index that varies from 1 to 7 (Fig. 9).

It is possible then to not only come up with an ad hoc policy for the insured's needs, but to identify a premium and suitable guarantee, avoiding (or containing) possible frauds for the insurance company and resistance against settling the claim for the insured.

4 Findings and Conclusions

The TIS Group's proposal about pre-analysis before issuing the policy allows the insurance company or agent to have specific information concerning their client's real needs. This contains risk of potential accidents,

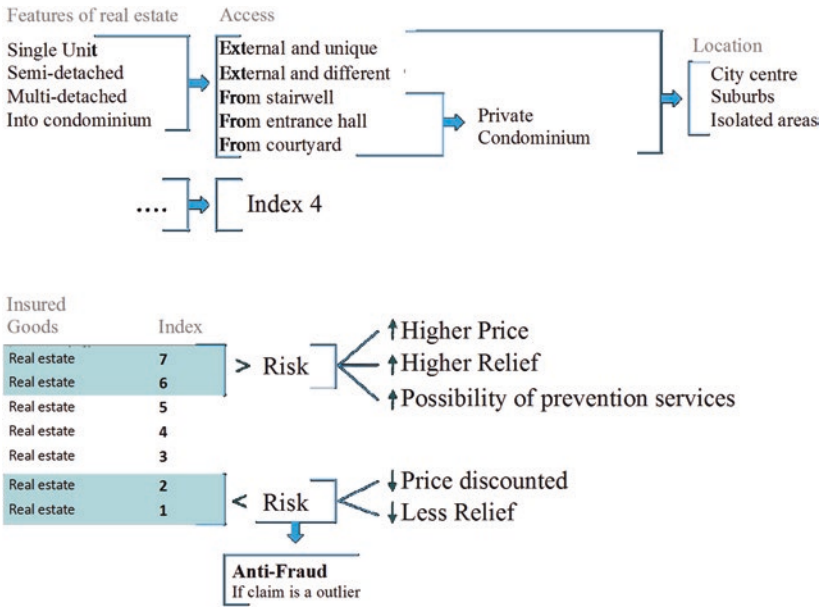

Fig. 9 Process of risk assessment on real estate (*Source* Own elaboration)

having thoroughly evaluated them and implemented a data base useful for proposing insurance products in the future. It is also reasonable to think that the client will be more satisfied and loyal and that the proposed policy will be compliant with the new legislation that covers that area.

In turn, the insured, will enjoy a **tailor-made** policy with specific and appropriate guarantees beyond a customised price. He/she will also be aware that they will have a faster service when defining settlement of any possible claim with a saving on time and money.

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CHAPTER 14

Sharing Economy Risks: Opportunities or Threats for Insurance Companies? A Case Study on the Iranian Insurance Industry

Meisam Ranjbari, Zahra Shams Esfandabadi and Simone Domenico Scagnelli

1 Introduction

In recent years, sharing economy has attracted the attention of many scholars, and in the real world, has driven strong competition among companies in different fields of activity. Airbnb in accommodation sector, Blabla car, Uber and Lyft in transportation sector and Funding Circle, LendingClub, Prosper and TransferWise in finance or banking sector are a few examples, which have disrupted the businesses of

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traditional capitalist companies in hoteling, mobility and banking industry, respectively.

Sharing economy companies have an innovative business model, using online platforms to connect an under-utilized resource of a consumer to a demander. Through the mobile applications (apps) designed, transactions in such systems take place easily and with a lower cost compared with traditional transactions. In fact, the business model of these type of companies strongly rely on the active use of information technology and trust between users and allow for new and more effective cost structures, which bring about lower prices for customers. Therefore, it has become very attractive for the consumers worldwide.

Lack of ownership, temporary access and redistribution of tangible and intangible assets are among the characteristics of sharing economy (Kathan et al. 2016), which also affects the operations of other companies in the same field of activity and increases the competition between sharing economy companies and the traditional capitalist ones. Besides, the characteristics of sharing economy activities lead to increase in the new and unforeseen risks for the insurance companies, which deal with the acceptance of risks from their customers. They can, in fact, impose challenges for the risk assessment process in the insurance companies and hence, affect the whole process of risk management and financial management in these companies, because assets traditionally insured under personal lines policies are being used for business purposes to generate income on a part-time, and often full-time basis. Therefore, significant risks are imposed to the insurance industry due to these collaborative consumption services, and the insurance companies must be very cautious about such changes.

In Iran, only two sharing economy companies have recently become active and both of them are in the field of transportation. Given the fact that the activities of the sharing economy companies have not yet been expanded, most of the insurance companies have not realized the

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risks which can be imposed on them by such activities. However, in the very near future, with the expansion of the sharing economy sector and the increase in the number of companies involved, insurance companies would face many legal, financial and administrative challenges in their automobile line of business, which would affect the satisfaction level of their customers.

In this paper, considering the business environment of insurance companies in Iran, the risks of sharing economy activities in the field of transportation in this country is investigated and analyzed. Therefore, the remaining parts of the paper are as follows. After reviewing the literature on sharing economy in the next section and introducing the sharing economy companies in Iran as our case study, we provide a brief introduction on the insurance industry in Iran, with a focus on the automobile insurance portfolio. PESTLE analysis for the business environment of the insurance activities considering the sharing economy is then provided, followed by the discussion and results containing causal-loop diagrams for the clarification of the analysis. Finally, conclusions are derived and suggestions for future research are provided.

2 Research Background

2.1 Sharing Economy

The term "sharing economy" was added to the Oxford Dictionaries in 2015. Since the publication of a book by Botsman and Rogers (2010) on the rise of collaborative consumption, sharing economy has become a popular buzzword in public media (Hern 2015; *The Economist* 2013). In sharing economy, information technology is utilized to make connections between dispersed groups of people and companies and provide them the opportunity to share access instead of ownership, so that they can make better use of goods, skills, services, capital and spaces. In fact, this environment is characterized by non-ownership, temporary access and redistribution of material goods or less tangible assets (Kathan et al. 2016), and technology is considered to be the primary cause of sharing services (Scagnelli et al. 2018; Montezemolo 2014–2015). According to the statements of sharing economy supporters, the companies and the platforms they offer "use technology not only to offer savings and convenience to consumers but also to make more efficient use of resources and to expand income opportunities for service providers" (Marshall

2015). Therefore, the technology, the community, the environmental awareness and the recent crisis are named as the drivers of the sharing economy in the literature (Montezemolo 2014–2015).

However, there is no common agreement on what activities comprise the "sharing economy" (Codagnone and Martens 2016) and it is extremely challenging to offer a definition for it, since this term is used in many different ways in practice due to different meanings being assigned to the word "sharing" (Martin 2016). Besides, the term "sharing economy" may be interpreted under different labels. Collaborative consumption, collaborative economy, on-demand economy, peer-to-peer (P2P) economy, zero-marginal cost economy and crowd-based capitalism are only some examples of the different interpretations which are currently interconnected to the notion of sharing economy (Selloni 2017).

In this paper, we consider the definition provided by Ranjbari et al. (2018), in which sharing economy is defined as "an economic system, whose intermediary companies utilize online platforms to facilitate and lower the cost of the for-profit transactions of giving temporary access—without the transfer of ownership—to idle resources of consumers in the P2P networks that it has created, because of the trust built among its members, who may be individuals or businesses". According to this definition, only two sharing economy companies, namely Snapp and Tap30, are active in Iran, both of which are in the field of transportation. These companies provide platforms to make a P2P connection for car sharing and ride sharing activities.

Considering the popularity of sharing economy among scholars, over the last few years, many studies have focused on the various dimensions and opportunities and challenges of sharing economy. Nadler (2014) analyzed the characteristics of sharing economy, and Richardson (2015) focused on society, access and sharing as its performance requirements. Roh (2016) distinguished the sharing economy into three main types: service product systems, redistributive markets and cooperative life style, and analyzed each of them. In addition, Bocker and Meelen (2016), Scholdan and Straaten (2015) and Hamari et al. (2016) investigated the motivations of individuals to participate in the sharing economy, and Trunkfield (2015) and Atkinson (2016) introduced four main pillars for the sharing economy as "digital platforms that connect spare capacity and demand", "transactions that offer access over ownership", "more collaborative and trust-based forms of consumption" and "branded

experiences that drive emotional connection". Wang and Nicolau (2017) identified 25 factors affecting the proposed price of accommodation in a sharing economy company, and Heo (2016) and Fang et al. (2016) examined the tourist market, which was influenced by the activities of the sharing economy companies.

The effect of the emergence and growth of sharing economy companies in the market on the activities of the insurance companies are not much considered by the researchers from the business management and business models' point of view. However, legal aspects of this change have been investigated in many articles. Among the documents that we could find regarding the sharing economy and insurance activities were a paper containing interviews with a group of experts, which is published by the Casualty Actuarial Society (Oryzak and Verma 2015) and a short report provided by Cognizant Business Consulting (Francis et al. 2016).

In preparing Oryzak and Verma (2015), 12 executives from major players in the sharing economy and the insurance industry were interviewed and their opinion regarding the interaction between sharing economy and the insurance company was reflected. What can be concluded from the sum of these interviews is that the changes being made by the sharing economy in the business environment can be both opportunities and threats, depending on the interaction of the insurance companies to them.

Francis et al. (2016) highlighted the new types of business models and risks imposed by the sharing economy activities, which insurance industry was not facing before (such as applying personal property for commercial purposes at certain times, high-frequency transactions and low premium amounts due to the short period of insurances, less control over how assets are used in each transaction and problems regarding risk pooling), and then, pointed out the unwillingness of the traditional insurance companies to provide coverage for these type of customers, which leads them to approach excess and surplus lines carriers and risk syndicates.

Of course, as stated before, there are several articles that analyzed and examined the sharing economy and the insurance activities together, but not necessarily from the management and business perspectives. Their main viewpoint is the legal aspects associated with the sharing economy activities. Articles that concentrate on the legal aspects of asset sharing and the impact of this behavior on insurance companies also indirectly emphasize the importance of making changes and innovations in the business model of insurance companies. Rassman (2014) considered the

liability of insurance companies in terms of the sharing economy activities in the field of transportation and the complexities that it creates for insurance companies over time. The problem noticed in this article and showed in a real case is insurance "gap", which points out the situation that a driver has turned on his application on the cell phone and is waiting for a request from a customer. At this time, we cannot clarify if the driver is working with the automobile to make money (doing a business activity that is not covered by the personal insurance coverages) or he is using his automobile as a private car. Therefore, the insurance company faces this challenge that if an accident takes place in this period and a loss or injury is happened, it should not be covered by the insurance policy, as the driver had been offering a commercial service at that moment. McPeak (2016), Sachs (2016) and Loucks (2015) also discussed controversial business issues in controversy over litigation and its related laws when it comes to exploiting personal insurance coverage. Dupuy (2017) stated that the governments are waiting for the emergence of new companies in the transportation network, and they are moving toward implementing widespread laws for companies in this area. Then, he reviewed the laws of such companies and pointed to the insurance "gap". Also, Davis (2015) discussed the insufficiency of insurance coverage for drivers, who work in sharing economy companies active in the transportation field.

In general, the challenges that the sharing economy creates for the insurance industry seem to have been more attractive to researchers in the field of law than thinkers in the field of management and commerce. However, the legal dimensions of insurance contracts are very important, and the terms and conditions governing insurance policies can have a significant impact on the risk management of insurance companies. Studies show that sharing economy companies in the field of transportation have attracted more attention in this regard, compared with sharing economy companies in accommodation or other fields of activity.

2.1.1 Sharing Economy in Iran

Snapp and Tap30 (to be read Tapsi in the local language) are two sharing economy-based companies in Iran in the field of transportation. These companies work on the P2P basis, connecting the regular drivers owning a personal car with the passengers who require a transportation service. Therefore, these companies do not own any automobile by themselves. Both ride sharing and ride hailing services are provided by these companies. You download an application on your phone, request

a driver, and go. Users can request a ride via the iOS or Android app, by indicating their location and destination and the price of the trip is set beforehand to avoid haggling. Snapp and Tap30 hire drivers upon completing a background check and showing a valid driver's license and automobile insurance policy. The payment by the passengers can be made via the application or through direct cash payment to the drivers, because Iran is still a cash-based society.

Currently, Snapp and Tap30 operate in Tehran (a city of approximately 8.7 million residents), Isfahan (a city of approximately 2.3 million residents) and Karaj (a city of approximately 2 million residents) cities. However, they are looking to expand to new cities and may even seek to expand internationally.

2.2 Iranian Insurance Industry

At the moment, there are 31 Iranian private insurance and reinsurance companies in Iran. Asia, Alborz, Dana, Parsian, Karafarin, Razi, Tose'e, Sina, Mellat, Hafez, Omid, Day, Saman, Novin, Pasargad, Moallem, Iran Moein, Mihan, Kosar, Ma, Arman, Ta'avon, Sarmad, Asmari, Hekmat Saba, Tejarat nou, Middle East Life Insurance, Kish P&I Club and QITA P&I Club (Qeshm) are the insurance companies and Amin Re and Iranian Re are the major reinsurance companies. There is only one governmental insurance company, known as Iran Insurance Company in this country.

Based on the latest figures published by the Central Insurance of Iran (CII) in its annual report, the volume of the total direct premiums for the insurance market in the year 1395 of the Iranian calendar—which covers the 21st of March 2016 to the 20th of March 2017—amounted to 280,176 billion Rials (Iranian currency), signifying a growth rate of 22.6% compared with the previous year.

Automobile insurance in Iran consists of 3 main parts: (1) Automobile Third Party Liability insurance (TPL) that provides coverage for financial damages and death, bodily injuries and disability caused to third parties, (2) Driver's accident insurance that covers death, bodily injuries and medical expenses happened to the driver of the insured vehicle, and (3) Automobile Hull insurance which provides coverage for damages to the insured vehicle.

According to the provisions of Article One of the Law of Compulsory TPL in Iran, automobile TPL and driver's accident insurance are

provided to all owners of land transport motor vehicles as a single combinatory compulsory insurance policy. On the other hand, purchasing hull insurance policy is not compulsory for vehicle owners. Therefore, two main motor insurance policies are considered in Iran: automobile TPL, which covers third parties and the driver, and hull insurance that provides cover for the insured vehicle.

Since the TPL policies constitute a significant share of the insurance companies' portfolio in Iran, their prudent management is of great importance. According to the most recent statistical yearbook of the CII, out of 54,410,867 non-life insurance policies issued in the Iranian year 1395 (21st of March 2016–20th of March 2017), 20,087,815 and 3,144,507 were TPL and automobile hull insurance policies, respectively. Therefore, a premium of 80,682.2 billion Rials was earned from the TPL policies in the mentioned year, while the share of automobile hull insurance policies was 13,947.3 billion Rials. In addition, out of 34,703,254 non-life claims paid in this year, 944,069 and 408,518 claims referred to TPL and hull insurance policies, respectively, leading to loss ratios equal to 95.7 and 69.6% for these policies (*Statistical Yearbook of the Insurance Industry* 2016–2017).

Earned premium, reported claims and loss ratio of the TPL and automobile hull insurance policies during the Iranian years 1386–1395 (21st of March 2007–20th of March 2017) are illustrated in Figs. 1 and 2, respectively.

Considering the significant market share of automobile insurance in the portfolio of the Iranian insurance companies and bearing in mind the activities of two sharing economy companies in some of the metropolitan areas of Iran, this paper examines the effects of sharing economy activities in transportation field on the Insurance industry in this country.

3 PESTLE Analysis and Sharing Economy Challenges for the Insurance Companies

PESTLE is a tool for business analysis, which deals with tracking the environment in which a company or industry is operating. This analysis considers the political, economic, socio-cultural, technological, legal and environmental aspects of the business environment and helps to provide a comprehensive analysis of the environmental factors that affect the activities of a specific company or industry.

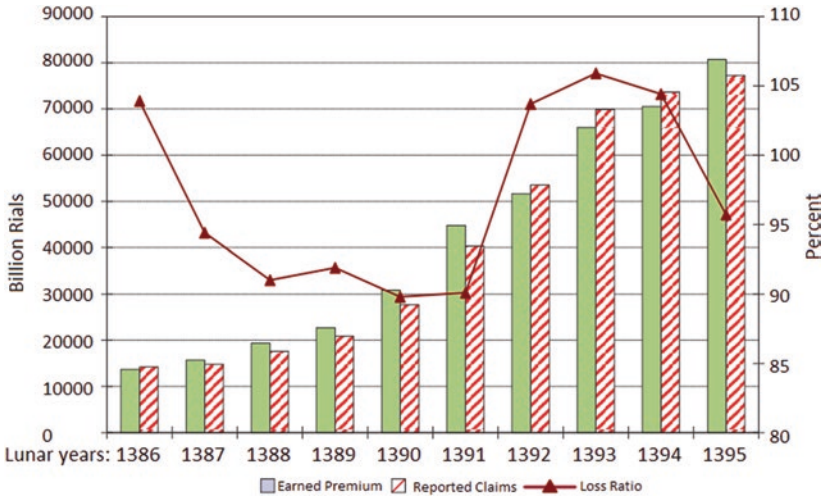

Fig. 1 Earned premium, reported claims and loss ratio of the TPL insurance policies during the years 1386–1395 (21st of March 2007–20th of March 2017) (Source *Statistical Yearbook of the Insurance Industry* 2016–2017)

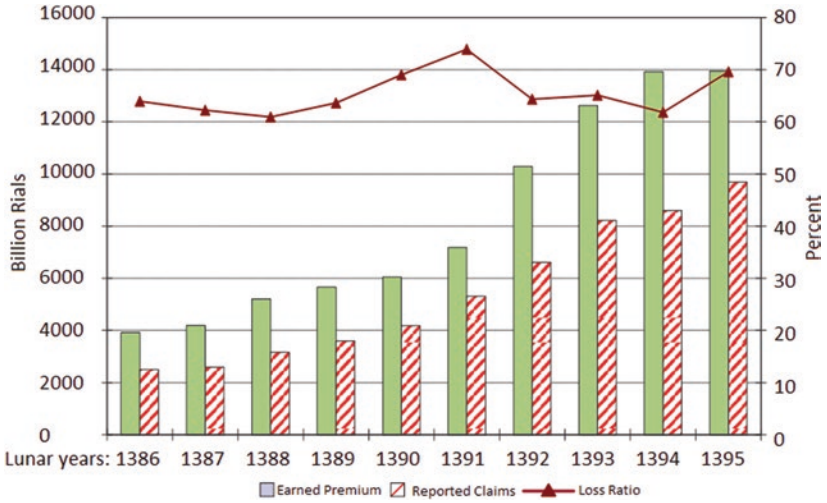

Fig. 2 Earned premium, reported claims and loss ratio of the automobile hull insurance policies during the years 1386–1395 (21st of March 2007–20th of March 2017) (*Source Statistical Yearbook of the Insurance Industry* 2016–2017)

In this research, PESTLE analysis has been conducted for the insurance industry in Iran. In this regard, for the political analysis, factors such as political stability and investment security, sanctions and the activities of international insurance companies in Iran are considered. Economic factors that are analyzed consist of indicators such as GDP, per capita income, the country's economic growth rate, inflation, domestic and foreign investment, monetary and financial factors, the country's economic infrastructure, credit and the status of the banking system. Legal factors include rules and regulations for the insurance companies and tax regulations, while environmental factors mainly cover the energy consumption and environmental issues. However, to shorten the text and to avoid regular analysis, we mainly focus on the changes that the entrance of sharing economy companies would bring about for the insurance companies. Therefore, socio-cultural and technological changes are discussed briefly in the following paragraphs.

Population growth, unemployment rate, people's attitude toward investment, urbanism, tourism, natural disasters and knowledge of insurance are among the socio-cultural factors in the business environment of the insurance companies. However, when focusing on the transportation activities and the emergence of sharing economy companies, and analyzing the socio-cultural dimension of the business environment, what is added to the regular analysis for the changes made by the sharing economy activities is the change in the behavior of the consumers of the goods or service that is being shared. This is more prominent about the companies offering accommodation services, because someone who lends an accommodation temporarily to another person may face a bad guest and have his property damaged. This will increase the frequency and severity of losses and rise the amount to be paid by the insurance companies. In terms of sharing economy in transportation field in Iran, this is a very rare happening, as the automobile is not driven by the passengers, but the car owner drives it and provides this service for the passengers. However, it is probable that the passenger makes damages to the car during the trip if he is a bad customer.

The development of sharing economy activities in the transportation field has been speeded up in Iran due to its significant lower cost compared with taxi services, its higher comfort and its capability of more effective time management compared with public transportation, escaping the driving in traffic jams and the requirement of a high investment

to buy a private automobile by the people. It also is a means for money making for the drivers. Therefore, both parties to the shared vehicle enjoy from the benefit of sharing, and this leads to an increase in the number of drivers and passengers joining the sharing economy activities. However, from the viewpoint of the insurance companies, beside the insurance "gap" that we referred to in Sect. 2.1, there would be a problem regarding risk increase due to more time spent for driving by the drivers. The longer the driving period, the higher the accident risk. This risk is more important for the insurance companies in the TPL than hull insurance, as it is a compulsory insurance policy and also the amount of losses in this policy is usually higher than hull insurance policies (a huge portion of TPL losses is linked with the compensation for third party death, which is called the blood money and is a very high amount in Iran). In addition, due to the economic status of the Iranian households and a high inflation rate specifically regarding automobile prices, most of the families prefer not to buy or use their own cars and use the sharing economy services, instead. This would increase the demand for sharing economy services and therefore, leading to more risk because of more shared automobiles in the street and/or more driving time by each of the shared automobiles.

Technological development is also considered as one of the environmental factors affecting the activities of each industry in various analyses. Therefore, technology change rate and the growth of electronic-based and ICT-based activities also affect the technological aspects of the business environment of the insurance companies. However, what is significant about active companies in the sharing economy is the growth of these companies using an Internet platform that provides instant access to their services for anyone using a smartphone and a SIM card. These platforms also provide rating systems to identify bad and high-risk drivers, which can be helpful in the risk management to some extent. In addition, in many countries, ride sharing and car sharing services are provided by using autonomous cars, which mostly use green sources of energy. In case these technologies are applied in Iran, the insurance companies would face new types of risks.

Currently, there is no specific rule or regulation set by the Iranian legislators for the insurance companies to encounter sharing economy activities. However, if such rules and regulations are set, depending on their context, they can have positive or negative impacts on the activities

and profit-making of the insurance companies. So, the sharing economy activities would either become an opportunity or a threat for the Iranian insurance companies.

4 Discussion and Results

The activities of Iranian sharing economy companies in the field of transportation in a few large cities, which are offering lower prices compared with the comparable public or private taxi service companies, have attracted the attention of many passengers. This has even resulted in leaving the market by many of the regular transportation companies in such a competitive environment. The more the number of sharing economy passengers, the more interested drivers join the sharing economy companies.

The key point in this change is the growth of the number of private cars that transport passengers without being registered as a shared automobile and without paying for additional insurance coverages or for the increased risks. Since the number of such automobiles is very significant, the extra amount of premium that should be paid to the insurance companies—but is not—becomes a large amount. In addition, when a driver joins a sharing economy company to spend his spare time or even his whole day in the street for transportation purposes, the risk of accidents increases. Therefore, the risks for both automobile hull and TPL insurance go up.

According to the above explanations, risk increases in one hand, and paying lower premiums than required from the other hand result in a serious challenge for the insurance companies. Because these companies cannot effectively manage their financial resources for the loss payments, this may lower their profitability.

To have a better understanding of the provided explanations, a causal-loop diagram is used to show the causal relationships between the variables in the whole system. Figure 3 presents this causal-loop diagram, making a connection between the emergence of sharing economy companies in transportation field and the profitability of insurance companies as financial institutions that are alive by receiving the insurance premiums. It is worth mentioning that to simplify the figure and focus on the main challenge, only the near causes and main reasons are shown in this figure, and the farther away factors that were analyzed in the PESTLE analysis, such as population growth, economic infrastructure, inflation and unemployment rate, are being ignored.

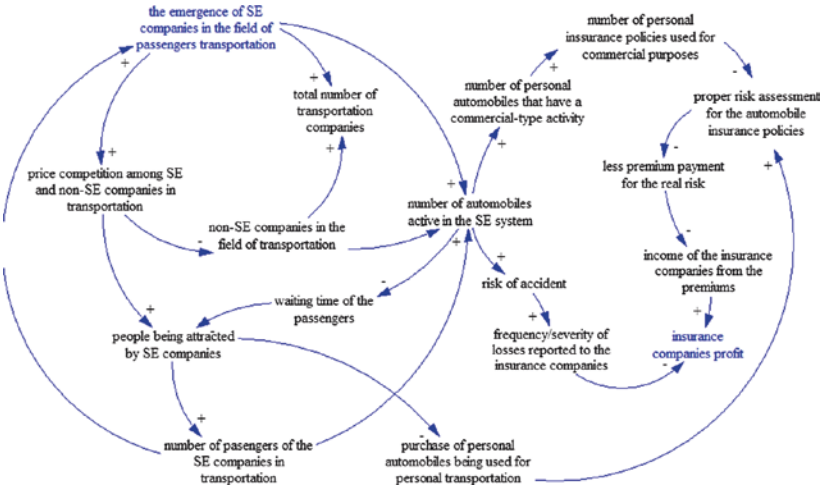

Fig. 3 The causal-loop diagram illustrating the impact of the activities of sharing economy companies in the field of transportation on the profitability of insurance companies in Iran (*Source* Authors 2018)

As illustrated in Fig. 3, the interconnections shown at the left-hand side of the figure clarify the competition between the sharing and non-sharing transportation companies on attracting the customers. The more the sharing economy companies grow by size or number, the more automobiles with lack of required insurance coverage enter the streets. This, as shown in the right-hand side of the figure, results in higher loss frequency/severity and not adequate premium payment, which affects the profitability of the insurance companies negatively.

However, as illustrated in Fig. 4, the key to help the insurance companies survive in such an environment is providing new rules and regulations and also, innovation in designing insurance products. Referring to Sect. 2.2, as TPL insurance policies are compulsory to be purchased by all the automobile owners—while automobile hull insurance policies are not obligatory—there are more strict laws, rules and regulations for the TPL policies. However, insurance companies can more freely decide on the design of automobile hull insurance policies. Therefore, the main solution for the insurance companies in terms of TPL policies should be supplied by the relevant legislative authorities, because of the legal aspects of the insurance contracts and the special

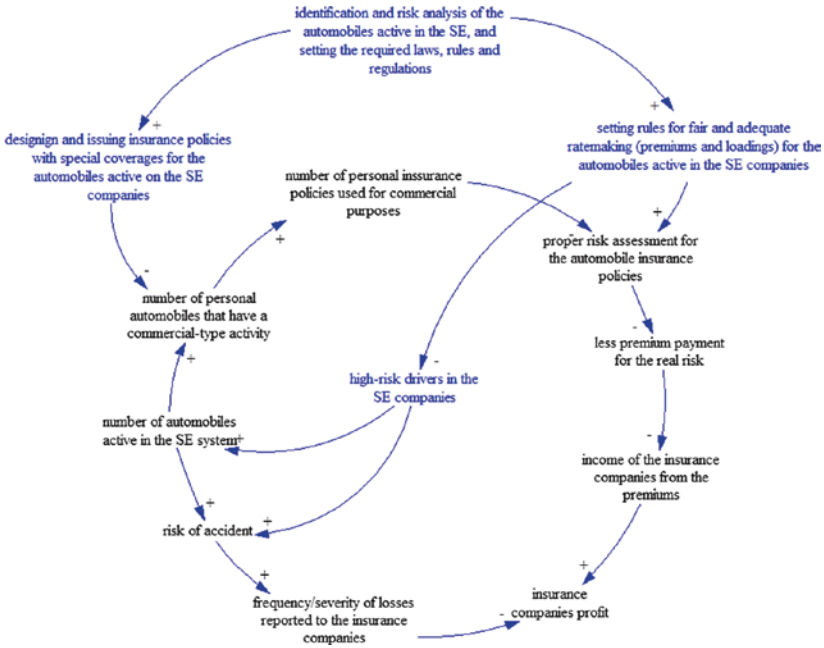

Fig. 4 The causal-loop diagram showing the solution for the problem of low profitability of insurance companies when encountering the activities of sharing economy companies in the field of transportation in Iran (*Source* Authors 2018)

rules and regulations that are set for the insurance activities in Iran, specifically for the TPL policies. There exist some laws regarding the TPL insurance policies that are set by the Iranian parliament and should be obeyed by all the insurance companies. Therefore, it is very vital that the legislative authorities for the insurance industry consisting of the Iranian parliament, the high council of insurance and the CII pay an urgent attention to the growing sharing economy activities in Iran and set the required laws, bylaws and instructions to better manage the insurance activities.

Besides, the insurance companies must be innovative in designing new insurance policies suitable for the automobiles in the sharing economy companies, weather for the TPL section or hull. Although they must

wait for the new regulations regarding TPL to be able to design new insurance products, they are allowed to design new automobile hull insurance products. It is important to note that management solutions are also required for detecting the automobiles that are active in the sharing economy companies, as people may deny mentioning their activities in the sharing economy to avoid paying more premiums. Hence, the intervention of the relevant authorities is also required to control the required information for issuing the TPL or hull insurance policies.

It is worth mentioning that to clarify the new risks for the legislative authorities, it is necessary that the insurance companies take part in the process of risk identification and they suggest some potential regulatory solutions. Therefore, as shown in Fig. 4 in blue color, this can result in both effective and fair ratemaking and designing new policies or insurance coverages for the automobiles active in the sharing economy system.

5 Conclusion and Future Research

Insurance companies as risk-taking entities can both affect and be affected by various elements within their business environment. Changes in the environment and the introduction of a variety of new businesses to the market can bring new risks and challenges for the insurance industry. Accordingly, sharing economy as a new phenomenon is creating new challenges for all insurance companies all around the world.

If insurance companies want to survive in the environments in which sharing economy companies are active, they have to pay serious attention to bringing innovation into their business models to meet the needs of customers in this type of emergent economy. This requires a prudent management in such companies. Besides, regulatory changes are required to support insurance companies in encountering the new changes.

Iranian insurance industry is considered as a case study in this research, since two sharing economy companies in the field of transportation have recently entered the market, and this would be the beginning of big changes and challenges for the insurance companies in terms of their risk assessment and product designs. In fact, the recent entrance of the first sharing economy companies to the Iranian Market has attracted our attention toward the Iranian insurance industry, because considering the current insurance market in Iran, the insurance companies need to take a deeper look into their business models to find innovative solutions in order to capture the revenue opportunities being entered into

the Iranian market and avoid threats being imposed by the environment. However, the insurance companies cannot be successful in this regard without the necessary changes being made to the laws and regulations governing the insurance activities. Besides, the interference of relevant authorities or designing effective data sets are required to prevent fraud in the insurance industry and to issue the suitable insurance policy for the right person.

Beside the need for changes in the motor TPL law set by the Iranian parliament, it is required that insurance companies be more cautious about their competitive ratemaking strategies for the automobile insurance policies, specifically the hull insurance policies. They should also be innovative in designing new insurance products for both automobile hull and the TPL, considering the probable announcement of new rules, regulations and data sets in future.

If effective management is brought within the insurance industry driven by innovation, the new challenges of sharing economy can turn into fruitful opportunities for the growth of the sector or otherwise, will result in serious threats for them.

Our study, which is focused on the effect of sharing economy transportation activities on the Iranian insurance companies, is not free from limitations and can be improved and extended in different ways; for instance, by modeling the interconnections between the contextual variables by using System Dynamics and testing various scenarios for potential environment changes or new policies. This can also be conducted considering sharing economy activities in other fields rather than transportation and also in different countries.

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CHAPTER 15

Integrated Communication for Start-Ups Toward an Innovative Framework

Fabrizio Mosca, Serena Bianco and Claudia Pescitelli

1 Introduction

Start-ups favor the development of a new entrepreneurial culture and contribute to the creation of a context more proactive to innovation.

One of the most relevant themes to support the start-up growth and stability over time is how it communicates and manages the relationship with the various stakeholders and within the internal organization. This is the motivation that led to the realization of this research focusing the attention on the Italian situation.

During this research, we can affirm the strategic importance of this activity for two specific reasons: a good communication activity influences the start-ups in terms of sales, strategic relationship and reputation, and the integration of communication tools and initiatives permit an improvement of the effectiveness of the same activity. Integrated communication should not be underestimated by start-ups in there early stage, but it requires planning, monitoring and continued optimization.

In order to give the right answer to the research questions of the study, we resorted to the dissemination of an on-line questionnaire.

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It was sent to a final sample of 232 innovative start-ups registered in the Italian business register, the "Registro delle imprese". The sample refers to the first six Italian regions by number of start-up companies, differentiated from one another by type: start-up B2B and B2C. The processing data are based on the communication tools used by start-ups and their effectiveness.

Considering the intention to make a transition from qualitative aspects of the research to a quantitative analysis, we used analytical tools such as Pivot Table, Principal Component Analysis and Cluster Analysis.

At the end of the research, a short excursus on the theme of crowdfunding has been realized. Crowdfunding is considered as an innovative application of integrated communication. To date, still a limited number of start-ups have undertaken campaigns of this type, but a good part of entrepreneurs believe in it; they think that it can be functional to the development of their business.

For this reason, it was decided to deepen, at empirical level, the ways of improving effectiveness of crowdfunding campaigns in terms of communication with the stakeholders.

2 Literature Review

Many studies focused on specific tools of communication for start-ups, for example, web communication that tries to engage the end users (Mara 2008); the electronic word-of-mouth communication in order to create an emotional value also in a digital world through "social media mining" process (Standing et al. 2016); the activity of fundraising, in this case communication raises awareness on obtaining funding on the web (Ley and Weaven 2011; Valanciene and Jegeleviciute 2014); new technologies and models like blogs, CRM (De Luca 2016), lean marketing, omnichannel; the importance of the social skills in the performance of a start-up (Baron and Tang 2009).

Communication is also important because start-ups have not a history to rely on and they have an hazardous propensity for novelty, for this reason entrepreneurs need to work on it (Aldrich and Fiol 1994). A communication model can be implemented by three strategies: content-centered, behavior-centered and adaptive-centered (Ulvenblad 2015). To achieve results with this model, it is important to program constantly a communication and marketing plan (Tuccillo 2014). Other researchers focused on relationship, because a start-up interacts with

partners more or less close to it, so the relationships could be strategic and can reduce some competence gaps (Oukes and Raesfeld 2016; Edelman et al. 2016; Colombo et al. 2011; Boari et al. 2005).

The impact of a powerful network of connections between local actors and the start-up becomes relevant. We need an integrated vision to provide a unique framework that enhances the understanding of the entrepreneurship process and its potential link with marketing (Lam and Harker 2015). In 2000 Invernizzi introduces the paradigm of organizational communication: communication is no more a variable that improves the image of the organization but it becomes a strategic leverage. It supports visibility and transparency, in order to create brand awareness; it improves efficiency and effectiveness of internal and external processes. Integrated communication allows managing internal and external communication flows making sure that the various actions structured by the company support each other with the aim of expanding the effect of the communication strategy put in place.

As it is mentioned in an important italian study (Guidotti 2004), the communication system can be structured in different level of integration. Integration at a strategic managerial level makes institutional, marketing and internal communications homogeneous and synergic. Next step is the integration at specialized, creative and media level, that chooses, plans and integrates communication actions in order to reach specific goals. The last level is the integration between on-line and off-line communication.

Integrated communication supports reputation and value creation in a company (Mazzei and Gambetti 2006) and different studies led to the definition of three ways in which communication influences reputation, either directly or indirectly: marks (explicit communication of the company); network of relationships (through which messages are widespread directly by stakeholders); behaviors (implicit communication focused on actions carried out and supported by the company) (Balmer and Gray 1999; De Pelsmacker et al. 2001; Gotsi and Wilson 2001; Invernizzi 2004).

An important part of the literature review is the analysis of the new tools of integrated communication. The first one is the *relationship marketing* also known as *CRM*—Customer Relationship Management—that presents a long-term perspective just to develop long-lasting relationship (Grandinetti 2002; Invernizzi 2000; Mazzei 2004). Other tools are *viral marketing* and *buzz marketing*. They are related to the word-of-mouth system and they allow spreading customer satisfaction and branding identity (Mauri 2002; Adams 1995; Kotler et al. 2001; Cioja 2013).

Corporate storytelling, the art of narrating stories, is an effective tool for spreading the company's mission and values to the various stakeholders (Gobè 2001; Qualizza 2009; Barker and Gower 2010). User-generated content is a real important tool especially when we use social media to communicate. Stakeholders can bring their ideas, opinions and advices in a simple and fast way (Lanchester 2007; Jaakonmäki et al. 2017; Cheng et al. 2017). The process of Knowledge Management, on the other hand, allows a constant share of information between the different areas of the company, thanks to the Intranet or to a specific software, sometimes in Cloud, that collects, analyzes and shares information through the different offices (Casalegno et al. 2015; Astrologo and Garbolino 2013). Lastly, we analyzed the branded content: an editorial content that promotes a brand and has an intrinsic value for the audience, value of entertainment, information and education.

The literature gap highlights the need of new studies that show communication strategies as an integral part of the entrepreneurial strategy for a start-up. One wonders if the integrated communication system for a start-up is perceived as necessary at a strategic level and if there is already, in entrepreneurs, the awareness of the need to realize a real communication plan to be followed during the various phases of the cycle of life of the nascent enterprise.

Furthermore, we tried to propose an original model that took into account the specific features of start-ups compared to SMEs—even innovative ones—that are a subject more discussed in literature.

3 Methodology and Data Collection

Previous researches showed qualitative analysis as the best investigation tool in the field of company communication. Through direct interviews, qualitative analysis allows for the identification of *best practices*,[1] in-depth analysis of companies' activities and the cause and effect of their behaviors (Thrassou and Vrontis 2006; Del Baldo 2010; Fassin et al. 2015; Lam and Harker 2015; Oukes and Raesfeld 2016; Standing et al. 2016).

[1] Best practice: this expression indicates performances showing the best start-up's operating features and quality indicators.

In this case, this type of analysis couldn't be carried out due to the large size of the sample. Starting from the survey "*Toward a hypothesis of integrated communication model for Food Start-Ups as creation of value and reputational capital for the territory*" (Mosca and Pescitelli 2015) and setting its in-depth analysis as the objective of the investigation below, we considered broadening the reference sample in order to increase the scientific value of the tested results. Thus, the quantitative investigation allowed for the collection of more data and provided a statistical analysis of the gathered information, a key aspect to lend credibility to the answers given to the *Research Questions*. Several previous surveys confirm this theory and consider employing a quantitative approach in relation to the analysis of a significantly large sample—usually bigger than one hundred companies (Baron and Tang 2009; Botha et al. 2015; Tuccillo 2014; De Luca 2016)—and the limited time available to the researcher. Let's imagine to be able to avail of a longer time, for example, one year: in this case, the researcher can carry out the described analysis in a qualitative way, identifying the start-ups' behaviors and decision strategies with higher precision (Ulvenblad 2016). Moreover, the questionnaire allows companies to save time when compared to a real interview.

The survey was then carried out by administering a web questionnaire to the identified sample. During the first (pilot) phase, the questionnaire was given 5 start-ups only to test the validity of questions and answers. After receiving a positive feedback, all questionnaires were administered and staggered over time.

The next step of the survey dealt with the elaboration of the answers given by the start-ups which decided to take part in this survey. The statistical and empirical analysis of the information provided the survey questions with concrete answers. Starting from these observations, in the final steps of the investigation, the elements making up the structural proposal of the start-ups' communication model were defined.

3.1 Statistical Sample

The sample was identified with reference to the list of innovative start-ups featuring in the Companies Register. We know for a fact that lots of start-ups supported by either public or private business incubators are not enlisted in the Register. However, this criterion was adopted to define the sample with higher certainty, lending it a scientific validity.

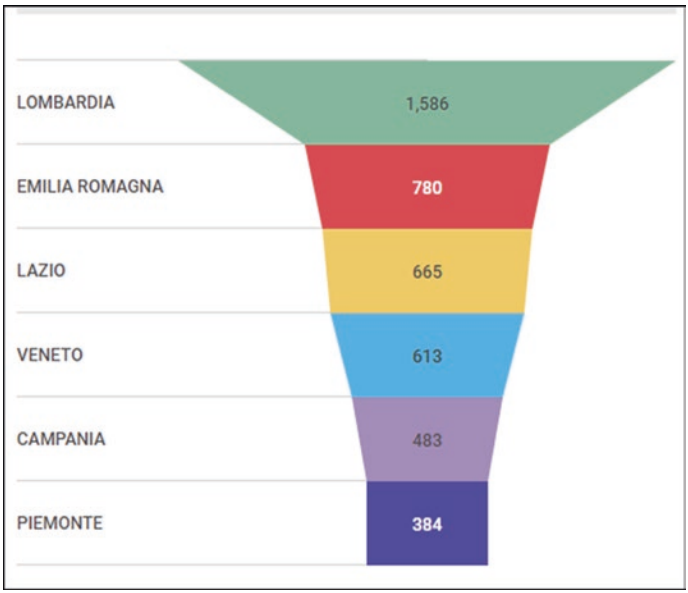

Fig. 1 Sample divided by region (*Source* InfoCamere data, personal elaboration 2017)

In 2017/18 the number of start-ups registered in the relevant section was 6973. Considering the size of the Italian sample, regions were classified in increasing order based on the number of innovative start-ups operating on their territory. At this stage, the sample for the investigation was identified as the start-ups belonging to the *first six Italian most densely populated regions*, a *sample of 4511 companies*, making up 64.7% of the total amount.

The focus was on the regions showed in Fig. 1, overall corresponding to more than two-thirds of the Italian sample.

Start-ups were contacted by email, preferring non-institutional addresses wherever possible. Below the details of the contact tracing (Fig. 2).

As resulting from a first analysis, the presence of start-ups on the web is not particularly uniform; only 67.1% of the innovative companies enlisted in the Companies Register (3027) have a running website which provides a direct contact with the start-up by filling out a specific on-line module (305) or sending an email to the specified email address.

DESCRIPTION OF THE CONTACT	NUMBER OF START-UP
E-mail address on website or social network	2722
Website with unregistered domain	93
Only the PEC is present	21
There is not the e-mail address	166
There is not the website	611
There are some e-mail address duplicated	8
The website doesn't working	348
Website under construction	232
Form on the website to send messages (only)	305
Authentication is required to access the website	2
Dangerous website	1
Website in chinese language	1
Only UK contacts (not italian references)	1
TOTAL SAMPLE	4511

Fig. 2 Description of the collected contacts (*Source* InfoCamere data, personal elaboration 2017)

All the other companies (1484), which couldn't be contacted using the methods identified in the investigation, were contacted through their certified email address. In fact, all companies enlisted in the Register are required to have such an address.

The reply rate was 5.36%, corresponding to 232 questionnaires filled out. In general, start-ups were reluctant to provide such information. Nevertheless, for the purpose of the survey, the sample proved to be rather significant.

3.2 Survey and the Research Questions

The questionnaire has been designed according to a grid that arises from literature on integrated communication models, reputational risk and more empirical aspects according to interviews conducted with the persons in charge of some University Incubators.

The questionnaire administered to the start-ups was divided in three parts:

- *First part: Start-up and performance*
- *Second part: Communication and analysis of the adopted strategies/ instruments*
- *Third part: Focus on Reward Crowdfunding.*

Below the fundamental Research Questions in the questionnaire:

- ***R.Q.1:*** *Is integrated communication impacting positively on start-ups' performances?*
- ***R.Q.2:*** *Could it be helpful to integrate all communication instruments available to the single start-up to maintain a long-lasting relationship with the stakeholders?*
- ***R.Q.3:*** *Is the integrated communication preventing the start-ups from being forced out of the market during the initial phase of their existence?*

These first three questions aim at analyzing the effect of the communication activity management, in particular the integrated communication, on different aspects of the start-ups. The first element is characterized by the performance: once the concept of start-up performance has been defined, we try to understand how and how much communication influences it. The second factor is the relationship with interested parties: this type of information allows an analysis of the guidelines for a good communication activity with the different stakeholders. The third element is start-ups' premature failure: a series of questions aims at testing the importance of integrated communication for the survival of start-ups.

The analysis of these three survey questions will clarify whether the integrated communication has a strategic value for the start-ups, thus becoming an integrated component in the business activities.

- ***R.Q.4:*** *Which communication instruments are most effective when used in an integrated manner?*

The fourth survey question focuses on the instruments employed in the communication activity with the different stakeholders and their

effectiveness. The activity's aim is understanding the innovative dynamics of the communication process, starting from the analysis of the differences in the use of traditional, digital and non-conventional instruments.

- ***R.Q.5:*** *What is the parameter that can measure the success of start-ups under a communication point of view also?*

At this stage, the monitoring arrangements of the business activity are investigated in order to understand both the importance attributed by start-ups to communication as an element of the definition of its own success and to verify the existence of a specific parameter to evaluate their communication activity.

- ***R.Q.6:*** *Is there a difference in terms of communication between B2B and B2C start-ups?*

The sixth survey question links back to the previous ones analyzing the activity of integrated communication by start-up type. It aims at understanding if the proposed reference model should support, in the definition of some aspects, the distinction between B2B and B2C companies.

3.3 The Analysis

Collected data have been analyzed using statistical instruments like factor analysis, in particular Principal Component Analysis (PCA) and Cluster Analysis.

These methods have been chosen due to their popularity among researchers. In fact, both the operating principle and the results of this type of analysis have already been extensively tested by previous similar surveys, e.g., prior studies on communication in small and medium enterprises and start-ups (Zara and Feltrinelli 2006; Baron and Tang 2009; Tuccillo 2014; Botha et al. 2015).

These statistical methods permit the removal of the initial variable excess in the survey without losing meaningful information content, thus explaining the analyzed phenomenon starting from two factors only. Moreover, Clustering Analysis can identify homogeneous groups of start-ups showing a homogeneous perspective in relation to a specific investigation field. Excel pivot tables were widely used to cross-analyze data and validate some research hypothesis.

4 Findings Discussion

The collection and elaboration of data provided significant answers to the survey questions initially posed.

- ***R.Q.1****: Is integrated communication positively affecting the performance of the start-ups?*

The analyzed data confirm the positive effect of communication and its influence on the performance of start-ups. The most senior entrepreneurs confirm this trend and highlight the importance of communication on sales increase and strategic relations.

The analysis shows how the elements affected by the communication are partly the same elements used to describe the performance of a start-up, even though weighted differently. This means the communication activity affects the performance level of a start-up.

Several entrepreneurs are considering the employment of a communication plan managed in an integrated way on the basis of the good results provided by this model. However, there is still a lack of awareness on the positive effect of communication when it integrates effectively in the company's activities (Fig. 3).

- ***R.Q.2****: Could it be helpful to integrate all communication instruments available to the single start-up to maintain a long-lasting relationship with the stakeholders?*

Business communication plays a significant role in maintaining a good relationship with the stakeholders. However, the adoption of an integrated system is not perceived by the start-ups as a key element in maintaining a lasting relationship with all the involved parties. In spite of that, data show an agreement on some communication guidelines pointing at the importance of this system as this leads to a more efficient management when organized with an integrated approach to communication: business identity communication, one-to-one strategy planning, creation of trusty and transparent relationships (Fig. 4).

- ***R.Q.3****: Is the integrated communication preventing the start-ups from being forced out of the market during the initial phase of their existence?*

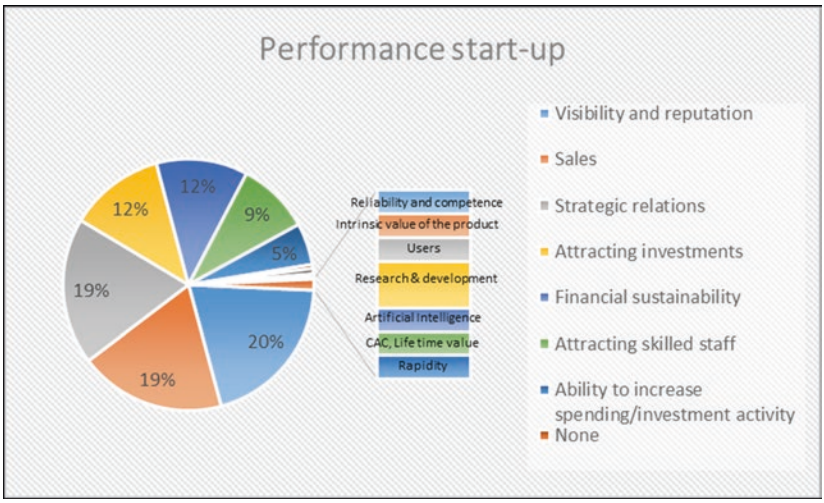

Fig. 3 Indicators describing the performance of start-ups (*Source* Questionnaire data, personal elaboration 2017)

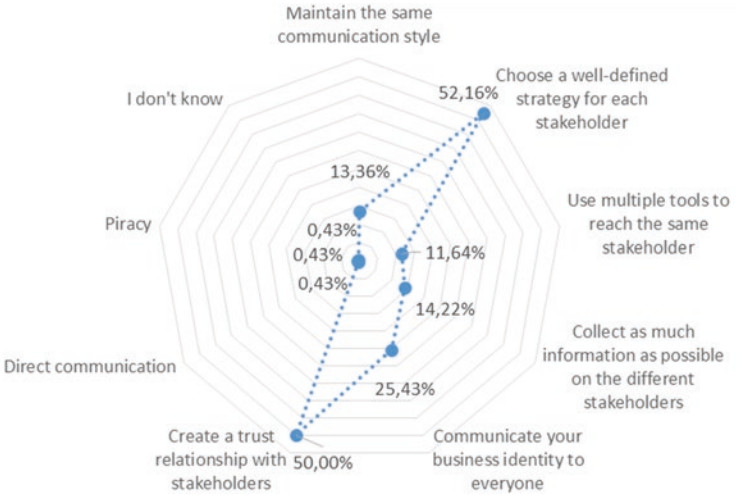

Fig. 4 Guidelines for communication with the stakeholders (*Source* Questionnaire data, personal elaboration 2017)

A well-planned communication activity from an early stage can prevent the start-up from being forced out of the market prematurely. However, there is a need for a certain program continuity and the necessity of maintaining the relationship with all stakeholders in order to comprehend and verify the market's continuous changes. Obviously, a good communication activity alone is not enough to implement a solid business; start-ups need, in fact, a balanced mix of three elements: assets, qualified human resources, communication.

- ***R.Q.4****: Which communication instruments are most effective when used in an integrated manner?*

The analysis showed how employing the various instruments in an integrated way increased their efficiency. This is visible in the close range positioning of the different instruments represented in the factor analysis graph that explains their direct correlation.

As highlighted in the enlargement of the second picture (Fig. 5), the factor analysis detects a direct correlation between sponsorship and social networks, crowdfunding and events, consumer/employee education and public relations.

These relations show a similar performance in the responses of the start-ups, e.g., if entrepreneurs have rated a specific instrument (for example, public relations 6) in a certain way, they are likely to give a similar rating to the instrument related to the first one (for example, consumer/employee education 6).

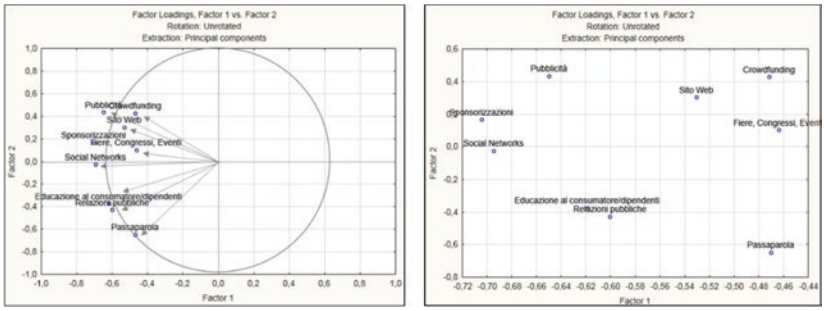

Fig. 5 Factor analysis on the use of the instruments and their effectiveness (*Source* Questionnaire data, personal elaboration with Italian labels 2017)

Moreover, the direct correlation implies that an increase in the efficiency of a certain factor is likely to produce an improvement in the efficiency of the instrument correlated to it.

In particular, thus, three effective integrating ways come to the fore:

1. consumer/employee education, public relations and word-of-mouth;
2. advertisement, sponsorship and social networks;
3. website, crowdfunding, fairs, congresses and events.

- ***R.Q.5****: What is the parameter that can measure the success of start-ups under a communication point of view also?*

Start-ups show different features to other companies and this is evident in the definition of the parameters for performance evaluation. The two most widely used indicators, according to the interviewees, are the definition of the level of performance and the number of users. However, answers are generally not homogeneous. Therefore, several parameters are likely to be evaluated in order to define the success of the business.

The same is true for the process of monitoring for the communication activity. In fact, there isn't a specific and precise indicator; start-ups take into account several factors to draw a picture of the different business aspects, which can be affected by communication.

The implementation of the outcomes of previous analysis, which showed how communication affects the performance and the process of maintaining the relationship with the stakeholders, with the findings highlighted in this section, lead us to the following conclusion: success indicators identified by the interviewed start-ups are influenced by the positive or negative performance of the communication activity (Fig. 6).

- ***R.Q.6****: Is there a difference between B2B and B2C start-ups in terms of communication?*

There are no significant differences between these two types of start-ups in relation to the operational management of the communication activities. In fact, the analysis of the integrated communication system shows the same empirical evidences for the creation of the communication model in both cases.

Differences between B2B and B2C start-ups show up in both communication techniques and instruments they employ. The most significant ones are:

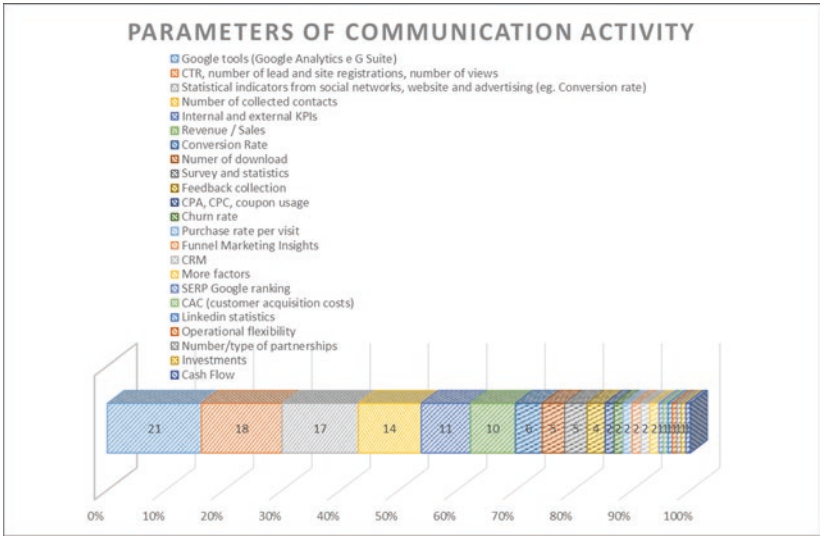

Fig. 6 Parameters of communication activity (*Source* Questionnaire data, personal elaboration 2017)

- B2B tend to participate more in fairs and events while B2C tend to make a wider use of social networks;
- B2B's business success is mostly measured by their level of performance whereas B2C's by the number of users;
- There is a prevalence of B2C start-ups planning and periodically updating their communication plan, even if this is relevant for B2B too;
- B2C start-ups tend to better monitor communication activities;
- B2C make more use of crowdfunding as a source for their business development. B2B start-ups, on the other hand, do not trust this integrated instrument of communication.

4.1 Focus on Reward Crowdfunding

Once all the communication tools have been identified, the focus is set on a particularly innovative action based on the integrated system of communication. The last part of the survey (R.Q.7) focused on crowdfunding, and in particular on the most common type: reward crowdfunding.

The survey question placed the attention on the elements responsible for the effectiveness of the communication in a crowdfunding campaign and aimed at understanding the entrepreneurs' opinion about this functional tool serving their business.

People who are familiar with this tool highlight how start-ups struggle to keep their promises at the end of the campaign whereas other business segments consider communication as a complex aspect to manage for a new company entering the market.

- ***R.Q.7:*** *What is the effect of crowdfunding on the start-up's communication and marketing activities and why is it rarely used in Italy?*

The most significant difference between the two start-up clusters has to do with the fact that "there is no guarantee of achieving the objective". Only those who have never undertaken a crowdfunding campaign consider this an important factor. Probably, those who are familiar with this activity are also aware of the risk they take when trying to achieve their goal, possibly focusing on communication to attract the right investors.

Seven empirical evidences came out of the questionnaire about reward crowdfunding submitted to the interviewed sample:

1. Scarce use of crowdfunding activities by Italian start-ups.
   Few companies have implemented crowdfunding campaigns due to lack of knowledge of the various operating models, difficulties in managing the project communication activity and the absence of guarantees of achieving the objective;
2. Reward crowdfunding is considered functional to business development by both the companies that have already undertaken such a campaign (mostly B2C) and those that haven't;
3. The creation of a community generates a sense of belonging, a strong link between stakeholders and the start-up project;
4. The effectiveness of reward crowdfunding depends on spreading a clear and simple message, establishing a transparent relationship with the supporters (promises must be kept), using the right tools to support the communication activity.
   As shown, communication plays a key role in achieving results in a crowdfunding campaign;
5. Entrepreneurs need to improve their understanding of the tool and the different models that can be used;

6. Cooperation with a specialized platform to undertake a crowdfunding campaign;
7. Use of high visual impact digital tools able to involve users and aiming at attracting the attention of potential investors.

1. Effective elements in the crowdfunding campaign:

According to those who have already undertaken a crowdfunding campaign:

Table 1

REALLY IMPORTANT	IMPORTANT ENOUGH	UNIMPORTANT
1-Direct and simple message	Use of supporting tools (eg social networks)	Direct knowledge of the investors
2-Transparent relationship with supporters	**Use of the website**	
3-Reputation (creation of a community)	Short video of the business idea	

Table 2

REALLY IMPORTANT	IMPORTANT ENOUGH	UNIMPORTANT
1-Transparent relationship with supporters	Reputation (creation of a community)	Direct knowledge of the investors
2-Direct and simple message		
3-Use of supporting tools (eg social networks)		
3-Use of the website		
3-Short video of the business idea		

According to those who have never undertaken a crowdfunding campaign:

The opinions of the two start-up clusters do not differ much with the exception of reputation. In fact, contrary to what one might expect, reputation is considered a very important component for those assessing the crowdfunding from outside. On the other hand, those who have already used "reward crowdfunding" favor more innovative digital communication tools. This aspect, in combination with their opinion on the other variables, shows that this group of start-ups has perceived the importance of crowdfunding under a communication point of view.

2. Reasons for the scarce use of crowdfunding in Italy

According to those who have already undertaken a crowdfunding campaign:

Table 3

REALLY IMPORTANT	IMPORTANT ENOUGH	UNIMPORTANT
1-Lack of knowledge of the functioning of the different model	Complex management of the tool	No guarantee of the goal achievement
2-Difficulty in keeping promises	Difficulty in communicating the project	Possibility of obtaining funds from other channels
	Little confidence in the tool	Risk of the activity

According to those who have never undertaken a crowdfunding campaign:

Table 4

REALLY IMPORTANT	IMPORTANT ENOUGH	UNIMPORTANT
1-Lack of knowledge of the functioning of the different model	Little confidence in the tool	Risk of the activity
2-Difficulty in communicating the project	**Difficulty in keeping promises**	**Possibility of obtaining funds from other channels**
3-No guarantee of the goal achievement	Complex management of the tool	

5 Findings Discussion

Some interesting managerial implications can be drawn from the analysis of start-ups' integrated communication system:

- Consider communication as an integral part of a company's action plan, as a result of the positive impact communication—especially integrated communication—has on start-up performances in terms of strategic relations, sales and reputation;
- Plan and adapt an integrated communication program over time. Start-ups that did so reported a higher performance improvement than the others;
- Focus the attention on managing direct relationships (one-to-one) in order to better understand users' needs (feedback, user-generated content);
- Plan in detail communication strategies tailored to each stakeholder;
- Adapt their communication style to the addressed subjects—this has proven very effective;
- When launching a communication activity, always keep in mind what the final users are interested in transparency, trust and shared values. Stakeholders often need the start-up to involve them in a relationship that is consistent over time;

- The main communication object is the company's idea of business;
- Use innovative tools like storytelling, viral/non-conventional marketing, neuromarketing, word-of-mouth, branded content and crowdfunding to appeal to different interlocutors;
- Integrate the communication tools, as this strategy has proven more effective;
- When managing communication, consider three additional aspects: search engine optimization, network and other realities and business plan;
- Monitor the integrated communication plan of the start-up over a pre-defined period of time in order to improve it and adjust it to both the market and the stakeholders' needs.

Based on the outcome of the empirical analysis, the list of the key elements supporting the start-ups' communication model identified by a previous survey can be confirmed and implemented: "*Toward a hypothesis of integrated communication model for Food Start-Ups as creation of value and reputational capital for the territory*" (Mosca and Pescitelli 2015).

Below, the model structure suggested by Mosca F. and Pescitelli C. (underlined italics) implemented on the basis of the survey's outcome:

- *The need for a professional approach to communication that is systematic and not improvised or random even when operating on a limited budget*. The immediate draft of an integrated communication plan is then fundamental to plan ahead both actions and goals, maximizing the scope of the available budget;
- *Communicate to different audiences: clients as well as stakeholders* prefer direct relationships and define strategies tailored on each stakeholder adjusting the communication style on the audience type;
- *The objects of communication are the business idea and the team's reputation, in a phase when brand reputation toward the stakeholders is still weak and the popularity of the product-service toward potential customers is still poor*. The message communicated (corporate branding, image and reputation) must be uniform despite the different channels, tools and initiatives employed;
- *Integrate the different communication tools, both traditional and innovative*, on-line and off-line. Through the integration activity, the stakeholders should perceive the following elements:

transparency, trust, sense of belonging to the start-up and value sharing. Moreover, a constant exchange of opinions between the subjects helps maintaining a consistent relationship over time;
- *Fully utilize the potential of the press office* and tools like storytelling, events and branded content to attract the attention of various stakeholders;
- *Do not neglect internal communication with team members and the different parties in the production chain*. The best tools for the integration of internal and external communication are storytelling, word-of-mouth, events/fairs/congresses, value sharing and user-generated content;
- Periodically monitor the integrated communication activities using different indicators to globally assess the performance of the start-up.

The considerations presented here lead to the graphic development of the "theoretical framework". This has been developed in two schemes: the first one reports the start-up's integrated communication process according to the elaboration of the information obtained from the analysis of the questionnaires; the second is an empirical model aimed at clarifying, mainly at a visual level, how communication activities should integrate, identifying a virtuous circle between start-ups and stakeholders.

As highlighted in the chart (Fig. 7), the internal process is simple: a communication team must be identified. The team members should belong to different company areas and report to a coordinator. In fact, one of the goals of this process is the integration of communication as a business component of the start-up. At this stage, the team will define what messages will be spread around on the basis of the objectives to be achieved on a specific period of time. We suggest communicating both the business idea and team reputation constantly and consistently over time.

The next step involves the drafting of an integrated communication plan on a semi-annual and annual basis. This activity will keep into account what stakeholders should be targeted, what communication tools should be employed and what budget is available.

If the survey aims at helping the start-up to define the best way of communicating, it should first focus on understanding what subjects interact with the start-up's activity and what the start-up wants those

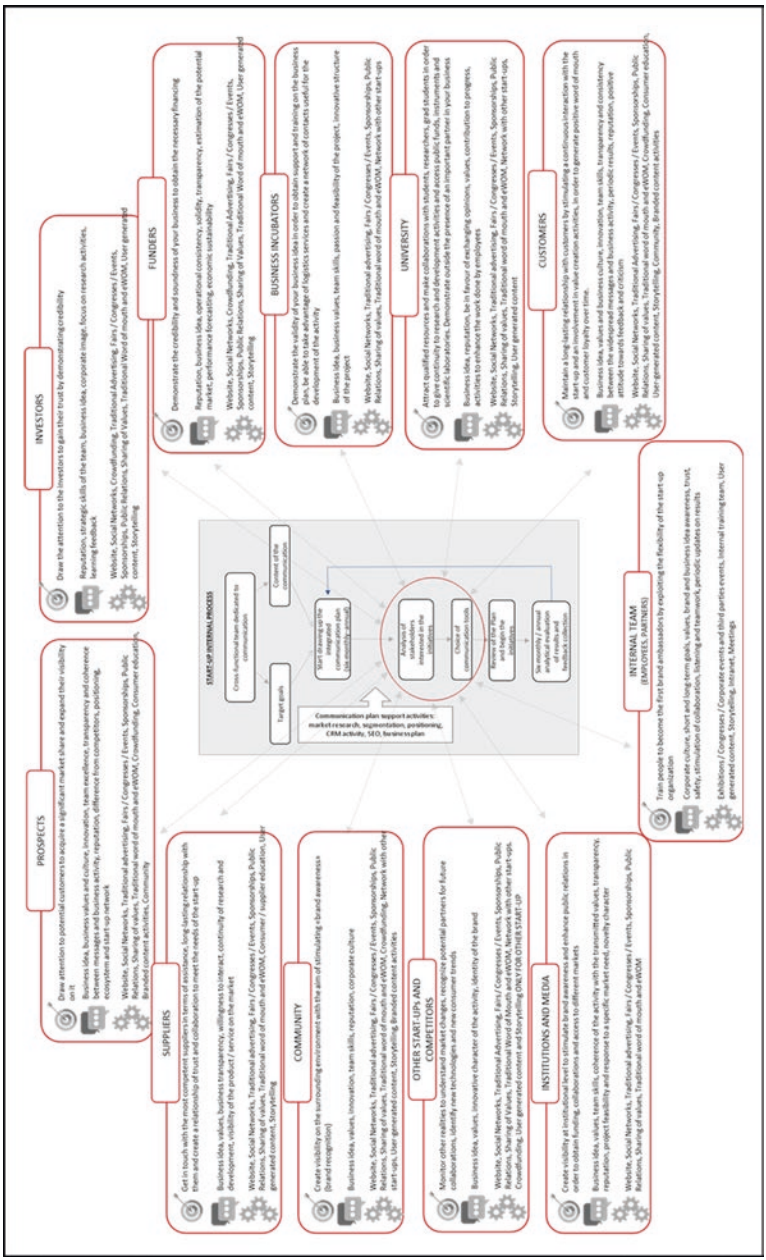

Fig. 7 Integrated communication process with map of the stakeholders to apply to the start-ups (*Source* Personal elaboration 2018)

subjects to perceive. For this reason, the survey included the map of the stakeholders, around the scheme for internal process, as a key tool both internally and externally related to the start-up. The communication objective, the type of message to be sent out and the most effective tools have been identified for each subject. Therefore, the entrepreneur will be able to easily define what initiatives should be included in the plan.

After the observation of some integrated communication plans drafted by the companies, three key aspects came to the fore (Ferrari 2016): description of the context (company's structural data, current situation, communication objectives), integrated communication scheme (initiatives, objectives, targets, general characteristics, estimated costs, organizational resources, priorities, coordinator, result parameters) and detailed planning of each initiative.

At this stage, results can be monitored at the end of each deadline.

Some expedients for a good integrated communication strategy reported by start-ups during the research phase are listed here

6 Survey Administered to Start-Ups: Best Practices Emerged

Table 5

1	Create a link between social pages, the website and the APP
2	Create campaigns targeting different stakeholders
3	Consider the activity of SEO[a] (Search Engine Optimization)
4	Monitor the activity using Google tools (easy to use and cheap)
5	Create specific events with a limited budget, given the small number of interested participants, the communication content can be adapted to the individual subjects
6	Implement crowdfunding campaigns to train the start-ups in communication activities
7	Provide free and accessible material
8	Focus on the awards received at "start-up competitions" to improve reputation
9	Bring forward a unique communication style
10	Use the communities to encourage positive word-of-mouth
11	Create multichannel communication strategies (goals, contents, tools, methods)
12	Measure the start-up performance to adjust and modify the chosen strategies
13	Show results to the stakeholders
14	Draft an accurate Business Plan

[a]SEO: activities implemented to improve a website's visibility on search engines aiming at either improving or maintaining its positioning in the list returned to web users by search engines

7 The Start-Up Integrated Communication Model

Hereunder the second processing of the theoretical framework concerning the management of the integrated communication activity of start-ups (Fig. 8) can be found.

It has been designed upon the empirical evidences brought forward by the present survey, the organizational communication model by Invernizzi E. (2000) and the integrated communication model for enterprises described by Guidotti E. (2004).

Underpinning this theoretical model are four types of communication available to start-ups:

- **Internal communication**: this aims at making the start-ups' collaborators the first "brand ambassadors". Thanks to the involvement, motivation and cooperation activities implemented by the management, the employees will communicate the mission, the company's image and the business culture to the outside world as firm believers in the message they are spreading. Some of the most effective tools for this type of communication are meetings, the intranet, internal events, the company manual and teamwork.
  Internal communication can be further divided into four sub-categories that should be integrated by the management for the best success of this type of communication:
  - *Strategic communication*: it aims at sharing values, strategies, policies and the culture of the company in order to involve people both emotionally and rationally;
  - *Creative communication*: it generates specific and adequate skills to create a setting for an exchange of information and dialogue between the organisation subjects, where knowledge is built internally and acquired externally, often informally;
  - *Formative* (or *knowledge) communication*: it spreads skills for everyone to avail;
  - *Functional communication*: it spreads the necessary information to implement the different production processes of the company.
- **Institutional communication**: it provides the start-up with a specific positioning by propagating the brand identity, values and style. The most common tools are digital and traditional instruments, PR, word-of-mouth, events, storytelling, branded content, sponsorship;

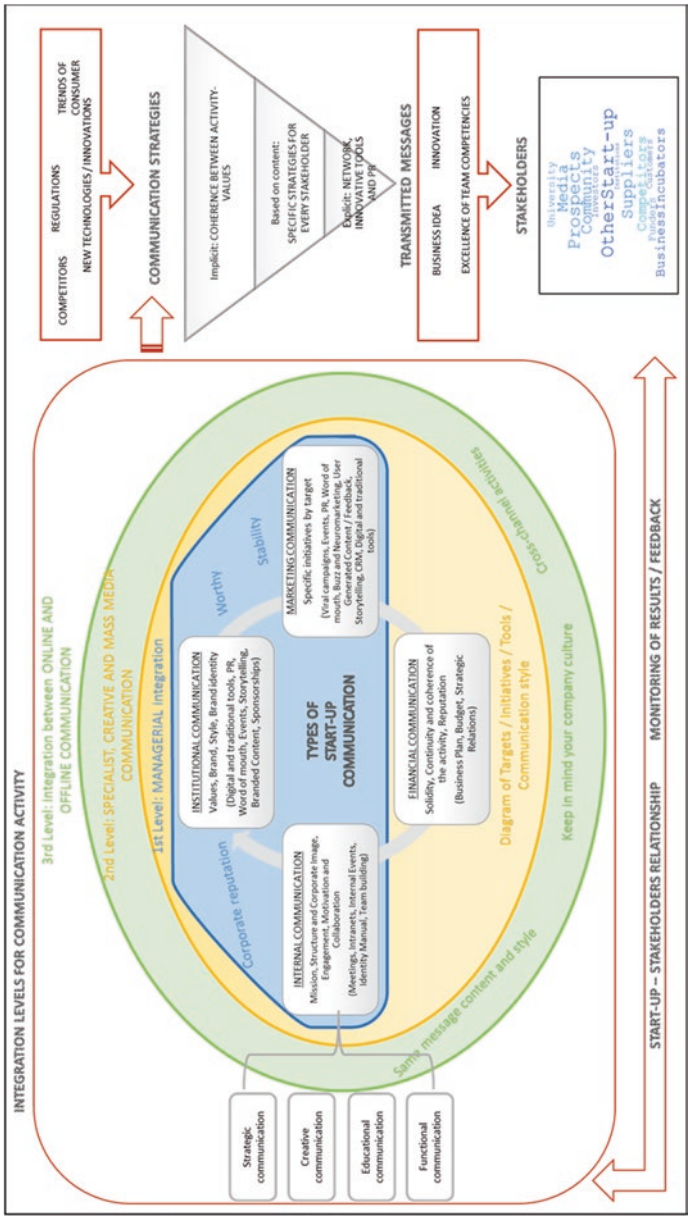

Fig. 8 Theoretical model of integrated communication to be applied to start-ups

- **Marketing communication**: it aims at creating specific actions tailored on subjects or objectives using tools like viral campaigns, events, PR, word-of-mouth, buzz and neuromarketing, used-generated content/feedback, storytelling, CRM, digital and traditional tools;
- **Financial communication**: it provides the start-up with a good economic and financial reputation. Some of the best tools for this activity are business plan, annual financial statement and strategic relations.

Once these types of communication have been identified, the start-up will have to integrate the activity of the first three forms in order to achieve the first level of integration. At a managerial level, the message about the company's image, reputation and brand solidity and personality must be uniform and consistent across the different types of communication employed.

The next step calls for the start-up to consider all types of communication to achieve the second level of integration, e.g., specialized level, creative level and the level of the means of communication. The integrated communication plan is a fundamental aspect of this phase. The plan outlines the actions proposed, the tools that can be used, the operation costs and style in relation to each of the objectives identified by the management. The planned actions shall be integrated in order to enable a more effective communication activity than each single strategy taken individually.

The third and last level of integration is between on-line and off-line communication. Here the start-up should make sure there are no differences between the content and style of the message spread around by the two channels to guarantee some sort of coherence. Moreover, there should be a constant reference to the company's culture and the management should implement cross-channel[2] policies aiming at integrating all the start-ups' means of contact with the stakeholders.

The activities can be started using some sort of implicit communication, focused on behaviors; explicit communication, aiming at being recognized by the recipients; or content communication, addressing the

[2] Cross-channel strategies: strategies providing customers with different, complementary channels allowing a user-friendly on-line ordering experience.

creation and maintenance of direct relationships between the start-up and the individual stakeholder.

In order to give the stakeholders a feeling of trust, transparency and sharing of values, all messages springing from the different strategies should refer to the idea of business, the concept of innovation and the team skills.

The integration activity is a dynamic process. In fact, the start-up will constantly monitor the model implemented to quickly adjust to market changes. New technologies and innovations, new competitors, new legislation and the evolution of consumerism trends can influence the activities of start-ups, even under a communication point of view. For this reason, start-ups must constantly be alert and assess signals coming from the outside.

Moreover, the model recalls the importance of monitoring the results of the communication activity in relation to the deadlines set at the beginning of the process. This operation enables the start-ups to sharpen their relationship with the individual stakeholders, each time improving or adjusting their approach to the subjects.

8 Conclusion and Further Steps

The *theoretical framework* concerning start-ups' integrated communication activities, based on research and results already discussed by other researchers, can lead to important benefits for companies.

The first benefit has to do with increased visibility on the market: start-ups can increase their value winning their own market shares and thus becoming more visible to stakeholders by building a solid and good reputation and a sense of trust and transparency through their communication campaign.

Moreover, the model can contribute to improve the ability to attract human resources: start-ups can attract qualified personnel by generating a strong internal motivation and communicating the value of their own innovative business concept to the world.

The third benefit concerns performance improvement and a reduced risk of premature bankruptcy for the start-up. When communication becomes a cross-cutting activity and an integral part of the company, positive results can also be noticed in other operational areas of the start-up.

The last benefit is feedback collection. Keeping a direct, or semi-direct, relationship with the stakeholders over time helps developing a relationship of mutual trust, which in return allows for the collection of useful business information.

This survey opens the door to possible, several new investigations on start-ups' systems of integrated communication.

More in-depth investigations could be carried out with a qualitative analysis of the sample with the aim of understanding the implemented communication activities: the selection methods, the operational phase, the management activity integrated with other initiatives, the assessment of the results and the stakeholders' answers. The quantitative analysis carried out provided the results with scientific validation. The next step should involve a qualitative analysis to better identify the specific communication activities put into action by the companies.

Moreover, it would be interesting to understand why start-ups have given different answers on the topic of reward crowdfunding. This could be done by focusing on the guidelines and the reasons standing behind the lack of trust in this activity, implementing a qualitative analysis of the operational management of different campaigns. An investigation on the point of view would highlight the strengths and weaknesses of this integrated communication tool with the purpose of making it as effective as possible.

Besides, start-up entrepreneurs could relate to the beneficiaries' perceptions of the reverse crowdfunding activity.

Appendix—Survey

QUESTIONARIO SUL SISTEMA DI COMUNICAZIONE DELLE START-UP

Il questionario proposto è finalizzato alla raccolta dati per una ricerca dell'Università degli Studi di Torino. Si precisa che le informazioni ottenute sono riservate esclusivamente al destinatario e verranno utilizzate in maniera anonima, ai sensi del DL 30/006/2003 n. 296, "Codice materia di protezione dei dati personali".

*Campo obbligatorio

ANAGRAFICA

1. **Nome della Start-up e del Referente** *

2. **Indirizzo della Start-up (Via, Città, Provincia)**

3. **Indirizzo e-mail di riferimento**

4. **Numero di telefono di riferimento**

I PARTE: Start-up e performance - Andamento

5. **1- Anno di costituzione della start-up:** *

6. **2-Tipologia della start-up:** *
   Contrassegna solo un ovale.
   - ( ) Business to Business
   - ( ) Business to Consumer

7. **3- Settore di appartenenza della start-up:** *
Contrassegna solo un ovale.

- ◯ Agricoltura, silvicoltura e pesca
- ◯ Attività manifatturiere
- ◯ Fornitura di energia elettrica, gas, vapore, aria condizionata, acqua
- ◯ Attività di trattamento dei rifiuti e risanamento
- ◯ Costruzioni
- ◯ Commercio all'ingrosso e al dettaglio
- ◯ Trasporto e magazzinaggio
- ◯ Servizi di alloggio e ristorazione
- ◯ Servizi di informazione e comunicazione
- ◯ Attività finanziarie e assicurative
- ◯ Attività immobiliari
- ◯ Attività professionali, scientifiche e tecniche
- ◯ Attività amministrative e di servizi di supporto
- ◯ Amministrazione pubblica e difesa
- ◯ Istruzione
- ◯ Sanità e assistenza sociale
- ◯ Attività artistiche, di intrattenimento e divertimento
- ◯ Altro:

8. **4- Quali dei seguenti indicatori ritenete più significativi per descrivere le performance della vostra start-up?** *
E' possibile dare più di una risposta
Selezione tutte le voci applicabili.

- ☐ Vendite
- ☐ Relazioni strategiche
- ☐ Visibilità e reputazione
- ☐ Attrazione di personale qualificato
- ☐ Sostenibilità finanziaria
- ☐ Capacità di aumento della spesa/degli investimenti
- ☐ Attrazione di investimenti
- ☐ Altro:

9. **5- Quali fattori devono essere tenuti maggiormente sotto controllo per evitare la prematura uscita dal mercato della start-up nella sua fase iniziale di vita?** *

Si possono dare al massimo 3 risposte
Seleziona tutte le voci applicabili.

- [ ] Capitale insufficiente
- [ ] Mancata comunicazione della business idea
- [ ] Comunicazione inadeguata della business idea
- [ ] Mancanza di trasparenza
- [ ] Il prodotto/servizio non soddisfa un bisogno del mercato
- [ ] I clienti non sono interessati al prodotto/servizio
- [ ] Gli imprenditori non conoscono a fondo i loro clienti
- [ ] Il team non era quello giusto
- [ ] Problema di prezzo/costi
- [ ] Altro:

10. **6- Una volta avviata, che cosa necessita principalmente la start-up per crescere ed affermarsi sul mercato?** *

Si possono dare al massimo 2 risposte
Seleziona tutte le voci applicabili.

- [ ] Capacità di comunicare la propria idea
- [ ] Capitali
- [ ] Risorse umane qualificate
- [ ] Capacità di attrarre l'attenzione dei potenziali clienti
- [ ] Adattarsi ai continui cambiamenti del mercato
- [ ] Altro:

11. **7- Con quali parametri viene misurato il successo della vostra realtà all'interno dell'ecosistema della start-up?** *

Contrassegna solo un ovale.

- ◯ Livello di performance
- ◯ Quota di mercato
- ◯ Esperienza acquisita
- ◯ Numero di utenti
- ◯ CAGR
- ◯ Contribuzione al progresso
- ◯ Reputazione
- ◯ wacc
- ◯ Altro:

II PARTE: Ruolo della comunicazione e analisi delle strategie/strumenti adottati

12. **8- Su quali elementi la comunicazione ha favorito l'aumento del valore della vostra start-up? ***

E' possibile dare più di una risposta
Seleziona tutte le voci applicabili.

- [ ] Aumento delle vendite
- [ ] Aumento del fatturato
- [ ] Aumento del numero di investitori
- [ ] Aumento del numero di collaboratori
- [ ] Aumento del numero di relazioni strategiche
- [ ] Ottenimento di IP (marchi, brevetti, diritti d'autore, ecc)
- [ ] Altro:

13. **9- Avete un piano di comunicazione che viene programmato ed aggiornato periodicamente? ***

Contrassegna solo un ovale.

- ◯ si
- ◯ no

14. **10- Quali linee guida principali cercate di adottare quando comunicate con i vari stakeholders (soggetti che hanno un interesse nella vostra attività commerciale)? ***

Si possono dare al massimo 2 risposte
Seleziona tutte le voci applicabili.

- [ ] Mantenere lo stesso stile di comunicazione
- [ ] Avere una strategia ben definita per ogni stakeholder
- [ ] Usare più strumenti per raggiungere uno stesso soggetto
- [ ] Raccogliere più informazioni possibili sui diversi soggetti
- [ ] Comunicare a tutti la propria identità di business
- [ ] Creare un rapporto di fiducia e trasparenza reciproca con gli stakeholders
- [ ] Altro:

15. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

	TOP MANAGEMENT/DIPENDENTI
Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

16. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

CLIENTI

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

17. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

FORNITORI

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

18. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

FINANZIATORI/INVESTITORI

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

19. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

ISTITUZIONI

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

20. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

CONCORRENTI / START-UP

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

21. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

INCUBATORE

Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

22. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

	UNIVERSITA'
Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

23. **11- Indicare per ognuno dei soggetti elencati quali strumenti utilizzate per comunicare con loro.**

E' possibile dare più di una risposta
Contrassegna solo un ovale per riga.

	COMMUNITY (AMBIENTE CIRCOSTANTE)
Sito Web	◯
Social Networks	◯
Cartellonistica	◯
Fiere/Congressi	◯
Eventi Aziendali	◯
Eventi organizzati da terzi	◯
Sponsor	◯
Relazioni Pubbliche	◯
Passaparola	◯
Condivisione dei valori	◯
Storytelling	◯
User Generated Content	◯

24. **12- Quanto sono efficaci per una buona attività di comunicazione, secondo la vostra esperienza, gli strumenti presenti nell'elenco sottostante? ***

Dare un giudizio da 1 (non importante) a 7 (molto importante)
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Sito Web	◯	◯	◯	◯	◯	◯	◯
Social Networks	◯	◯	◯	◯	◯	◯	◯
Crowdfunding	◯	◯	◯	◯	◯	◯	◯
Pubblicità	◯	◯	◯	◯	◯	◯	◯
Fiere, Congressi, Eventi	◯	◯	◯	◯	◯	◯	◯
Sponsorizzazioni	◯	◯	◯	◯	◯	◯	◯
Relazioni pubbliche	◯	◯	◯	◯	◯	◯	◯
Passaparola	◯	◯	◯	◯	◯	◯	◯
Educazione al consumatore/dipendenti	◯	◯	◯	◯	◯	◯	◯

25. **13- Quanto ha inciso l'attività di comunicazione sulle performance della vostra start-up?** *
Contrassegna solo un ovale.

	1	2	3	4	5	6	7	
poco	◯	◯	◯	◯	◯	◯	◯	molto

26. **14- In una scala da 1 a 7, in che misura i seguenti elementi rendono difficoltoso il rapporto con i singoli soggetti che hanno un interesse nella vostra attività commerciale?** *
1- poco difficoltoso; 7- molto difficoltoso
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Mancanza di trasparenza	◯	◯	◯	◯	◯	◯	◯
Mancanza di condivisione degli stessi valori	◯	◯	◯	◯	◯	◯	◯
Scambio di opinioni ridotto	◯	◯	◯	◯	◯	◯	◯
Rapporto poco costante	◯	◯	◯	◯	◯	◯	◯
Distanza fisica tra le parti	◯	◯	◯	◯	◯	◯	◯

27. **15- Monitorate periodicamente i risultati o i dati derivanti dall'attività di comunicazione?** *
Contrassegna solo un ovale.

◯ si
◯ no

28. **16- Se si, con quale indicatore?**

29. **17- Qual è stata la vostra migliore strategia di comunicazione adottata negli anni?** *
Raccontatecela in poche righe.

III PARTE: Focus sul Reward Crowdfunding

Si tratta di una forma di raccolta fondi tramite l'apporto di piccole o grandi donazioni da parte di utenti su internet. In cambio del contributo, gli investitori richiedono un premio tangibile, ma non finanziario. In alcuni casi la ricompensa consiste nella consegna del prodotto, oggetto della campagna di crowdfunding, prima che possa essere acquistato sul mercato dai consumatori finali.

30. **18- Avete mai intrapreso una campagna di reward crowdfunding?** *
Contrassegna solo un ovale.

◯ si *Passa alla domanda 31.*
◯ no *Passa alla domanda 34.*

31. **19- Su quale piattaforma?** *

32. **20- Quali sono secondo voi gli elementi più efficaci in una campagna di crowdfunding? ***

Dare una valutazione da 1 (non efficace) a 7 (molto efficace)
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Relazione trasparente con i sostenitori	◯	◯	◯	◯	◯	◯	◯
Conoscenza diretta dei possibili finanziatori	◯	◯	◯	◯	◯	◯	◯
Reputazione (creazione di una community)	◯	◯	◯	◯	◯	◯	◯
Messaggio chiaro e semplice	◯	◯	◯	◯	◯	◯	◯
Uso di strumenti a supporto (es. social)	◯	◯	◯	◯	◯	◯	◯
Breve video di spiegazione della business idea	◯	◯	◯	◯	◯	◯	◯
Uso del proprio sito web	◯	◯	◯	◯	◯	◯	◯

33. **21- Perchè secondo voi il crowdfunding è uno strumento ancora poco utilizzato dalle start-up italiane? ***

Dare una valutazione per ogni elemento in scala da 1 (poco significativo) a 7 (molto significativo)
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Poca fiducia nello strumento	◯	◯	◯	◯	◯	◯	◯
Difficoltà nel comunicare il progetto	◯	◯	◯	◯	◯	◯	◯
Difficoltà nel mantenere le promesse fatte	◯	◯	◯	◯	◯	◯	◯
Mancata conoscenza del funzionamento dei diversi modelli	◯	◯	◯	◯	◯	◯	◯
Rischiosità dell'attività	◯	◯	◯	◯	◯	◯	◯
Gestione complessa dello strumento	◯	◯	◯	◯	◯	◯	◯
Possibilità di ottenere fondi presso altri canali	◯	◯	◯	◯	◯	◯	◯
Nessuna garanzia del raggiungimento dell'obiettivo	◯	◯	◯	◯	◯	◯	◯

34. **19- Pensate che possa essere funzionale allo sviluppo del vostro business?**

Contrassegna solo un ovale.

◯ si
◯ no

35. **20- Quali sono secondo voi gli elementi più efficaci in una campagna di crowdfunding?** *

Dare una valutazione da 1 (non efficace) a 7 (molto efficace)
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Relazione trasparente con i sostenitori	◯	◯	◯	◯	◯	◯	◯
Conoscenza diretta dei possibili finanziatori	◯	◯	◯	◯	◯	◯	◯
Reputazione (creazione di una community)	◯	◯	◯	◯	◯	◯	◯
Messaggio chiaro e semplice	◯	◯	◯	◯	◯	◯	◯
Uso di strumenti a supporto (es. social)	◯	◯	◯	◯	◯	◯	◯
Breve video di spiegazione della business idea	◯	◯	◯	◯	◯	◯	◯
Uso del proprio sito web	◯	◯	◯	◯	◯	◯	◯

36. **21- Perchè secondo voi il crowdfunding è uno strumento ancora poco utilizzato dalle start-up italiane?** *

Dare una valutazione per ogni elemento in scala da 1 (poco significativo) a 7 (molto significativo)
Contrassegna solo un ovale per riga.

	1	2	3	4	5	6	7
Poca fiducia nello strumento	◯	◯	◯	◯	◯	◯	◯
Difficoltà nel comunicare il progetto	◯	◯	◯	◯	◯	◯	◯
Difficoltà nel mantenere le promesse fatte	◯	◯	◯	◯	◯	◯	◯
Mancata conoscenza del funzionamento dei diversi modelli	◯	◯	◯	◯	◯	◯	◯
Rischiosità dell'attività	◯	◯	◯	◯	◯	◯	◯
Gestione complessa dello strumento	◯	◯	◯	◯	◯	◯	◯
Possibilità di ottenere fondi presso altri canali	◯	◯	◯	◯	◯	◯	◯
Nessuna garanzia del raggiungimento dell'obiettivo	◯	◯	◯	◯	◯	◯	◯

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CHAPTER 16

Thinking Food Safety: The Consumers' Perception

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1 Introduction

In recent times, food sector stakeholders have been addressing the issue of interpreting the concept of quality. The latest Common Agricultural Policy (CAP) reviews have demonstrated how this concept has changed in the last ten years, with the development and transformation of an agriculture based principally on the production of quantity into an agriculture based on multifunctional quality, involving production, environment and landscape (Frascarelli 2008). This phenomenon was

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determined by the rapid mutations which have occurred in the last twenty years at international level, e.g. globalization of international trade, increase in food consumption, climate change, reduction of natural resources, land grabbing.

Referring to industrialized countries, and particularly to Member States of the European Union (EU), the need to provide a minimum level of food supply has directed agricultural policies to cultivation specialization, process mechanization and productivity improvement, overshadowing territory-linked aspects such as biodiversity, culture and traditions (Maltese et al. 2016). The ISO 8402 standard defines «quality» as «the combination of the properties of a product or a service which confer to it the ability to satisfy the explicit and implicit needs of the consumer». This definition is the first approach to the complexity of its meaning. It helps us to comprehend the connection between the peculiarities of a product/service and consumers' expressed or unexpressed needs (Mirandola et al. 1989; Peri 1995; Proto 1999).

Besides the general definition of quality, published in the aforementioned certification, the ISO 9000:2000 emphasizes even more the evidences and specific characteristics of a product or a service, extending its scope. It identifies quality as the «level in which a combination of intrinsic characteristics meets the requirements». The word *intrinsic* refers to the existence of some *characteristics* or features of a product, a service, a process or activity but also of a person, an organization or a system. The word *level* relates to the various degrees of satisfaction of people or entities interested in the combination of the intrinsic characteristics while the word *requirements* refers to «a need or expectation that can be expressed, or generally implicit or binding».

This definition highlights satisfaction of the requirements without a need to reach absolute excellence, which is generally a hard target to achieve. There are no explicit references to the product and its consumer (ISO 8402) but there is the will, on the one hand, to extend the scope of the definition, in order to involve any entity interested in the combination of the characteristics, and on the other hand, to provide quality measurability based on compliance with the requirements (Mattana 2001).

Agro-food quality has played an important driving role for the European Economic Community (EEC) and the EU. Since the establishment of the EEC, in the second post-war, the CAP has played a key role in the European economic policy. CAP aims to achieve the necessary

requirements for satisfying the needs and the protection of European consumers: this purpose should be reached taking into account the evolution of the definition of «quality». Indeed, the quality concept is dynamic, linked with other elements such as time, places and stakeholders involved. It's worth noting how consumption has evolved from post-war times to nowadays, and also how eating habits have changed in relation to geographical areas and complexity of the food chain.

According to Percivale et al. (1996), food quality is defined in relation to three main aspects, i.e. *food characteristics*, *psychosocial use* and *service*. The first aspect can be segmented into four interpretations of quality, i.e. *agronomic, health and hygiene, nutritional* and *sensory*. All four interpretations are essential to assure the success of a food product in the market.

Agronomical quality requires the existence of some characteristics that are useful to the primary producer, such as resistance to diseases and parasites, adaptability to climate conditions and to the soil, genetic heritage of the plant species. This category can be extended to the whole agricultural activity, breeding included, and can be considered *agricultural quality*.

Nutritional quality interprets the potential ability of a food product to provide the fundamental elements for the growth and well-being of an individual (nutrients). For every element, its availability in nature needs to be considered, besides direct or mediate assimilability. The essential elements can immediately be assimilated or they need one or more chemical transformations before assimilation.

Hygienic-sanitary quality is very important among food quality types. It requires compliance with current EU legislation (Hygiene Package) and therefore it is a necessary condition for the consumption of food products in the territory of the EU. Indeed, EU food safety Regulations underline the necessity to guarantee the absence of contaminants or substances that can be dangerous for the health of consumers. Hence, it is possible to distinguish among physical, chemical and biological contaminations.

Sensory quality is subjective, subordinated to tendencies and fashions, varying in time and space. Its properties are aspect, colour, odour or smell, taste, aroma and consistence. *Aspect* is determined by shape, dimension, characteristics of the surface, conditioned by the uniformity of presentation and the packaging. *Colour* is characterized by tonality such as red, green; by saturation, e.g. bright colour, and by brightness. *Smell* characterizes many products with its typical features and can also

be a good sign of freshness or of product edibility. *Taste* refers to the set of senses perceived on the mucosa of the mouth. *Aroma* refers to the set of olfactory and taste senses felt when food is introduced into the mouth. *Consistence* is the structure of the product and its mechanical behaviour (Percivale et al. 1996).

Peri (2006) has wisely analyzed the food quality concept. Based on the assumption that «quality can be described as the necessary requirements to satisfy consumer needs and expectations», he has found out and differentiated two typologies of consumers: the *homo edens* and the *homo œconomicus*. The *homo edens* identifies quality through intrinsic and psychological aspects of a product, while the *homo œconomicus* is more sensitive to the aspects of guarantee and those related to product-packaging and product-market systems.

Commercialization requirements of a foodstuff in a narrow sense are food safety, market conformity, nutrients and sensorial aspects. Moreover, there might be other elements in the evaluation process of a food product, such as tradition, raw materials origin, country of manufacture and presence of ethical behaviours related to the production and/or consumption of food products, for example various interpretations of the concept of sustainability, from which safeguard of the environment and its biodiversity, equitable distribution of wealth along the supply chain or animal well-being are derived.

Guarantee requirements allow to verify the presence of some remarkable characteristics in the food products. They are composed of certifications (every phase of the supply chain can be guaranteed from an independent third corporate body) and legal traceability (in this case, the EU made traceability of food products and their constituents compulsory). Nevertheless, it is important to specify that guarantee is commensurate with consumers' trust in the producer and, in general, in food business operators: the loyalty many consumers show towards agro-industrial firms (business marks) or retailers (commercial marks) are a tangible example of this.

The product-packaging system should satisfy expectations related to marketing, identification and functionality of a product. Particularly functional characteristics and aesthetics of packaging are essential, e.g. ergonomics, maintenance, storage, waste management, information written on the label (to a large extent compulsory for European legislation) and conditions of use.

The requirements of the product-market systems are synthesized in the availability (i.e. presence of the product on the market) and in the positioning in an appropriate price range in order to satisfy consumer expectations as to their willingness to pay.

Careful examination of the requirements brings into light the importance of hygienic-sanitary control and the need to guarantee food safety. In this framework, food safety seems to play a central role in the food sector; but exactly what does it mean at food consumption level? In the light of aforementioned information, this paper aims at investigating consumers' perception of food safety and related topics.

2 Literature Review

Before introducing the topic of food safety in a narrow sense, it is important to remind of the fact that, unlike what happens in Italy, in English-speaking countries the meaning of food safety can be understood in three different ways: *food security*, related to food supply and self-sufficiency; *food safety*, linked to the guarantee of healthiness of food products; and *food defence*, an expression commonly used by the American Food and Drug Administration in order to define activities connected to the protection of foodstuffs from deliberate actions of contamination or manipulation.

The first World Food Conference was held in Rome in 1974 by the Food and Agriculture Organization of the United Nations (FAO), facing the issue of the world food crisis. During the summit, the «food security» concept was defined as «availability in every moment of adequate food, to sustain an expansion of food consumption and to eliminate fluctuations in production and prices».

Later on, some changes were brought to this definition. Its meaning was extended, and nowadays includes aspects related to the effective access to food, i.e. «food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life». The issue of sustainability, in its various interpretations (FAO 2003), was added to this definition.

The food safety definition has in recent years been enriched with new interpretations related to people's phobias caused by acts of terrorism. This brought to the introduction of the *food defence* concept. Indeed, several cases of intentional contaminations occurred in the US in the last

decades led agro-food companies to take strict protection measures and coin the term «Food Defence», used to identify a defence system against acts of intentional adulteration. The Food and Drug Administration has published the Regulation FSMA-IA-Intentional Adulteration which will come into force on 26 September 2019. This standard will have to be adopted by all agro-food companies exporting to the United States, thus implementing a food defence system that should reduce risks of intentional adulteration.

The EU guarantees high food safety standards, introduced into the market by Member States with the imposition of rigid production requirements. The primary aim of the EU policy is the protection of public health, which is tightly connected to the economy and the environment, since the EU is the greatest producer of food and drink products in the world, and environmental conditions can have important impacts on the food chain (EC 2000).

The EU has developed several rules and control systems in order to guarantee safety in the food sector and therefore to reassure consumers (Grunert 2005). In the last thirty years, there has been a succession of cases of fraud and, more in general, of food scandals that have undermined the safety of European and international consumers. The registered food-borne diseases and food infections have increased over the last decade despite the use of modern production technologies and good manufacturing practices (Djukic et al. 2016).

Food fraud means the production, detention, trade, sale and supply of foodstuffs that do not conform to current legislation. The most recent interpretations differentiate between *sanitary frauds*, which are actions that make food in fact or potentially harmful, and *commercial frauds*, meant as activities that don't determine concrete or immediate risk for public health but favour illegitimate profits to the consumers' detriment.

Actions aimed at modifying food characteristics are subdivided into three types. *Alteration* is a natural degenerative phenomenon of the composition and the organoleptic characteristics of a product, caused by wrong storage methods. *Adulteration* is deliberate subtraction or addition of some food components. *Sophistication* is a total or partial change of a food product, determined by total or partial substitution of some components with other, less valuable ones. The following table reports some cases of fraud and food contamination which have created alarm and insecurity among European consumers (Table 1).

Table 1 Some examples of food fraud and contamination

Mad cow disease. The case of the *bovine spongiform encephalopathy* (BSE, also known as the mad cow disease) is the most blatant case, subsequently regulated and perhaps overestimated. Regulation n. 1760/2000/EC was centred exclusively on bovine meats and aimed to guarantee consumers more transparency through the communication of traceability, underlining the importance of the origins of a food product as a tool of guarantee. There are countless periodicals and scientific articles concerning the BSE phenomenon and the consequences on human beings of the variation of the Creutzfeldt Jakob disease (vCJD) (Will et al. 1996; Weber et al. 1997; Weihl and Roos 1999). Moreover, the Creutzfeldt Jakob disease is a phenomenon known also as consequence of the transplantation or injection of contaminated human tissues (Ellis et al. 1992; Billette De Villemeur et al. 1992)
Methanol wine. Methanol added to wine caused a scandal and the death of about ten consumers, harshly striking the wine market in March 1986 (Barbera and Audifredi 2012)
Chernobyl. The Chernobyl disaster (1986) was the most serious recorded accident in the use of atomic energy for civil purposes. The consequences on environment and agriculture became evident within a few days after the deadly event, even over distances of hundreds of kilometres: in 1987 in Sweden 1.4 million Swedes lived on soils contaminated by deposits of radioactive particles and some food products were excluded from trade after the concentrations of Cesium 137 were verified (Bruce and Slorach 1987). In 2004, a comparison of the levels of radioactivity affecting food products in 1986 and in 2002 respectively was carried out in Austria, in order to measure the time of halving of the level of radioactivity (Schwaiger et al. 2004). Several areas in Europe still suffer from consequences of the Chernobyl accident, with a consistent presence of radio-nuclides in soils and food products (Nesterenko et al. 2009) as well as in animals: in 2013 the presence of wild boars contaminated by Caesium 137 was signalled in Valsesia, an alpine valley a few miles from the largest residential areas in the Pianura Padana (Turin and Milan), and in Tirol, near the border between Austria and Germany
Dioxin. When dioxin was found in milk at the end of the eighties of last century in the Netherlands, it was understood as a sign of environmental disaster due to the presence in the environment of harmful substances caused by human activities; within less than ten years it was realized that cheese and animal feeds were contaminated, turning the environmental disaster into a real food problem (Loeber et al. 2011). Cases of contamination in Europe are numerous and involve various categories of products: meat, milk, cheese and eggs but also nonalcoholic drinks (Verbeke 2001; Nemery et al. 2002; Bánáti 2011). At the end of 2007, Italy was involved in an international scandal due to the presence of dioxin in buffalo mozzarella cheese exported to South Korea: at that time the bad waste management (and the subsequent abusive fires, the main cause of the presence of dioxin) in Naples was subject to debate during the election campaigns
Sudan Red. The case of Sudan red dye in chilli pepper is for instance a known case of harmful substances added to food products. After its carcinogenicity was ascertained, several foodstuffs containing chilli pepper imported from Asia were withdrawn from the market and emergency measures were taken for their destruction (Commission Decision 2003; Tateo and Bononi 2004)

(continued)

Table 1 (continued)

Avian flu. The first case of avian flu (contamination by virus H5N1 from birds to human beings) was signalled in Hong Kong in 1999, but only since early 2003 the phenomenon became (supposedly) pandemic in Southeast Asia and then spread out to the rest of the world (Babakir-Mina et al. 2007) Regulation n. 543/2008/EC, concerning poultry meat trade rules, makes it compulsory to point out the origins of foods (just in case they come from countries outside the EU). This is a useful tool to reassure consumers. The Italian Health Minister promulgated an ordinance by which norms related to poultry farming biosafety became more strict, and the obligation to specify the place of origin of poultry meats was introduced (Ministerial Order, 10 October 2005)
Killer bacterium. There are numerous cases of bacterial contamination in the food sector; two of them, for example, concerned the presence of Escherichia coli and Pseudomonas fluorescens, respectively. The first one was about the detection in cucumbers of the killer bacterium, soon known as *bacterium of German food and vegetables*: in 2011, after an EU-wide scare campaign, it had every consumer on edge. The high level of attention and concern was caused by the contamination of some food products by a particularly resistant bacterium called Escherichia coli (O104:H4), which in the most serious cases led to acute kidney insufficiency with lethal consequences (WHO) In a second, more recent case, a well-known European furniture company was involved in a scandal: Chinese customs officers suspended a cake-competition because of the presence of faecal bacteria; shortly after, the trading firm forbade the sale of such products in the restauration areas of trade centres, at the same time withdrawing numerous products in March 2013. The third case of contamination of food products is that of *blue Mozzarella* (2010, 2012, 2013), which affected the gastronomic image of Italian consumers. The blue coloration of the cheese is a phenomenon caused by the presence of a particular bacterium called Pseudomonas fluorescens (Cantoni et al. 2003; Bevilacqua et al. 2006; Nogarol et al. 2013)

Moreover, the healthiness of Genetically Modified Organisms (GMOs) in human foods and animal feeds could be added to the list of problems mentioned above. European consumers declared a certain concern towards GMOs used in the food chain. According to a survey, one out of four European consumers is strongly worried about them and 37% of the respondents have expressed a moderate fear. Furthermore, similar results have been registered for additives as well (Eurobarometer 2006).

This fear towards GMOs is common to all new technologies that find application in the food sector, e.g. regarding animal cloning or the 'hamburger' obtained from stem cells; it probably originates from unclear information that doesn't allow to mature a structured judgment on potential advantages and possible disadvantages deriving from the use of such innovative tools (Bánáti 2011).

On the one hand, some schools of thought believe in the harmlessness of GMOs for human health and environment, underlining the need for them in order to reduce hunger in the world; on the other hand, other schools of thought underline their interference with the environment, and believe in a consequent necessity of absolute prohibition of their diffusion.

According to Martin (2013), GMO food products are comparable to other bio-food products in terms of toxicology, but there is some kind of scepticism by consumers, especially European ones. However, attention should be paid also to the environmental impact of cultivations: on the one hand, there are consequences due to the variation of agricultural practices; on the other hand, there is a possibility of genetic flux among OGM species. In both cases the risk of a negative interaction between GMOs and environment is evident. In this context it is nevertheless useful to underline that for millennia human beings have been confronting with nature, trying to modify its characters on the basis of their needs, for instance by empirical selection.

There are numerous studies on the issue of food safety perception by consumers. Sometimes the concept of food safety and guarantee is associated with the origins of the raw materials.

Bernués et al. (2003) observe the behaviour of European consumers towards products of bovine and ovine origin. Their study highlights the importance of including information related to the origin and place of production (besides the due date), as well as to product tests and traceability of the animals and products. It's also essential that producers can guarantee implementation of quality control systems.

These demands emerge from the necessity of a guarantee of food safety. According to the achieved results, Bernués et al. (2003) suggest labelling systems, supported by promotional and advertising elements and by the guarantee of an independent third corporate body.

Banterle and Stranieri (2008), according to two different investigations respectively concerning operators in the meat sector and consumers of meat, underline the importance of implementing a system of effective and efficient traceability in order to guarantee a high level of safety (operators) and a system of labelling that, besides showing the origin, also provides information related to the production system (typology of breeding, animal feeds) and the date of slaughtering (consumers). Van Ittersum et al. (2007), according to the need of European consumers who request more and more guarantees, and relying on certification

granted by third entities, underline the importance of denominations of origin (DO), in order to offer consumers more transparency and further information, in addition to those required by law.

The EU has reviewed its rules on food in order to regain consumers' trust, which was strongly compromised by the numerous food scandals. In particular, the European legislator has adopted horizontal norms, applying to all food products (e.g. Regulation n. 178/02/EU on general principles and requirements of food law), as well as vertical norms, concerning single typologies of products (e.g. Regulation n. 1760/2000/EU on the identification and registration of bovine animals and related labelling).

The new EU Food Policy requires a complete and integrated approach to food safety. This approach should be able to oversee the entire food chain and involve all operators of the sector, from producers of animal feeds to users of the foodstuffs. A revision of horizontal EU legislation led to the enactment of Regulation n. 178/2002/EU, which 'establishes the principles and the general requirements of food Legislation, institutes the European Authority for Food Safety (EFSA) and establishes the appropriate procedures in the field of the food safety', as well as to the adoption of the so-called hygiene package in 2004 (EU Regulations n. 852, 853, 854 and 882).

3 Methodology and Data Collection

With the purpose to collect data and information in accordance with the identified objective, the authors interviewed consumers using a questionnaire with closed questions. This provided the interviewers with homogeneous guidelines, and the closed questions produced uniform data to be elaborated statistically. A preliminary version of the questionnaire was tested on 20 consumers, in order to notice possible mistakes and possible structural weaknesses (Vecchio and Annunziata 2013; Clonan et al. 2009). This step was very important because, according to the results, it enabled the authors to identify some critical issues linked with the comprehension of the questions.

Indeed, it was ascertained that some consumers were confused about the different interpretations of safety, i.e. safety, security and defence. For this reason, the authors decided to focus exclusively on aspects linked to food safety.

The final version of the questionnaire was divided into three sections: the first part collects demographic, social and educational information on interviewed consumers, for instance gender, age, place of residence, nationality, qualifications, education and activity. The second part concerns some aspects of the consumers' behaviour in the phase of purchase of a food product in relation to the features influencing their decision making choices, e.g. safety, labels, origin of the raw materials, circumstances that can worry consumers in this phase. The third and last part investigates the elements that can reduce the perception of risk and the implementation of a supplementary system of food safety (Panghal et al. 2018; Bovay 2017).

The questionnaire was communicated and distributed through digital channels and socials networks, i.e. Facebook, and it required on average about 10 minutes to complete. The diffusion of the survey via online social networks enabled to get answers from people of various ages, with different jobs and economic conditions, in order to achieve diversified outcomes. The questionnaire was completed by 355 persons coming from various places of residence in Italy and with different educational backgrounds. The majority of respondents are Italian (99%) and almost 32% of them live in Piedmont. Almost 53% of the respondents has at least a bachelor's degree and the majority of them is employed.

The respondents have been divided into 6 age groups: less than 22, 23–29, 30–37, 38–57, 58–73 and over 74. According to the fact that almost 84% of the respondents are between 23 and 57, the authors decided to focus on these three age groups in order to make it easier to draw comparisons among the groups: the respondents between the ages of 23 and 29 are the so-called *young millennials* and are 32% of the whole sample. The members of the second group (30–37) are the so-called *old millennials*, and are 17% of the sample; the other respondents, aged between 38 and 57, are members of the so-called *generation X* group, and they are 35% of the respondents.

The interviewees were asked to answer some questions by rating the features in a Likert scale from 1 to 5, and other questions by choosing the most appropriate option.

The achieved results were submitted individually to each author, who analyzed them separately so as not to influence one another (Atkinson and Shaffir 1998). The results of the analysis were then compared and the principal points identified.

4 Findings

Test results show how food safety is one of the most important features in the purchasing process of foodstuffs. Other features as the geographical origins of the food, its organoleptic properties and its traceability can also be important factors that affect consumer decision making.

On a five-point Likert scale, respondents rated food safety 4.45, considering it the most influential element in the process of purchase. The results indicate that there is not a significant difference in responses among the three age groups, but it can be observed that respondents between 38 and 57 are the most concerned about food safety (4.52).

Organoleptic properties along with nutritional values and geographical origins of foodstuffs are rated highly by respondents who consider these elements very influential in the process of decision making. Here again, there is no significant difference among age groups.

The results show how elements such as ethical trade label (2.88) and branding of foodstuffs (2.95) are considered less influential than the other features mentioned in the question.

Regarding the absence of GMOs and the marking of a certified quality label on foodstuffs, the results show how respondents between the ages of 30 and 37 are more concerned about these features than the other age groups, who consider these elements less influential in their decision making. This gap occurs also regarding the geographical origins of food: as we can see, respondents between the ages of 30 and 37 are more concerned (4.40) than the other age groups (Fig. 1).

Moreover, the results show how respondents are more worried about the occurrence of harmful substances in the food (4.33) and the lack of hygiene and health checks (4.20) than about the other circumstances mentioned above. It also appears that respondents are less worried about the environmental impact of the food they eat or buy in comparison to other instances.

Results show that there is homogeneity in the responses of the three age groups, except for circumstances such as the existence of chemical additives in foodstuffs, where there is a gap among the opinions of the groups. It appears that respondents between the ages of 23 and 29 are less worried about the chemical additives existing in the food they buy than the other age groups. The results also show how respondents between the ages of 30 and 37 are more worried about food waste (4.17) than the other two groups (Fig. 2).

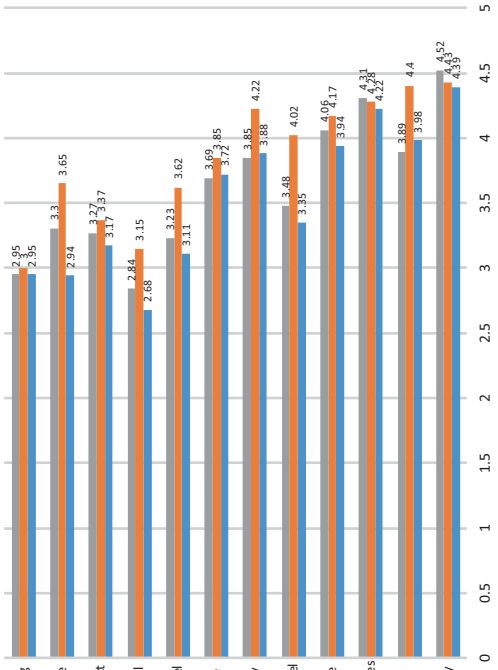

Fig. 1 Question 1. Please, assess the following items when buying a foodstuff

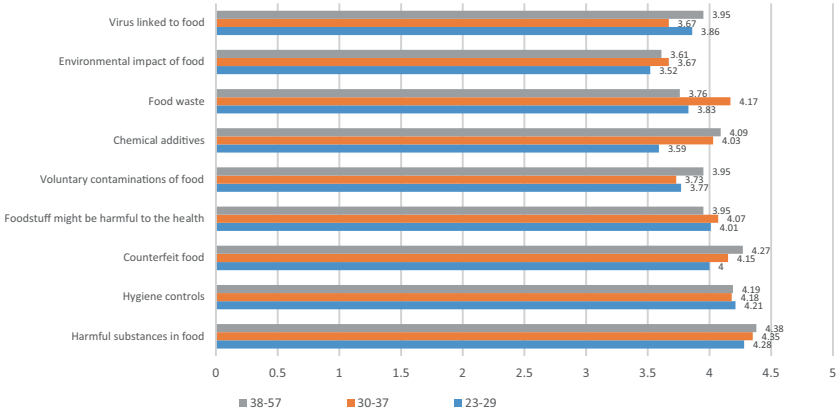

Fig. 2 Question 2. Please, assess the following items related to risks in the food sector

It appears that respondents are confident in the inspection bodies for food safety, with a gap occurring among the responses of the age groups. As it appears, younger respondents between the ages of 23 and 29 are more confident and trust more in the information written on the labels of the food products than older respondents. It's interesting that respondents don't consider best-known brands of foodstuffs safer than unknown brands and don't associate the safety of the food product to its brand (Fig. 3).

The results show that respondents consider imported products and precooked food products riskier in terms of food safety than other products mentioned below. It's interesting that younger respondents between the ages of 23 and 29 consider foodstuffs marked with the protected geographical indication label less risky than the older respondents between the ages of 30 and 37. It's also remarkable that the Halal certification is considered less risky by the younger respondents rather than the older ones, who are more sceptical about the label in terms of food safety (Fig. 4).

The results show that respondents are more sceptical about discount markets and are more concerned about the safety of food products sold in these places than in other points of sale. It is interesting as well to observe that respondents are also concerned about the safety of food products consumed at home, and the age group between 23 and 29 is the most concerned one (Fig. 5).

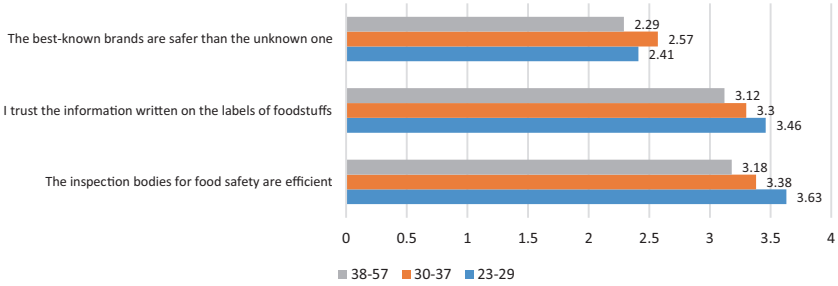

Fig. 3 Question 3. Please, assess the following sentences as to warranty tools in the food sector

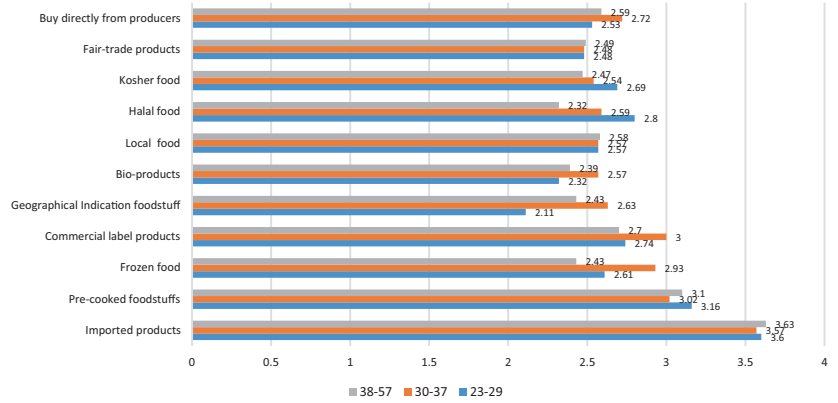

Fig. 4 Question 4. Please, assess the following type of food on the basis of the level of risk

According to the opinion of respondents, cleanliness and hygiene of the store along with a clear labelling of the products contribute to create a stronger perception of food safety. The respondents don't associate the purchase of packaged products to a stronger perception of food safety (Fig. 6).

The majority of respondents would pay between 11 and 20% more for having more safety in the food they buy (Fig. 7).

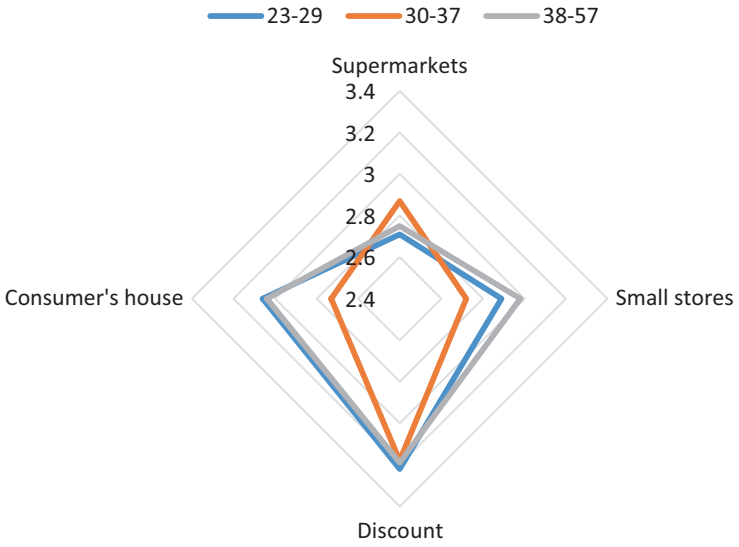

Fig. 5 Question 5. Please, assess the following places on the basis of the level of risk

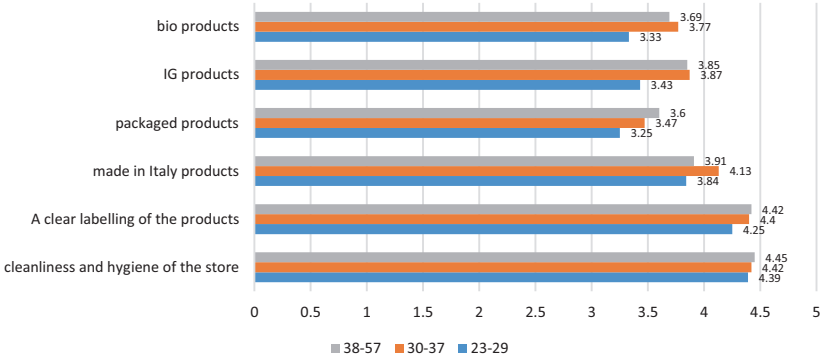

Fig. 6 Question 6. Please, assess the following items that could help the improvement of the perception of safety of the food products purchased

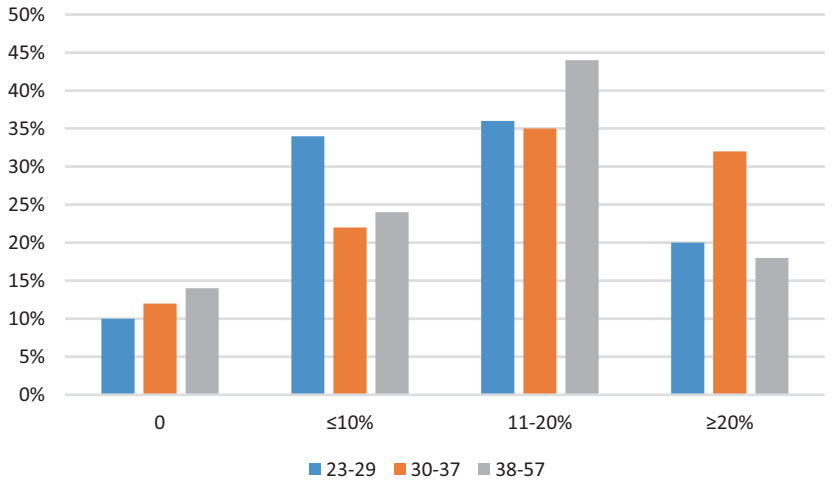

Fig. 7 Question 7. How much more would you pay for having more food safety?

5 Discussion and Conclusions

With the purpose of achieving the general objective of human health protection, the European Legislator has founded EU food discipline on the basis of risk analysis, supported by scientific tests. EU Member States and the Commission may adopt appropriate risk management measures based on the precautionary principle, in case a product or process can be potentially dangerous for health even if scientific and objective evaluation have not yet allowed to determine the risk with sufficient certainty.

The general rules of EU food legislation prohibit trade of dangerous food products, which are harmful for health or not appropriate for consumption, and they forbid introduction on the market of dangerous animal feeds. Traceability of food products, feeds, animals and of any ingredient of food products or animal feeds, in every phase of production, transformation and distribution is made compulsory by Regulation n. 178/2002/EU. This Regulation establishes the EFSA, with the role of providing scientific opinions and technical-scientific assistance in all sectors directly or indirectly involved in foodstuffs or animal feeds.

The most meaningful rules in this sense refer to the so-called Rapid Alert System for Food and Feed (RASFF). Indeed, the operators of the food supply chain have achieved benefits in terms of food safety, information management, logistics, quality, market, diffusion and promotion by the implementation of traceability (Bernués et al. 2003; Banterle and Stranieri 2008; Amendola 2011; Arnoldi et al. 2012; Contato 2005; De Cindio et al. 2011, 2012; Ene 2013).

Specific rules, as the hygiene package, have reorganized European legislation on food safety with particular reference to the hygiene of food products. The enacting terms of the Regulation refer to the previous Directive 43/93/EEC and confirm (extending it to primary production) the necessity of applying the Hazard Analysis and Critical Control Points (HACCP) system by all subjects coming into contact with food products (Panisello and Quantick 2001). The European regulatory system seems to be sufficiently strict and complete to guarantee and reassure European consumers. Nevertheless, according to the results achieved in the investigation, some degree of perceived insecurity emerges among consumers.

The highest levels of insecurity seem to concern selling points where low-priced products are traded (discounts) and products imported from abroad, confirming that the local origin of a product is considered to be a sign of strong safety guarantee (Bernués et al. 2003; Van Ittersum et al. 2007; Banterle and Stranieri 2008). More cleanliness of stores and more specific and clearly written labels seem to be further elements guaranteeing consumer safety.

Besides such aspects, the results highlight that the request for safety is further confirmed by the availability of the majority of interviewees to pay a price for the implementation of tools apt to guarantee food safety, as argued by Grunert (2005). Moreover, supply chain operators should implement new tools in order to reduce the perception of risk, such as more information and communication on food quality, which are more and more required by consumers. Lastly, the strengthening of the normative system seems to support, with great conviction, the aim to avoid contaminations and food scandals. However, this does not seem to be sufficient for reassuring Italian consumers.

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CHAPTER 17

Product Risks and Life Cycle

Anna Claudia Pellicelli, Erica Varese and Luigi Bollani

1 Introduction

The purpose of this paper is to analyse the progress of risk management and the tools that can help companies to better deal with the risks they face. The research carried out on a sample of companies from different sectors offers confirmation and new convictions.

After the analysis of the drivers and of the evolution of risk management, business risk has been examined by three approaches: the risks associated with the various phases of the product life cycle, the risk of industry decline, the risk that the company will get its strategy wrong.

During the various phases of the life cycle, the product or service encounters risks of various kinds. Those during the embryonic phase are very different from those that occur during the maturity phase.

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Frame (2003) suggests to examine these risks with a five-element "grid":

1. market risks (will there be demand for our product?);
2. technical risks (are we capable of technically producing the new product?);
3. operational risks (are we capable of producing the new product efficiently on a large scale?);
4. financial risks (can the new product generate profits?);
5. legislative risks (will the new product comply with the laws and regulations in force at the time of launch?).

2 Literature

The essential assumption of every research is to examine existing literature.

Literature on risk management is very extensive, but mainly concerns on the risks of financial nature. Only in recent years, attention has been paid to risk management as an integral part of a company's overall strategy. In recent years, risk management has gone from being confined to the financial area to being an integral part of the strategies of companies and therefore of the decisions made at the top of the organisation.

3 Methodology and Data Collection

The purpose of this paper is to analyse the progress of risk management and of the tools that can help companies to better deal with the risks they face.

To this end, a sample of companies from the automotive, pharmaceutical, electronic, air transport and mass retail sectors was chosen.

The documentation available on these companies (annual reports, previous research, publications, articles of the specialised press) was collected. Each company was then asked to provide material on the role played on risk management.

The documentation collected was examined by asking four questions. (1) Is there a specific risk management function? (2) Which risks does it deal with in particular? (3) Which policies? and (4) What place does risk management have in the organisation?

4 Finding Discussion

Deloach (2000) and Sadgrove (1997) identify a series of risk management "drivers".

4.1 Risk Management "Drivers"

The need to innovate. In order to maintain a successful position, a company has to innovate. Innovation requires agility, an aptitude for continuous change//an ability to continuously change. Innovating means revealing new risks, which have to be identified and assessed. According to Grove (1997), sooner or later every company is faced with a "strategic inflection point", which can be defined as the moment when the premises on which the business is based are changing. The greatest risk is in the decline of the "vision" that had led the pioneer or the management to success. Microsoft is an example of great success, but in the early 2000s even this company was faced with an "inflection point". "A computer on every table, in every home" was the vision that had guided the organisation. Focusing on the PC, however, Microsoft's management had lost sight of an important trend: the explosive development of the Internet.

Obsolete business models. The "New economy" breaks down many boundaries between sectors and incorporates intangible assets, sources of value creation which, unlike tangible assets, are not the sole property of the company. As business models change, new risks emerge.

New management methods. Outsourcing, e-commerce, lean management and just-in-time, to increase the efficiency of management, make businesses more vulnerable and place companies at new risks. What benefits do they gain in exchange for the risk of losing control over strategic activities (production, innovation)? At the same time, driven by the need for greater rigour, various companies have developed risk and return measurement tools in order to achieve the best allocation of capital. Risk Adjusted Return on Capital (RAROC) and Economic Capital at Risk (ECAR).

Greater management responsibility. The stricter rules and, above all, the outcome of the investigations following the financial scandals that have swept through companies that were thought to be successful, have made both board members and top managers more attentive to the responsibilities they take on. The public is more demanding from companies in terms of environmental protection, safety in the use of products and the supply of truthful and prompt financial information.

Higher premiums. In recent years, insurance companies have seen the cost of compensation rise sharply. They have been forced to review risk levels, increase premiums and restrict the levels of coverage insured. They no longer take certain risks. As a result, some risks have gone back to weighing directly on the financial statements of the most exposed companies.

More in-depth analysis of scenarios. The construction of scenarios and the analysis of their probable impact on company economy have also progressed. This allows risks to be included in an overall assessment framework for the (most likely) future of the company to a greater extent than in the past.

More effective information systems. The advent of the Internet gave a further boost to the greater effectiveness of information systems. Enterprise-wide Resource Planning (ERP) systems are easily accessible. They do not indicate the measure of the risks, but they provide a lot of information that was not fully and quickly available in the past. This focus is reinforced by the growing role played by e-commerce in business management.

Intervention by supervisory authorities. The loss of confidence in the financial markets and in the company as an institution caused by financial scandals has prompted government authorities in various countries to issue regulations that force companies to identify and control the risks they run and to adequately inform shareholders and other stakeholders.

More attention from investors. Another trend that has led to greater focus on risks is the close attention paid by investors, both institutional and individual, paid not only to economic performances but also to the strategies adopted, to the remuneration of top management and to the responsibilities undertaken with society in general. High risks depress the price of shares and raise expectations of returns.

4.2 Evolution of Risk Management. Towards an Integrated Vision

Deloach (2000) clearly interpreted the evolution of the concept of risk management by identifying three phases. (1) Traditional risk management; (2) Business risk management; and (3) Enterprise-wide risk management.

In a broad sense, risk management was born with business. It became a specific function with defined rules, responsibilities and methods, starting from the 1970s in financial management and banks in particular. Gradually, the need for a specific function extended to other types

of enterprise. There was also an evolution in the way of interpreting risk management: from being a simple reaction to events, it became an anticipation of possible effects deriving from future events.

Sadgrove (1996) identifies three stages of risk management. The first stage considers non-business risks only (those that do not derive specifically from the management of the company), such as theft or fire risks. The company deals with the risks in a "reactive" way, "defending" itself. In the second stage, the risk is handled in a "proactive" way. The risk can be reduced by adopting new policies: plant compliance with fire regulations reduces the risk. These policies or campaigns are often promoted by insurance companies that aim to reduce compensation. They are also supported by governments, companies, consumer associations and trade unions that aim to reduce risks for customers and workers. In the third stage, risk management assesses business risk. By assessing the risk of entering a new market, the company acts in a "proactive" way, facing its competitors better and increasing its ability to make a profit. The evolution from the previous stage is that risks are assessed by projecting them into the company's system.

Phase one: *Traditional risk management*. Many organisations rely on the traditional model, which consists in managing financial risks and disaster risks through transactions and forms of internal audit. Classic risk management uses derivative instruments (index-linked prices, currency risk sharing), insurance products and other forms to mitigate the potential negative effects of certain events. Risks managed through coverage with an insurance product, a derivative and the like are financial risks. These instruments transfer risk exposure to other parties through transactions (insurance companies, banks, other financial institutions). Internal audits, on the other hand, seek to prevent and avoid the occurrence of a negative event.

Many people think that this traditional form of risk management is not appropriate for the modern economy. According to Deloach (2000), there are at least three reasons why this happens.

- Risk management responsibilities are often fragmented. The purely financial view reduces risk management to a "cost centre". Hedging is not necessarily the best solution. Risks that emerge from day-to-day management can be better addressed with long-term solutions, with management policies rather than with transactions.

- In traditional risk management, risks are often considered separately from each other. This means that the advantages of a unified vision are lost. Risk management is the responsibility of one department while other functions of the company are managed by other departments.
- Risk management is an integral part of corporate strategies. It cannot therefore be delegated to a team or to several individual teams as insurance, finance or internal audit.

Daimler Chrysler. "The risk management system is an integral part of the planning, audit and reporting process for all legal units and central functions. Its purpose is to systematically identify, assess and control risks".

Phase two: *Business risk management*. The limitations of a narrow vision of risk management have prompted many companies to broaden their horizons. The occurrence of incidents in non-financial areas and their highly negative consequences on management have convinced top management not to leave the problem to risk managers alone. The firm belief that many risks can be managed and that some of them can be better managed with better tools and better policies, taking a systematic approach.

The evolution towards systematic risk management has become a necessity feeling by many companies. Risk analysis techniques, such as Monte Carlo simulation models and the option theory, have also been applied to non-financial risks. According to Deloach (2000), real integration into the business takes place when it is clear that "the risk managers must understand the business, while the business managers must understand the risk, so that risk and business cannot be distinguished".

Phase three: Enterprise-wide risk management (EWRM): a new perspective. Phase two marks a significant step forward if compared to phase one, but in risk management, the focus is still on individual risks or similar risks. There is often a lack of uniformity in assessing and managing different types of risk. Above all, there is a lack of assessment of the trade-off between risks (to accept them or not) and opportunities (to seize them or not).

EWRM takes another step forward in incorporating risk management into strategies. EWRM seeks to anticipate, to be "proactive" and to support the business model aimed at creating value. By integrating risk management, strategic management and planning processes, the organisation can identify opportunities to create value that have the most attractive

Table 1 Evolution of risk management

From	*To*
Fragmented	Integrated
Negative	Positive
Reactive	Proactive
Ad Hoc	Continuous
Cost-based	Value-based
Limited focus	Wide focus
Driven by single functions (finance in particular)	Driven by management processes

Source Deloach (2000, p. 16)

trade-off between risk and reward and design a business model that responds to these opportunities.

"But to integrate risk management into strategies," warns Deloach (2000), "we need a transparent, broad, consistent and constantly improved approach that can align strategies, processes, people, technologies and knowledge" (Table 1).

4.3 Business Risk

Business risk is the one that emerges from managing a business. Without risk, there is no business. The primary aim of business is to create value. The higher the business risk—especially in cases of success—the higher the possible creation of value. This is the basis, the very object of the enterprise. It cannot be transferred to others.

It is a risk related to the sector-specific risk. For a mobile phone company, it is the risk of a profound change in the structure of the market, in the preferences of potential buyers, in the decisions of the authorities that regulate the market and in the entire environment (particularly in technology).

Many companies were born but have not succeeded in overcoming the embryonic phase.

"There is no business without risk" is a generic phrase. To discuss business risk, we need to make a distinction between its various components. Business risk has numerous components:

- the risks associated with the various phases of the product life cycle;
- the risk of industry decline;
- the risk that the company will get its strategy wrong.

The categories of risk mentioned above—market risks, financial risks, operational risks, risks of a change in legislation, technological risks—are components of the business risk.

Product risks and life cycle. During the various phases of the life cycle, the product or service encounters risks of various kinds. Those during the embryonic phase are very different from those that occur during the maturity phase. Let's briefly summarise the main phases of the cycle.

Frame (2003) suggests examining these risks with a five-element "grid":

1. market risks (will there be demand for our product?);
2. technical risks (are we capable of technically producing the new product?);
3. operational risks (are we capable of producing the new product efficiently on a large scale?);
4. financial risks (can the new product generate profits?);
5. legislative risks (will the new product comply with the laws and regulations in force at the time of launch?).

There is maximum risk during the product concept phase. There is no certainty about future demand, about the reactions of competitors. The financial risk is high, because the company incurs costs, but does not know if the revenues will cover them. Technical risks are high too, especially if the product is highly innovative, because there is no production experience for that particular product. The same conclusions are reached for operational risks. The risks are high because large-scale production has not yet begun. New unknown risks may exist.

In the development phase, market risks decrease as demand for the product begins to develop. If the product can be patented, the risks decrease further. On the other hand, operational risks may increase, especially if sales develop rapidly. The company may not be able to meet the demand. Technical risks are reduced because the product has now been tested and improved if necessary.

In the maturity phase, the risks increase again. The threat comes from competitors. They imitate the product. They enforce low prices,

reducing profit margins. The most effective defence is to reduce costs, but this can increase operational and financial risks because new solutions need to be found. Technical risks, on the other hand, are lower because the most important problems have now been solved.

In the decline phase, the main risk is that cash flow will be reduced beyond a certain limit. Competitors have eroded market shares. The product is obsolete. Prices are unprofitable. Without the launch of new products, cash flow can be eliminated altogether.

Risks of industry decline. There are also examples of risks to the future of a business/sector. Remember the case of the auditing companies. The 1990s were a time of consolidation and "over double-digit" revenue growth for large audit firms. In 2003, things changed dramatically. The global economic crisis, financial scandals and the collapse of Arthur Andersen changed everything. The survivors—PricewaterhouseCooper, Ernst & Young, KPMG and Deloitte & Touche Tohmatsu—faced a major threat that could have led to their dismemberment and the end of a business model that offered a range of professional services.

The SEC (USA) imposed the independence of auditors. Even before the Enron scandal, audit firms had to abandon their consulting activities. The Sarbanese-Oxley law, enacted in the United States in response to the Enron and WorldCom scandals, also imposed the separation of audit and tax consulting activities (one of the main sources of revenue for the Big Four).

Risks of making the wrong strategic choices. In 2003, Nokia invested 80% of its research and development budget mainly to give telephones the properties of a computer. The urgency to achieve a result was due to the fact that Microsoft had been developing software for "smart phones" for years, threatening Nokia's dominance in this market.

In 2004, signs began to emerge that Nokia had invested huge amount in winning the wrong battle. The "smart phones" were too big, too expensive for many consumers and still held a very small share of the market. In addition, in order to focus on "smart phones", Nokia had neglected the fastest growing segment of the mobile phone market: medium-sized models with colour screen and built-in camera. This mistake gave the company's rivals an unexpected opportunity to take market shares away from Nokia.

Managing operational risks starts with corporate governance and requires enhanced operational audits.

By reducing the variability of profit-making risks, the company complements the management's ability to create value (King 2001).

Techniques such as the Balanced Scorecard (Kaplan and Norton 1996) and Value Based Management (Knight 1921) aim to create value by increasing profits through improved performance and therefore efficiency. If performance improves, expectations of higher profits and therefore of higher cash flow rise. Managing operational risks creates value by reducing the risks that a company runs in order to make a profit.

King (2001) goes on saying that strategies that ignore risks may not create as much value as expected because choices that aim to increase profits could simultaneously increase risks. Understanding which risks are associated with a strategy allows management to dissolve the trade off between risk and profit.

Research into marketing processes

It is uncertain when any outcome is considered to be equally possible. When a probability can be assigned to certain outcomes we are talking about risk, which is just quantified uncertainty. For example, the marketing manager might feel that a product has a 90% chance of achieving 30% market share in its first year. Clearly, the ability to make successful decisions is enhanced if we are operating under conditions of known risk rather than uncertainty.

The most important task of marketing management is conversion of uncertainty into risk and the minimization of risk, the role of marketing research is that of using information as intelligence at this end.

4.4 Product Risks

Products can have varying levels of risk and it is usually wise to have a portfolio of new products to balance the risk/return equation. In fact, the portfolio allows some latitude for the fact that product acceptance and revenue cannot be precisely forecast and planned. Every firm can reduce product risks adopting three different types of growth, commonly known as Core Growth, Adjacency Growth and Breakthrough Growth. The first type of growth refers to new and improved versions of an existing product. Larger or smaller package sizes, stronger or weaker flavours, lighter or heavier components are all example of Core Growth. Most of these modifications are intended to increase usage among or provide more options for current customers. Firms can even adopt the Adjacency Growth in order to reduce product risks. They introduce new products either in the same existing customers segment or in tangential segments or in totally new markets. Of these three alternatives, the least risky is reaching the existing customer base through franchise

extensions. A franchise extension, also known as a brand extension, refers to taking what the product connotes and applying it in a different product category.

For example, Arm & Hammer baking soda extended its brand franchise to detergent, toothpaste and similar products for which the concept of "fresh and clean" was appropriate. Another way consists of adopting the flanker brands. Flanker brand are used when a company wants to enter a slightly different markets segments but does not want to dilute its current image. For example, Intel introduced low cost Centrino processor brand in order to protect its premium Pentium brand; the stylist Giorgio Armani introduced a low-cost brand, known as Emporio Armani, in order to protect its premium Giorgio Armani brand. Nevertheless, a firm could also adopt a third approach, in particular the Breakthrough Growth. This is the riskiest approach because provide an incentive to the company to create a new product for new markets, especially if the product is not just new to the firm but also new to the world. The company must carefully assess whether the risk is worth the effort, whether it will be possible to develop and protect a competitive edge in the future and even whether the idea is best left for competition.

Risk managers should make an effort to reduce risk by balancing short versus longer term horizons.

4.5 Product Life-Cycle

A product manager should periodically compare the existing portfolio with competitive product lines or families. Furthermore, a product manager should analyse the life-cycle of a product (Fig. 1).

Fig. 1 Product life-cycle (*Source* Gorchels 2012)

Table 2 Product categorization within a product line

	Reinforce	*Renew*	*Relaunch*	*Retire*
Percentage of contribution to profits	High	Mid to high	Potential	Low
Brand value	High	Potentially high	Potentially high	Declining
Growability	Self-sustaining	Growable	Growable	Unsustainable
Strategic lift	Solid	Can be grown	Can be grown	Declining
Time-based potential	Solid current	Future growth potential	Future growth potential	Past performer
Strategy and resource commitment	Maintain: Focused and steady resources	Grow: Increase resource commitment	Grow: burst of supporting resources	Contract: reduce support

Source L. Gorchels (2012)

According to the Boston Consulting Group matrix, the product life cycle is composed of four steps. As we can see on Table 2, first of all, there is the "reinforce" strategy; second of all the "renew" strategy; third of all the "resurrect" ore "relaunch" strategy and last of all the "retire" strategy.

Firstly, a product manager should adopt the "reinforce" strategy. In fact, a reinforced product generates a good income stream but might not justify significant marketing expenditures. The product manager should look for ways to protect market share and prevent losses to the competition, preferably with minimal cost outlays. Instead renewed products require revitalization because they are not performing at a level objectively determined as possible. These products require specific demand creation activities to gain increased usage or market penetration. Furthermore, relaunched (or resurrected) products are those that have been ignored or even discounted, but presently seem to have value in the current environment. This could be the result of technology growth, change in the competitive arena or even a sense of nostalgia. These products might generate revenues through a relaunch campaign. At last, a product manager should retire products that are no more competitive or that are at the end of their life cycle. This kind of products are easily identifiable because marked by a noteworthy decline in sales, a lack of ability to achieve goals or the development of a superior product with better and higher functionalities.

4.6 Risk of Dependence on Customers or Suppliers

The dependence of the company from its customers or the procurement of materials from some large suppliers, is a constraint to entrepreneurial activity that must be taken into consideration (see i.e. Bollani and Bottacin 2018): a sudden decline in sales due to the renunciation of orders by a large usual customer, or the sudden increase in raw material prices by a large usual supplier, they can place the company in a state of financial instability.

For these reasons, lists of customers in decreasing order of turnover or lists of suppliers in decreasing order of orders, represent a first step towards the analysis of concentration of corporate business, laying the groundwork for the preparation of effective marketing and risk control plans in a medium term.

For the reasons mentioned above, awareness of the degree of concentration of turnover depending on few customers or few suppliers, is a strong point in policies business.

The dependence analysis can be measured with the *Gini concentration index* and the *concentration curve of Lorenz.*

In particular, the *Gini coefficient* measures the inequality among values of a distribution (in the case, levels of purchases or sales). A *Gini coefficient* of zero expresses perfect equality, where all values are the same (for example, where every customer or supplier has the same amount). A *Gini coefficient* of 1 (or 100%) expresses maximal inequality among values (e.g., for a large number of customers or suppliers, where only one of them has all the financial amount, and all others have none, the *Gini coefficient* will be one).

Afterword, the specific interest towards customers and suppliers of greater weight, pushed the management of the companies to use the c.d. "*ABC curve*", that was developed as a complementary tool with respect to the *Lorenz curve.*

5 Conclusions and Limitations/Further Steps

The main conclusions reached by authors have been compared with what companies do in reality. For this purpose, a sample of companies from the automotive, pharmaceutical, electronic, air transport and mass retail sectors was chosen but not completed.

The documentation available on these companies (annual reports, previous research, publications, articles of the specialised press) was collected. Each company was then asked to provide material on the role played on risk management.

The limitation of the research is the lack of total responses from the operators, which has to be further developed.

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