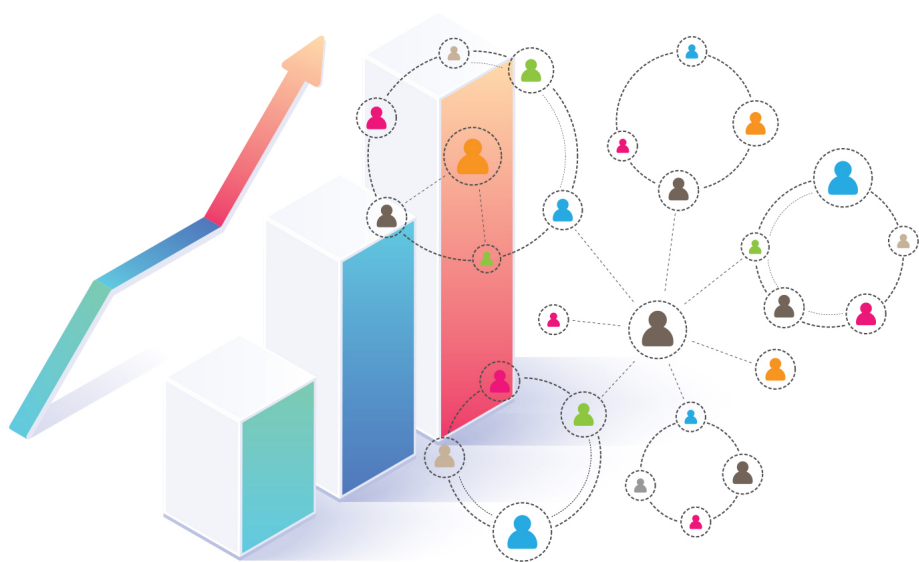


ECONOMIC ISSUES, PROBLEMS AND PERSPECTIVES

# Modeling Economic and Social Behavior



Lucas A. Jódar Sánchez • Elena de la Poza Plaza  
Paloma Merello Giménez • Alberto Celani  
Editors

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# **MODELING ECONOMIC AND SOCIAL BEHAVIOR**

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# **MODELING ECONOMIC AND SOCIAL BEHAVIOR**

**DR. LUCAS A. JÓDAR SÁNCHEZ**  
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## **PREFACE**

This book deals with the modelling of economic and social problems affecting worldwide societies in an individual but also in an aggregate manner.

The sustainable development of societies in the XXI century requires individuals' efforts but also resources to be addressed toward the ideation of solutions of multidisciplinary nature.

Topics included in this book will challenge the reader with socio-economic problems dealt with quantitative and qualitative data treated with diverse techniques of analysis.

The first paper deals with modelling the public sector. In particular, L. Jódar and E. de la Poza critically discuss the assessment performance systems at the public sector.

Next chapters deal with the design of sustainable societies considering different approaches and applications; the commonality existing in the studies presented consist of the identification of the public bodies responsible for leading the action towards the construction of sustainable societies. Thus, J. Orozco and E. de la Poza study how pedagogical techniques can accelerate the students' acquisition of sustainability competences at Higher Education Institutions (HEI's). Besides, A. Wright analyzes how a collaborative learning design approach in HIE's is useful to create a novel city service charter with multiple benefits: economic but also social ones.

F. Domene and P. Merello's research deals with the social dimension of sustainability and how having a gender diversity policy as well as a corporate social responsibility (CSR) committee affects positively the percentage of women in the board.

Also, J. García and E. Chavez examine the 3P's of sustainability concept: planet, people and profit by analyzing the sustainable commitment of the largest and most powerful Mexican companies. Thus, N. Guadalajara and E. Urcelay estimate the recreational benefits generated by an eco-park in México providing a useful tool for the managers and administrators of the park can ensure the park's sustainability.

In addition, C. Marín and P. Merello focus their study on showing how the amount and quality of non-financial information reported by companies increases when a Royal Decree-Law entries into force in Spain.

The necessary sources of funding for boosting the green economy is studied by M. El Morjani and E. de la Poza who explore the worldwide green bond market for the period of time 2007-2017.

L. Kulhánek and K. Dvoroková in their study show empirically how the EU-13-member countries converge to the EU-15 average, understanding the real converge exists when the gap in the economic level of the compared countries reduces. In addition, R. Molina et al., work deals with the controversy generated about the justice of bailouts within the Eurozone.

Following in the book you will find two contributions related to the behavioral management. First one by M.A. Pérez-Benedito et al., proposes an empirical model for identifying the drivers that best contribute to meet firms' optimal management decisions in Italy. Also, S. Radukić et al., investigate economic implications of the increased market power in the context of the behavioural economics and industrial organization.

Finally, the book ends with two applications to accounting. Both contributions are relevant for the strategic management of institutions. Firstly, F. Pardo and C. Vercher study provides information about the recognition of goodwill impairment and the level of disclosure in a country. Secondly, P. Merello models the impact of Basel III agreements on the bank industry.

## **ACKNOWLEDGMENTS**

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*Chapter 1*

**NEGATIVE EFFECTS OF COMPETITION  
ON THE EVALUATION OF HUMAN  
PERFORMANCE IN THE PUBLIC SECTOR:  
THE CASE OF SPAIN**

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**ABSTRACT**

In this paper, we show the drawbacks of using competition and its measurement with indicators and metric rankings for assessing individuals and public organisations in Spain. Campbell's Laws summarises most negative effects.

**Keywords:** Ethics, quality control, public university, evaluation, Campbell's Laws

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## INTRODUCTION

Today the management of social public organisations in Spain is infected by the virus of competition and quantification. Lack of leaders' authenticity motivates the emergence of amateur public managers, who are limited to watch the mirror of rankings. Although they are representative of left-wing parties in Spain, they are used to only copy models devised in the USA, which are sometimes old models, and even failed models, simulated as new and modern ones (Baudrillard 1978).

With the improvement of technological platforms, Big Data and artificial intelligence, the social project evaluation methodology is one of the fields and a business with enough universality, to such an extent that it meets the "too big to fail" condition, and incurs the risk of contagion and perpetuation in the most of the public sector.

We refer to using indicators and rankings prepared by international companies, blindly followed by amateur political leaders/managers elected through political decisions, who spend public money so that their organisations appear monitored in them (El Mundo 2019).

Competition between companies is positive for not only business and the economy, but also for consumers in a free market economy because potential clients may choose several suppliers of the same good, which allows prices go down. Lack of competition, for instance in a monopolistic model, makes prices rise. In football team markets, one can state that when players compete for the job, it increases their motivation and helps them to continue keeping as fit as possible.

We do not think that a writer, artist, scientist, or intellectual worker in general, produces better products due to competition with other colleagues. It is unclear whether competition can always guarantee a sport team's performance so that all players do the best they can. It probably depends on the person's character. In some cases, competition can even be negative if self-esteem or confidence diminishes.

In any case, physical fitness can improve with exercise and expert advice, but how do you improve talent and creativity? Some intangibles are neither visible nor measurable. Intellectual activity is an example of such,



and its evaluation should not be mechanical, standardised and objectified because hope, idealism, imagination and creativity are the essence of certain activities like teaching and research, as with any intellectual job.

We as humans are moved by emotions, and we compare ourselves to others in a natural way all the time, everywhere, because it is our social condition (Veblen 1912; Spinoza 1986; Damasio 2008; Christakis and Fowler 2009). These characteristics have positive and negative consequences, and positive management requires managers to promote what is positive, and to stop or do away with what is negative. This requires knowledge of the team and personal interaction.

Artificial and excessive competition promotes negative attitudes of others, non-cooperative behaviour, and even misbehaviour. Purely individual jobs are minority as most jobs are done as teams. Thus cooperation is more important than competition, and is certainly healthier both physically and emotionally. Labour stress, addictions, overdedication to one same activity and disregarding others are frequent errors caused by wrong management policies. Vanity and originality are powerful drivers for most artists, scientists and intellectual jobs in general. These people, given their nature, should not act by being moved by competition, unless they are misled by wrong policies that awake greed, lack of ethical behaviour, plagiarism, fashion and publicity.

Section 2 deals with lack of quality control in the evaluation of research and teaching activities at the Spanish University. Section 3 examines misconduct and lack of ethics that appear when considering competition in evaluation processes. The risk of contagion and perpetuation of errors if changes are not made are also addressed.

## **QUALITY CONTROL IN ASSESSMENT PROCESSES IN THE SPANISH PUBLIC SECTOR**

Rectors of Spanish Public Universities have competed with others in the last decade through positions based on rankings, which they use as an

indicator of their management and their university's quality. Like all humans who mimic their neighbours' behaviour, rectors suffer from and spread contagion through periodic meetings of the Council of Rectors of Spanish Universities (CRUE), and from the fashion of focusing management in terms of rankings, indicators and quantitative issues. Numbers are seductive, and appear to be transparent, scientific and impartial (Nichols and Berliner 2017).

Unfortunately, they are not the only followers of this wrong attitude as the Ministerial National Agency of Evaluation is also infected by the metrics tyranny virus (Merry 2016). In Spain, those new methods and behaviours that appear in the USA are frequently copied. However, copies are so bad that a kind of inferiority complex appears that motivates followers to practice the zeal of converts.

The metric evaluation of individuals and organisations, and the use of quantitative items to judge performance, are old and questioned. Since the 1970s, famous laws have stated that measuring and controlling the quality of human performance is a wrong quality criterion (Ravetz 1971; 1990; Campbell 1976; Nichols and Berliner 2017; Muller 2018).

The two Campbell's Laws, state that (Campbell 1976):

“The more any quantitative social indicator is used for social-decision maker the more subject it will be to corruption preasues, and the more it will be to distort and corrupt the social process it is intended to monitor”.

These laws stated that, after checking that quantitative methods were unapplicable to evaluate human behaviour, they were checked when the father of the quantitative evaluation method, Robert MacNamara, implemented it into Vietnam War management during the first period when he was Secretary of Defence of the US Army.

In fact one of the main difficulties of applying this quantification-based evaluation method is to select the magnitudes to be measured in order to construct the intended indicator or ranking. With the Vietnam War performance evaluation, the selection of a wrong variable and the number of

casualties of both sides of the conflict led to a bad conclusion with the US losing this war.

Not only because the data of the selected variable were both unverifiable and unbelievably large, but also because this variable was not the relevant one, that of gaining control in the territory or the enemy's level of resistance. Obviously, it is easier to compute bodies than calibrate these intangible variables and, for the same reason, it is easier to acquire misleading data.

If the "scientific" method has been applied to evaluate the performance of a teacher and/or research activity, or that of a university, then all kinds of misleading behaviors have been studied and reported in (Biswanger 2013; Muller 2018; Baglioli 2016). The case of teaching has been analysed in (Campbell 1976; Nichols and Berliner 2017; Muller 2018).

Stakes are high when teachers and administrators can lose their jobs or, conversely, can receive large bonuses for students' marks, or when humiliation or praise for teachers and schools appear in the press as a result of test marks.

Two decades ago, the effect of this competition procedure reached all university levels, and spread from University to lower levels of education and beyond the Academia to civil society (Hedges 2010). One gets the feeling that most students in university classes are not interested in learning, but in passing a degree. Softness spreads everywhere all the time, from top to bottom and at all levels.

This occurs because University financing also makes the same metric mistake, and the number of university graduates is a very important item. And so it is that, according to Campbell's Laws, this motivates distortion and corruption because a message from the Rector and further down in the political power chain appears, which indicates that the number of successes in evaluations should be as high as possible, or the university budget will lower.

Pressure lies in relaxing the expected level; why? Partly because the university budget is linked with the number of graduate students' successes and, of course, as Campbell's Law predicted, distortion then appears because pressure is placed on lowering the expected level. If somebody reacts to this

tendency, obstacles appear in many ways, along with a big mediocrity population with Rectors, Deans and colleagues.

At previous levels to university, contagion is immediate. At High School, the curriculum is narrowed to the test that students sit to allow them to access a public university, which is much cheaper than a private one.

Instead teachers teach the genuine curriculum and invest a lot of time in preparing a wrong test to access university, which does not adapt at all to each Faculty's discipline.

This spells complete disaster. Students choose the easier and securer way to enter a public university because it is cheaper, which is followed by passing a degree as easily as possible.

In the ranking of priorities, learning, achieving maturity, acquiring the capacity to take risks and facing challenges are nonexistent. Any potential talent is wasted.

The competition virus in the two last decades has been such a joke that you can find long queues of students after partial marks have been published, but only a few of them have attended tutorials to learn more. They are only willing to pass the exam. Teachers simulate that they teach and students simulate that they learn. The majority of graduates have a slight notion and are really ignorant graduates. When graduates arrive at companies, they have no idea about their jobs.

Guiltness is plural but it is also due to students' misconduct and to teachers in the learning process, which is based on a nonsense competition of marks instead of being based on knowledge. As the general message intends to lower the expected level, even competition is distorted as one seeks a degree, and not knowledge, not maturity, not capacity and not effort, but passing a degree is a must. In addition, this strategy is senseless because lots of graduates occupy low-level jobs because graduates' degrees are not valued by companies.

The exaggerated reliance on marks for making judgements creates conditions that promote distortion and corruption. The overvaluation of marks is an indicator of school success, which often compromises the validity of test marks themselves.

Campbell's Laws are ubiquitous, and show up in many human endeavours. Business, for example, regularly becomes corrupt as particular indicators are deemed important to judge failure or success. If, for example, stock prices are indicators of a company's success, companies perform manipulations to ensure that they look good.

Lives and companies have been destroyed as a result of such misbehaviours. Cases like Enron, Qwest, Adelphia and WorldCom are practical examples of Campbell's Laws.

## **WHY IT IS IMPORTANT TO WARN ABOUT THIS METRIC EPIDEMIC**

Public and private social media do not help to mitigate the wrong effects of competition and quantification. In fact quite the opposite applies because they stimulate it, partly due to ignorance and partly for business reasons. We can frequently read in serious newspapers all kind of information indicating which countries' citizens are happier, or the list of the richest people, or the most influential citizens, or whichever ranking.

These rankings are usually made up of questionnaires that have been passed to people and are not founded on tangible realities. It does not matter because one assumes that they are true statements, which of course they are not. Every week we can listen on any radio claims and invented competition games about who is the best football player of all times, or the best football team. There is even a ranking of the best football teams in the world, or the richest ones, or the first clubs in merchandising income.

There is a big dangerous business stimulated by media: gambling games. We can continuously listen to gambling game ads on private radios, and many people, especially young people, are addicted to them. In spite of the public health risks involved, this practice increasingly grows non-stop because these ads sponsor radios programmes, sport clubs and newspapers. Competition and rankings always come close to business and superficial information. This is not related to useless knowledge in line with (Revel

1998) because this data collection does not achieve a level of knowledge, but is only a simulacrum of reality, in line with (Baudrillard 1978).

Like fine drizzle, this persuasive constant publicity seeps into many people's brains and leads them to bet. It seems that the seduction of rankings and competition spreads everywhere non-stop. Very few people complain in spite of the fact that many people are becoming gambling addicts. When young people start gambling, there is a very high risk of them becoming addicts, and this possibility is greater for almost everybody with the help of technology.

If the ruin of companies, the lives of individuals and jobs are important to prevent this apparent good, but are really a mistaken management criterion, then the impact could be even stronger if the method is applied to public health management, the legal sector or national security.

## CONCLUSION

This paper deals with the drawbacks of using competition and its measurement with indicators and metric rankings for assessing individuals and public organisations in Spain.

The authors question the reliability of international agencies to monitor the organizations which pay them. In fact, the application of the Campbell's Laws is under question. Here we generally refer to not only university rankings, but also those of international agencies that qualify companies or countries. Are Goldman Sachs, Moody's and other similar agencies reliable? Why do they fail when a crisis appears? Do they also suffer Campbell's Laws? Yes, they probably do.

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## *Chapter 2*

# **MIND-MAPPING FOR INTERDISCIPLINARY SUSTAINABLE ARCHITECTURE**

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## **ABSTRACT**

Teaching Sustainability is an especially demanding task requiring a multidisciplinary approach as is clearly demonstrated by the world focus on the UN Sustainable Development Goals (and specially goal 11: Make cities inclusive, safe, resilient and sustainable). The flipped classroom methodology facilitates the necessary discussion for embedding different points of view on the learning process. In this way students can effectively receive out-of-class and in-class opportunities to promote personal learning; however, structuring the huge amount of information handled is a very difficult tasks for students. In order to develop students' learner autonomy or high-level thinking skills to achieve the learning competencies embedded on an Interdisciplinary Sustainable Architecture (ISA) curriculum, the use of mind-mapping learning strategy is known an

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effective knowledge construction tool for helping students' organizational thinking. Besides, many previous studies have considered the peer assessment an effective learning strategy to provide students with a teacher's perspective view to think and evaluate knowledge acquisition. Therefore, this research developed an online peer assessment approach to supporting mind-mapping flipped classrooms. Moreover, an experiment has been conducted to evaluate the advantages and disadvantages of the proposed approach on students' learning analytics such as time involvement and learning reflections. It is important that educators use an online peer assessment learning environment for learners and aim for the goals to help learners become more critical, independent, and autonomous in the development of any Sustainability curriculum.

**Keywords:** flipped learning peer assessment, mind mapping learner autonomy, multidisciplinary sustainability curriculum

## INTRODUCTION

Sustainability is a trending topic for our society. It involves many disciplines ranging from basic science to sociology and business, but always involving a technological approach when an architecture curriculum is involved. The purpose of ISA is not only the assessment of current or future cities, but also understanding how buildings and urbanism can contribute to more resilient societal organization in cities. In the twenty first century, the internet and the incipient Internet of things has allowed instant access to unfiltered, ubiquitous information which adds information analysis and its management as key disciplines for ISA development. Therefore, transversal competencies such as peer assessment and knowledge mapping have become important analysis and communication tools for future sustainability professionals. However, in the twenty first century globalization, Architecture curriculums are no longer just a collection of technical tools, but also a space which demands the integration of higher level competencies [1] for developing better organizational skills, creative (and critical) thinking, problem-solving abilities, or even more important team work. To face with such new environments and challenges, students' learning processes have to be developed through team assessment and include

strategies where faculty incorporate multidisciplinary knowledge in a critical environment.

Recent evidences [2] on the complex interaction between competencies development and oral interaction, indicate that flipping classrooms provides more time and interactive environment for teachers and students, and also helps students interact actively and improve speaking and writing skills [3]. The main reason is that by flipping classes students undergo a self-discovery process of learning materials, knowledge grounding leading to personal understanding and leaving all the time available in class for face-to-face instruction for oral team interaction for knowledge acquisition and final writing for memory development.

The classroom is a debate space for teacher-student communication and interaction, as well as group discussion, including peer evaluation [4]. However, Strayer [5] within flipped classrooms there is no proper guiding strategy, it is easy for students to feel frustrated about learning workload or unsuccessful flipping strategy.

Consequently, the development of the students' competency on identifying, defining and organize all relevant concepts within this environment appears as the natural solution for efficient knowledge acquisition. This technique Concept (or Mind) mapping, introduced by Noval and Gowin [6], facilitates active meaningful learning while developing a structure for all relevant information. In the past decade, classroom research [7] has demonstrated the advantage of active teaching for engaging students, followed by a mind-mapping strategy for a successful knowledge integration [8].

On the other hand, although previous studies have pointed out that concept or mind map learning strategies can help students to organize knowledge effectively, there is still the possibility of failure in mind-mapping learning strategy in university classrooms. Some key factors for failure are difficult to accept, the mind-mapping strategy of students themselves, and are unfamiliar with the way of thinking [9]. The result showed that mind mapping mainly benefited the students' writing in the elaboration dimension. Therefore, if the teacher could not only help the students using the mind-mapping tool to generate ideas in their writing

process, but also integrate much more supportive guidance with teachers or peers, such as using peer assessment strategy to encourage peers to make reflections and improvements.

Due to the above reasons, it is necessary to develop a flipped teaching strategy based on group mind mapping, followed by peer assessment tools to assist students in summarizing, organizing concepts, and assessing others' work for an effective knowledge acquisition. Thus, in this paper, a strategy is proposed for gaining meaningful insight on the mind mapping-based flipped classroom. Moreover, 3 consecutive years of classroom research have allowed a fair understanding of the advantages, and disadvantages, of first the flipped teaching approach, and second the proposed mind mapping approach, by answering the following questions:

- 1) Do students who learn with the integrated mind mapping-based flipped learning approach have significantly better learning achievement than the students learn without this strategy?
- 2) Do students who learn with the integrated mind mapping-based flipped learning approach have significantly better learning involvement than others?
- 3) Do students who learn with the integrated mind mapping-based flipped learning approach have significantly better learner autonomy than their peers?

## **EXPERIMENTAL PLAN AND METHODOLOGY**

### **Research Population Implementation**

The course on “Non traditional Materials for Architecture” provides a relevant test bed for assessing students' learning performance and perceptions due to its independence from the traditional curriculum (besides being optative) which gives the students, and faculty, more innovative opportunities. This course belongs to the Graduate degree in Building Engineering at Universitat Politecnica de Valencia (UPV) and is taught

during the second semester of the last degree year. During the last three years the course has been taught, first on the traditional lecture based approach (course 2016-17), second following the Flipped Classroom methodology (course 2017-18), and on the last intake (course 2018-19) including for performance assessment the mind-mapping approach. Students are scored also on their learning styles to check any deviation due to a significant change on the student population.

The compared course evaluation taken from the corresponding syllabuses (table I) shows the main items evaluated on the different approaches all having the same weight on the final score. The course was taught by the same faculty all years.

**Table 1. Nontraditional materials in architecture course**

Traditional	Flipped	Flipped+MindMaps
Lab practice	Lab practice	Lab practice
Class project	Class project	Class project
2 exams	Class exercises	Mind-maps

On the table the explanation for the evaluation items is explained on the next paragraphs:

- Lab practice: evaluation of the lab group solutions to exercises related to the lab work,
- Class project: team development of a proposed alternative solution to a building using nontraditional materials. The project develops all points introduced on the theory class applied to the practical case proposed. Besides the written document with all the details, the students make a joint executive presentation (5 minutes) of the project relevance.
- Exams: short questions to evaluation knowledge acquisition on the theory sessions of the course.
- Class exercises: individual solution of short numerical and logical questions for real cases.

Mind-maps: individual mind-maps (using the e-tool Mindmup) presenting, and defining, all concepts presented in class in a connected graph. The students have to include relevant application examples from the Internet.

**Research Population Implementation**

For statistical significance, it is agreed that experiments of different student populations are comparable when their learning styles can be considered as stable [14].

For evaluating the learning styles, the Felder-Soloman questionnaire [10] was used on all occasions. This decision was based on the adequacy of this test, according to Ruey-Shiang [11], for ensuring first a similar type of student population each year, and second the right learning styles for good flipped teaching performance [12].

On table 2, the comparative learning styles per course are shown ensuring a relevant value (above 2) for one third of the population which gives a certainty of 95% for the hypothesis of equivalent populations according to ISO/TS 17503:2015.

**Table 2. Learning styles percentage of the students per course**

Learning Style	Traditional course 2016-17	Flipped course 2017-18	Flipped+MindMaps course 2018-19
Active > 2	42	38	41
Intuitive > 2	39	46	45
Visual > 2	60	52	59
Global > 2	40	49	38

**Methodology for the Analysis**

In order to evaluate the 3 proposed research questions, the corresponding output variables considered were:

- 1) Average of class performance score. This is the best evaluation we can obtained for the overall learning achievement.
- 2) Average of student satisfaction in the course. Under the research conditions learning involvement is directly connected to student satisfaction according to Narjaikaew [15]. The student satisfaction is measured at UPV by an individual (UPV controlled) survey.
- 3) Average of mind-map evaluation. Learner autonomy is especially relevant when their own creativity (individual concept-map evaluation) is measured [16].

**RESULTS AND ANALYSIS**

On table 3, the evaluation of the different items described on point 2.3 is presented for the course on each of the years considered for the research.

**Table 3. Experimental results for the course each year**

Indicator	Course 2016-17	Course 2017-18	Course 2018-19
Course average score ± std. dev.	6,3 ± 0,2	7,0 ± 0,1	8,1 ± 0,1
Average student satisfaction ± std. dev.	7,4 ± 0,4	8,1 ± 0,2	8,6 ± 0,1
Average individual score ± std. dev.	5,3 ± 0,3	5,8 ± 0,2	7,1 ± 0,1

From the results shown above, it is clear that the combination of flipped teaching and mind-map individual work is an excellent option for optative technical courses. After the introduction of flipped teaching relevant progress is evident as expected for the delivery of complex non-mathematically based disciplines [17]. Later enhancements due to individual mind-maps are especially relevant on multidisciplinary topics [18].

The student satisfaction develops a clear increase of results both as a group or individually which shows also a relevant increase in student

autonomy. Additionally, the smaller standard deviation indicates that the conclusions are more representative for the group.

## CONCLUSION

From the evidence presented on this paper, a simple path to deliver effectively sustainability competences has been introduced. Flipped teaching has been proved here as a very effective methodology for scientific topics with low mathematical burden, as well as the use of mind-maps for structuring multidisciplinary disciplines. The procedure can be easily extrapolated to other fields where the multidisciplinary approach is a key element of the message.

Although there has been considerable progress in the incorporation of Sustainable Cities into the curricula of higher education institutions (HEIs) in Europe, particularly on competences for sustainable development and on pedagogical approaches, there has been limited research on the connection between how courses are delivered (pedagogical approaches) and how they may affect sustainability competences.

This paper has presented the results from an academic research into the best delivery practice for Sustainability through flipped teaching and mind maps. The acquisition of sustainability competences, and the related pedagogical approaches, are key to achieve sustainability. It is also relevant to take note of the increased work load by faculty in charge.

Follow-up research, could provide insights on how to better use, rethink, redesign, and combine these with other pedagogical approaches to provide a more sustainability-oriented education.

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### *Chapter 3*

# **IRISH RETAILERS CHART THEIR FUTURE: A COLLABORATIVE LEARNING DESIGN APPROACH TO CREATE A NOVEL CITY SERVICE CHARTER**

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## **ABSTRACT**

This novel work pivoted around a collaborative cyclical learning experience between businesses in a City Centre scape and a local Higher Education (HE) Institution in Europe. This concept provided for a dual aspect to learning; third level MBA adult students in parallel with business operatives in a City setting.

City Centre businesses were struggling in the face of changing consumer purchasing patterns and were looking to source new and

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innovative ways to sustain and attract new business into the City. The students who are assessed through Problem Based Learning were tasked with addressing this business problem in cooperation with City Hall and to write a 'service charter for this City', while being assessed for progression for their MBA programme.

A mixed methods research methodology was applied to gather the primary data which was in two stages. The first stage looked at developing a new model for retail practice (a service charter) and the second stage looked at how the overall process was perceived and experienced by the students and the City stakeholders alike. The final aim of this work was to examine this collaborative approach to learning and assessment for the students while enhancing their learning and assessment experience.

The overall outcome of the process resulted in the development of a service charter for the City, an interactive final student assessment strategy and further specific service training for business owners on their overall service delivery to customers, with an overarching aim to improve the economic outlook for the City.

It can be concluded that collaborative co-creation learning works and has many benefits from an economic and educational perspective.

**Keywords:** collaborative learning, problem based learning, co-creation, assessment strategy, retail sector, online, City service charter

## INTRODUCTION

This chapter outlines how Cork City<sup>1</sup> in the South of Ireland imagined and developed a novel way to address the challenges of a complex business environment. This was realized through a collaborative Problem Based Learning concept with a Higher Education Institution – Cork Institute of Technology (CIT) through their Master of Business Taught programme for working adult learners and the Cork City Centre Forum. The Cork City Centre Forum is a group of key stakeholders including Cork Chamber, Cork Business Association, the Gardaí<sup>2</sup> and Bus Eireann<sup>3</sup>, as well as representatives from the retail and hospitality sectors in the City, to form CORE (corkcitycente.ie (a)).

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<sup>1</sup> For Cork City Map: See Appendix A.

<sup>2</sup> Irish National Police Force.

<sup>3</sup> Irish National Bus Service.

The collaborative learning process centered on a group of 22 MBA Level 9 students while they interacted with 20 City businesses who are members of the Cork City Centre Forum to develop and write a City service charter. This was part of the assessment strategy for their master's coursework, and this real-life case formed the collaborative journey outlined and discussed here to develop the new charter. Finding novel ways to assess third level students is always a challenge for Higher Education Institutions. Finding problems to solve that are current, local, relevant, and authentic are welcomed by students and Higher Educational Institutions as they are viewed as beneficial to both parties to the exercise (Wright, 2018). Imagine the opportunity of being placed at the fulcrum of learning and business development through a dual aspect collaborative learning challenge and experiential learning. This experimental approach was afforded to the MBA when they were tasked with writing a 'service charter' for their City – while in parallel, being assessed through 'problem solving' for 5 ECTS credits with the third level partner. The dual aspect of learning between businesses and college began when the students sought to solve a problem for City businesses and find and present a solution to their problem and reflect on it, and the second, when a recommendation came from the research that the participating businesses needed to undertake further training in order to implement the plan of the final City service charter.

Addressing inconsistencies in the service model and synchronising efforts to grow commercial activity is best addressed through cooperation in the competitive space, an approach known as 'co-opetition', a phrase first coined in 1913 by the Sealshipt Oyster System in the USA (Jansen van Nieuwenhuizen, 2016) to describe the idea of cooperative competition, or cooperating with competitors, and to convey its understanding of how the oyster traders should deal with one another. Its principles are that in cooperating with one another you are creating more business for each of you; you are in 'coopetition' not competition, working together to common advantage (Jansen van Nieuwenhuizen, 2016). Co-opetition is a perspective on business relationships which highlights the ambivalence of competition and cooperation (Stein, 2010).

The City business community at the core of this study are now leading the way through coopetition by joining together to establish a coordinated approach to the quality of service delivery in their City. Also, for educators, there is a need to move beyond the conceptualisation of education as a simple acquisition of knowledge to one which nurtures and assesses innovation and expertise in the utilisation and application of knowledge (Boland, 2010). This is best achieved through engagement and co-creation with industry partners, and this is one of the pillars of the education models in Higher Education in Ireland. Enhanced engagement between Higher Education and enterprise is a priority within a new system performance framework which has been introduced as part of the national strategy for Irish Higher Education (Hea.ie).

## **SETTING THE CONTEXT CHANGING PURCHASING PATTERNS**

Purchasing habits and behaviours have changed significantly in the last decade. With changing patterns of behaviours come economic pressure and challenges for the retail sector. The economic downturn internationally and nationally, particularly post 2009, has been blamed for some of these pattern shifts, but also, it has to be acknowledged, that modern day living, work-life-balance, ease and convenience of purchase, increased access to broadband, and the development of large ‘out of town’ shopping plazas have all lead to the change in purchase behaviour. Although this is a seismic change that slowly enveloped the retail sector world-wide, Irish retailers have also noticed the changes and decline in ‘foot-fall’ in what is referred to as traditional methods of purchase behaviour, where shoppers came through the doors of ‘bricks and mortar’ premises typically in City centre settings. These traditional methods of shopping are now in grave decline. The reality is that these forces creating new challenges are here to stay for the retail sector, and businesses need to be creative to survive (Burke, 2019). The biggest of the world’s digital platforms have become a reality and are viewed

by most as indispensable public utilities; for example, Amazon is retail delivery (Herrle, 2019), and Amazon is ‘eating’ the traditional old models of the retail world, where traditions are changing. Between 2010 and 2016 Amazon’s sales in North America, for example, quintupled from \$16 billion to \$80 billion with half of all U.S. households now Amazon Prime subscribers (Thompson, 2017). Other factors such as ‘easy return policies’ have made online shopping cheap, user-friendly, and risk-free for consumers in apparel in particular, which is now the largest e-commerce category; therefore, in order to compete with online forces, physical-store retailers have to offer similar deals and convenience as the online model (Thompson, 2017), putting pressure on profits.

In an Irish context, consumers are also opting for the online experience and opt to conduct their purchases in international online stores rather than in local ones. In 2017, for example, Irish people spent €2.7 billion at foreign-owned websites (Taylor, 2018). By the end of 2020, Taylor (2018), believes that €10.1 billion will be spent in online shopping by Irish consumers. Examining this in the context of inflation, the rate of Irish inflation stood at 1% in the first quarter of 2019. While the rate of inflation remains low in Ireland, there have been significant increases in real wages over the quarter, which impact on prices. Core retail sales grew by 4.7% in the first quarter of 2019. The ongoing Brexit debacle has also impacted seriously on consumer confidence and is the main reason for the fluctuation in the rate of consumer spending (Burke, 2019).

The reality for Irish retailers is that Irish consumers continue to be tempted by discounted prices and any available offers or promotions, and, as a result, retail prices have continued to fall. There are concerns in the retail trade in relation to continuing to offer discounts and lower prices, in that this is not a sustainable model. All of this is acting in parallel with input costs such as labour (minimum wages), insurance, rents and rates that all continue to escalate, and Retail Ireland<sup>4</sup> are concerned that “the time will come where something must give” (Burke, 2019).

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<sup>4</sup> Retail Ireland is the leading voice of Irish retailers and works to represent the sector’s interests to Government, media and all other stakeholders ([retailireland.ie](http://retailireland.ie)).

## THE CHALLENGE

The work to address the challenges faced by Cork City retailers started in 2012, whereby City traders in a small area of the City called MacCurtain street (formerly King Street) on the north side of the river Lee wanted to see if something could be done to improve the look of the streetscape so as to attract more shoppers and visitors to the area. This particular area of the City is home to an iconic theatre, The Everyman Theatre (opened in 1897, Charlie Chaplin came to give a performance in 1912), and the Metropole Hotel (opened in 1897), but foreby these iconic landmarks, the area was in decline. The street also has many important historical connections of importance and value, for example links to the Irish Civil War. It also boasts underground caverns of standing. The concept of co-creation was born at this time between the City and Cork Institute of Technology where work began with a group of Master's students as part of their course work to see what concepts and solutions could be developed to address the decline of this part of the City. Through this joint endeavour, the idea to re-brand the area as 'The Victorian Quarter' came to fruition. The 'Victorian Quarter' is a unique historical destination offering an eclectic mix of speciality retail, hospitality and entertainment experiences (Smyth, 2017). After the successful outcomes of this City street project, another cohort of Master's students were challenged to apply the same research and techniques to a different area of the City - 'Oliver Plunkett Street' beginning in 2014 with a similar brief as MacCurtain street ('The Victorian Quarter'). The concept then was to reimagine that area of the City and develop a new branding proposition for it. This resulted in a new branding initiative in 2015 of 'The Plunkett Quarter', with the idea to keep and sustain the same 'Quarter' theme, as was in operation in the 'Victorian Quarter', but with a new identity. From this, 'The Plunkett Quarter' entered the 'The Great Street' awards in London in 2015 and it won:

The prestigious award is the first time the award has been won by an Irish city.



The expert group looked at the social, cultural economic, political and physical development of villages, towns and cities across the UK, Ireland and Europe. “They recognise the most enduring and improved urban environments and we are absolutely thrilled that Oliver Plunkett Street is now listed as their Great Street of 2016.” Geoff Haslam, lead assessor for the Academy of Urbanism said the judges were overwhelmed by Oliver Plunkett Street as it offered everything they were looking for in ‘a Great Street’. “We sometimes have to search for the DNA of a street, but Oliver Plunkett Street exudes it - it’s a vibrant living street and community, full of little surprises,” he said. Fellow assessor, Alastair Barr said that in the six years of judging awards, Oliver Plunkett Street had really “raised the bar” for the other two finalists in Liverpool and London. The group behind entering the Cork street in the competition, the Plunkett Street Quarter said they were delighted to receive the award just two years after their establishment. (Roche, 2015)

As a result of the co-creative success between the City Centre traders and the CIT Master’s students, another project was commissioned with another new cohort of Master’s students whereby the City was examined in its entirety. A whole City project began and was completed in 2017, and the main recommendation that came from this was the acknowledgement that the City retailers were experiencing strain on their businesses and that there was a need to develop a new creative concept that would make ‘destination Cork’ for shoppers and visitors alike a ‘stand out’ City that was agreeable and welcoming. The kernel of the idea came to light, and the core concept of; ‘what if the City could offer a unique visitor/shopper experience through excellent customer service together with a sense of pride of place. The concept to develop a ‘City Service Charter’ was born through a co-creative process with Cork City centre traders and the Master’s students.

## **A CITY SERVICE CHARTER**

A sense of welcome identifies the soul of a city. The quality of service defines it. A collective excellence in service delivery creates an experience

for the consumer which is memorable, affirming, and, most importantly from the commercial perspective, it makes the consumer eager to repeat it. While each business operation has its own style, personality, and particular environment, there are certain constants in the provider-consumer interchange which will, when taken all together in a city, paint a picture in the mind of either satisfaction or dislike, contentment or discomfort, efficiency or sloppiness. (Wright, 2017)

Developing a service charter is a new concept and not widely embraced, and a search of the literature proves to be scant. The purpose of a service charter is to outline and detail the standards a customer or client can expect when engaging with service providers in a City. A City service charter is a collective commitment by all of those engaged in the daily service life of the City to focus on the needs and preferences of their customers, motivated by values such as respect, integrity and excellence. Among an extensive set of aspirations, the following are especially desirable:

- 1) Universal commitment to cooperation and involvement by all sectors of service providers in instilling and supporting a sense of pride of place and pride in excellence of service delivery which is not only satisfying to the consumer but exceeds expectations;
- 2) Seek to enhance the customer experience by being attentive to all aspects of City life, particularly streetscape, safety, and courtesy;
- 3) Constantly monitoring and communicating through consultation and feedback;
- 4) Ensuring staff are trained to be thoughtful, courteous, skilled and motivated;
- 5) Reviewing the performance of staff and providing training in enhanced skills where shortcomings are identified;
- 6) Ensuring that information, resources and services are readily available and accessible, providing clear channels of communication whereby the consumer may have a voice on issues of concern and matters that affect them, and providing explanations on decisions that are made and actions that are undertaken based on the feedback that is received from the consumer.

- 7) In a digital age of expanding online interactions, protecting your personal information and addressing compliance with all legislative privacy requirements.

When writing a service charter, it is necessary to define the purpose, scope and standards of your business's commitment to customer service so that both your employees and customers know what to expect ([smallbusiness.chron.com](http://smallbusiness.chron.com)).

## **METHOD TO DEVELOP THE CHARTER**

The initial stages to develop the charter centered on meetings with City retailers aligned with the Cork City Centre Forum to discuss their challenges and to talk through what might be needed. This consisted of 5 meetings with a group of 6 businesses from varying sectors through clothing, books, haberdashery, to hospitality. Ideas were discussed and a plan of action was formulated. From this point, funding was secured through Enterprise Ireland to facilitate some of the initiatives. This was achieved through the Enterprise Ireland innovation voucher scheme ([enterprise-ireland.com](http://enterprise-ireland.com)) and Cork Institute of Technology. It was decided to have an open meeting with the public where all stakeholders in the City were invited to an evening briefing about what the collaborative process between the City and CIT would involve and how they could contribute to it. At this open meeting, Sandra Mathew-Marsh M.B.E, from Visit Kent in England was invited to come and launch the project and talk about what they had achieved with 'Visit Kent'. She also held a workshop for the Master's students to talk through what they had developed with the brand 'Visit Kent' and to stimulate ideas. Visit Kent has embraced the idea of enhancing the visitor experience; however, they did not have a charter for same.

After the initial briefing with City stakeholders a mixed methods research approach (Patton, 2012) was applied using positivistic and post-positivistic methods to gather the data that would be instrumental in plotting the charter. This was executed through a survey based on 17 questions using

a Likert scale that also included open-ended questions to gather as much data and ideas as possible. The survey questions were designed to allow ‘top of mind’ responses to the questions. The survey research instrument was pilot tested and cleansed. This survey was then distributed to City Stakeholders in person and also through their membership of Cork Chamber of Commerce ([corkchamber.ie](http://corkchamber.ie)) so as to be all inclusive. This resulted in 535 responses. The survey focused on the visitors to the City, consumers, retailers, and as many businesses in the City that were willing to participate. All six Quarters of the City were included and surveyed to ensure that it was as representative as possible. The surveys were completed during busy shopping times and during the time-frame of 19<sup>th</sup> of October through to the 1<sup>st</sup> of December 2017. Surveys were conducted in person and online. Street Surveys were also conducted during busy times such as Saturday 11th of November (morning); and Thursday 16th (evening) of November 2017. In order to triangulate the data, 10 face to face interviews with key businesses were conducted to establish what these businesses needed and required from a service charter. The interview guide consisted of questions that were semi-structured in nature to gather the richest possible data. The interview guide was also tested and cleansed prior to its execution.

Some of the brief findings from the surveys revealed that:

- The biggest engagement/participation rate (44%) was from the heart of the city. This is where most of the retail is based.
- The survey was welcomed and supported by all business sectors in the city
- Businesses were positive overall towards the initiative
- Businesses welcomed an interest in the City as they were concerned for their future
- Consumers expect friendly polite engagement with service providers
- Top ranking words included friendly, professionalism and competency
- Training and regular communication is needed to support engagement in the process.

Findings from the face to face interviews revealed that businesses were very keen to try to do something to address the issues of modern-day purchasing habits, and to encourage more City centre ‘foot-fall’. Some of the comments that emerged from the interview research are as follows:

“Customer service should be at a consistently high level, not just hit and miss,” “we have to stand out and offer our customers something different through customer service,” “we must embrace pride of place,” our goal is to have the customer feel very welcome,” “Cork is small enough to have a character and also big enough to prosper,” “the charter could be seen as one aspect of the smart cities initiative,” we need training for it,” “the time has come to act.”

Overall, it was believed and found that, if the City could offer outstanding customer service to shoppers who made the effort to visit the City centre, this would prove to be a differentiating factor for shoppers and might encourage City visits and retail engagement, instead of the online shopping option.

From this, the City charter guidelines were developed along with two new tag lines as follows;

‘Open to Explore’, and ‘We are Glad You’re Here’.

The charter developed 3 main principles as the core concepts and guidelines for City business to sign up to and adhere to:

Principle No.1	<b>Service Principle</b>
Principle No.2	<b>Customer Principle</b>
Principle No.3	<b>City Principle</b>

Detailed Content at [corkcitycentre.ie (b)].

Figure 1. Customer service charter 3 main principles.

The charter outlined below is available online and in print copy to all City stakeholders:



[corkcitycentre.ie (b)].

Figure 2. Outside cover of the customer service charter.



[corkcitycentre.ie (b)].

Figure 3. Inside content of the customer service charter highlighting the 3 main Principles: Service, Customer, City.

## **COLLABORATIVE LEARNING: PROBLEM-BASED CO-CREATIVE EXPERIENCE**

Originating first in medicine and the health sciences, Problem Based Learning (PBL) progressed into mainframe Higher Education. A learner-centered approach, PBL is where students engage with a real-life problem (Savery, 2006). PBL is complex in nature and not simple teaching techniques, but total educational strategies (Barrett, 2005). Problem Based Learning is a very specific approach to education learning (Barrett, 2005) and it affords students space and time to define their own learning and to be creative (Barrett, 2005; Kahn & O'Rourke, 2005). Students are tasked with coming up with a novel solution which facilitates interactivity with businesses and each other and enhances learning (Barrett, 2005).

Experiential learning also enhances student learning in higher education (Kolb & Kolb, 2107). Kolb initially developed a model of learning based on the notion that the best learning is achieved through involvement of reflection and action and puts action into a management of learning model. Moon (2004) outlined that experiential learning is often assessed through written content in the form of a reflective journal (Moon, 2004) [students had to work on an individual reflective journal throughout their learning experience]. Work experience can also be considered experiential learning (student cohort are all employed full-time), as we all reflect, and learning is based on experience, therefore, (Moon, 2004) believes that all learning is experiential.

According to Roschelle, & Teasley (1995) collaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem. Dillenbourg (1999) states that it is challenging to agree on what collaborative learning is and, in its broadest context, means that learning happens together. Learning can involve two or more people, groups or, communities learning together, and at all levels (CIT students and City Stakeholders). Dillenbourg (1999) goes on to suggest that collaborative learning is an activity of joint problem solving, and learning is expected to occur as a side-effect of problem-

solving, measured by the elicitation of new knowledge or by the improvement of problem-solving performance. The pedagogical sense is prescriptive; one asks two or more people to collaborate because it is expected that they will thereby learn efficiently. The psychological sense is descriptive: one observes that two or more people have learned, and collaboration is viewed as the mechanism which caused learning (Dillenbourg, 1999) (students worked in groups to solve the problem – three groups of four students and two groups of five students).

## **ASSESS THE OVERALL EXPERIENCE**

This collaborative process received much attention and interaction from all stakeholders, and it was important to review and reflect on the overall experience after the event. After developing the charter, it was considered appropriate, from a Higher Education perspective, to review and examine the student assessment practices to evaluate if there is a benefit in collaborative learning experiences through PBL. As outlined, twenty-two MBA students and 20 businesses were involved the evaluation of the co-creative collaborative process research as well as one member from City Hall. It was also important to gauge the views and experiences from the City stakeholders to gather their insights after the process. This would inform future collaborative work.

### **Methodology to Assess the Collaborative Experience**

A mixed methods approach was applied, and both sets of data were triangulated (Patton, 2012). To examine the experience of the learning of the students a positivistic research methodology was applied as quantitative facts can be directive and informative (Harvey, 1998). A quantitative research survey instrument using a Likert scale was developed after the learning, and in conjunction with colleagues involved in department programme development. The questionnaire was tested to eliminate any



errors and cleansed prior to surveying the students. All 22 MBA students (9 female, 13 male) were asked to fill out the survey in person in a class setting to ensure 100% participation. The survey was completely confidential so that private contributions and negative experiences where they arose could be provided in strict confidence (Harvey, 1998). Students were given the freedom to make genuine comments about their experiences. Comment boxes were also included to gather deeper insights and opinions which are informative for the research.

For the second element of the research, the City business participants were asked in person about their experience of the collaboration and working with the students and their implementation of the service charter when it was put into practice. A qualitative methodology was applied as it was believed that a post-positivistic approach (Patton, 2012) would gather in-depth answers from participants about their experiences. In all, 20 City centre businesses participated in the interviews. An interview guide consisting of 10 questions which focused on their overall experience, learnings and suggestions for the future were gathered. The City Hall contact was also asked to participate in the research to add to the data. A pilot interview was conducted, and all cleaning and ethical considerations were considered. Due to the importance of this service charter and the future of the project, all the businesses who participated initially in the project completed the interview along with the City Hall – 21 participants in total.

## **STUDENTS' EXPERIENCE**

Setting a problem at Master's level for assessment was found by the students to be appealing and stimulating. Of the cohort of 22 students, 87% stated that it was a positive experience. Stress was mentioned by 5% who maintained that it was a taxing experience overall. When asked about solving problems together as a class unit to come up with a plan, 66% stated that working in a class group was enjoyable overall. In terms of personal development, 39% stated that it improved their professional development skills, with 30% stating that the process will benefit their interpersonal skills

in the future due to the specific nature of the task of dealing with City businesses and City Hall.

From a negative perspective, some students did state that they believed that the real-life challenge was stressful as they were tasked with delivering a working document that was to be used in the future by City Hall and participating businesses. 25% of the students worried initially that they may not be “up to the task” – or, “the standard required,” as the work was of the level of a “professional consultancy.”

“I was gravely concerned initially; what if it all fell flat and was not of the standard expected by City Hall, and also, how could this impact on my overall Master’s grade?” Another student stated that they were “worried that they may not be able to deliver the required document in the given term time.”

Other positive encouraging comments included – “I felt excitement, joy and happiness when we met the deadline and the City representatives loved our service charter.” Another student stated that “I cannot explain the sheer delight at seeing the final colour version of our plan in beautiful red – the colour of our City.” “It was such an honour to complete this work for City Hall.” The final statistic showed that the students were very satisfied with this form of assessment at Master’s level and 90% stated that they would love more collaborative learning with industry in the future for other modules.

## **CITY TRADERS EXPERIENCE**

Findings from the City traders were extremely positive – they liked working with the students on developing the City service charter. Some of the positive comments included, “I enjoyed working with younger people to determine how they viewed our City and our service delivery.” Another participant stated that it “was a novel experience and I learned so much more about overall service delivery.” The next retailer stated that “we have to be competitive as a City and this project focused our minds on how to be more competitive!.” Two contributors mentioned that businesses need to work

more closely together and not to dwell on competitiveness” – This of course is the whole ethos behind co-opetition. “The three new principles devised by the Master’s students from their research of; ‘Service, Customer, and City Principles’ are something that we can now strive to achieve as business and in a wider context as a City.” Other participants noted how much they enjoyed the training that they had to partake in themselves to learn how to implement the charter that the students devised. “It was exciting returning to further training.” “We learned so much from it.”

Some negative comments included, “the timing was bad for my business.” For me, “the induction day was too long as I had to find staff cover.” Timing will always be an issue for us – we are retailers always on the go,” but the “summer time was definitely the wrong time due to staffing issues.” City Hall stated that one of the learnings was to run the training just before the summer as many shops get temporary staff in over the summer time, so the mystery shopper audits can be affected. For the next roll out, we will run it in February. The next challenge will be to move beyond the 20 businesses that participated initially and to have a City-wide implementation of the new City service charter.

## **THE FUTURE FOR CORK CITY RETAIL**

As a result of the initial indications and uptake of the charter in 2018, more City businesses have undertaken to sign up to the charter and this number is growing. City retailers believe that they can offer a differentiating factor by embracing and actualizing the charter for their business. In the words of one retailer:

This is where we in the brick-and-mortar shops can compete and win. Customers now want a real connection and a very high-quality service, so we all need to look regularly at our offering. We may feel we are doing our best, but we now have to compete with our customers shopping in the comfort of their homes and retail experts all agree that customer service is

the key to a successful bricks-and-mortar business, [Joan Lucey, Vibes and Scribes & Cork City Forum].

## **CORK CITY CUSTOMER-SERVICE CHARTER TRAINING**

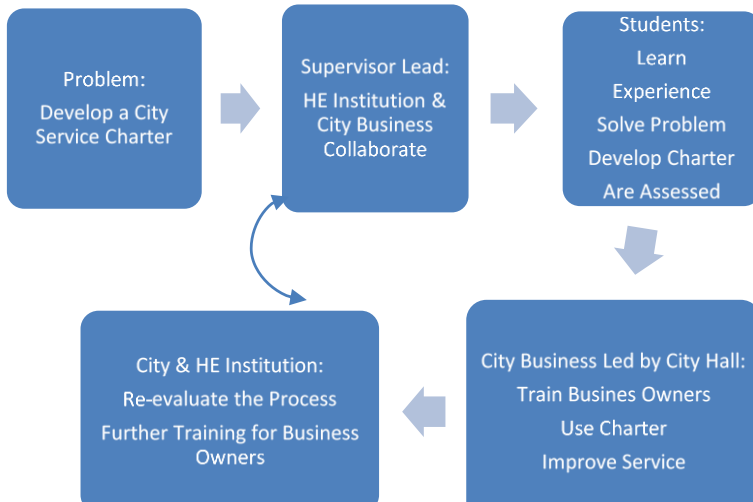
As part of the ongoing initiative to better the City, City retailers have undertaken professional training to develop techniques on how best to deliver the charter and perfect service delivery to their customers. As evidence that success leads to success, and, as part of the customer service initiative, Cork City entered the Retail Excellence Ireland (REI) 'Friendliest Place Awards' at the end of 2019. Vibes and Scribes book shop and Nano Nagle retail shop won the 'Top best stores in Ireland', and Cork City won the 'friendliest place award' in Ireland. Interestingly, worldwide, Cork is named as one of the world's friendliest cities, ranking 17th overall (Kenny, 2019).

Here in Cork City, we decided to put the customer at the heart of everything we do, and it is amazing to already see such recognition of our combined efforts as Cork is named as Ireland's Friendliest City. (Roche, 2019)

From the development of the charter, training has been established and was also highlighted in the research findings as key to its implementation. Therefore, the City has allocated a small budget for interested retailers and training has commenced and will be ongoing for City Traders. The 'train the trainer' workshops are now in phase three of the process (starting with just 20 business there are now over 50 participating businesses) and steadily growing to date 2020. Phase one started with the 'English Market' and the 'Victorian Quarter' of the City in 2018 commencing training on service delivery for the charter and this was expanded to phase two and three in 2020. The results to date are that the first and second phase are complete with the third phase in progress. This has made for an interesting cycle of

training which began with the Higher Education Institution engaging with industry and leading the way to promote learning.

The following figure outlines the cycle of learning from the process:



[Source: Author].

Figure 4. The collaborative educational co-creation learning cycle.

## CONCLUSION

The benefits of co-creation are compelling and the results of developing the City service charter are all embracing. The benefits from an educational and City community outlook are persuasive. Attention was drawn through public presentations, research work, media reporting and the final charter presentation and publication to the City centre traders. City traders came together and created a new critical mass to move forward into the 21<sup>st</sup> Century. There is now a process and a novel, positive plan in place for the future. The expansion of the charter is ongoing, and momentum is growing for this innovative approach. More City stakeholder public events have been held, with the latest in the Everyman Theatre in November 2019 hosted by leading UK performance coach Alf Dunbar. Alf Dunbar outlined how to

create excellent successful customer facing service to attendees, highlighting to City stakeholders that “you are the difference.” Alf Dunbar has successfully worked with businesses and organisations in 25 countries around the world, where he continues to inspire retail and hospitality managers and staff to become ‘best in class’ in their industry. According to Dunbar (2006), through excellent customer service, everybody wins, businesses and customer alike. The event was viewed as “another big step towards making Cork City the best in Customer Service and the best place to enjoy shopping” ([corkbusiness.ie](http://corkbusiness.ie)).

In the context of learning, to be challenged is to learn and to learn one must be challenged. Setting a real problem and encouraging enquiry is a perfect way to assess students in Higher Education settings (Biggs, 1999). The findings of this research are very positive in the context of collaborative learning and Problem Based Learning (PBL) with a Higher Education institution and co-creation with local businesses. Theorists provide much debate around the ideas and philosophies for the use of PBL and advocates of collaborative and PBL provide compelling benefits in the literature for their use. This has been reflected in this current research. Using collaborative and problem solving can provide original and exciting challenges for instructors and their students. The benefits of this type of learning experience and assessment for the students, especially at Master’s level, are all-encompassing as Master’s students need and deserve to be challenged and PBL provides this where the students can become part of a ‘real life’ collaborative team in an organizational setting; in this case a City scape setting with local businesses.

Overall, solving the problem, developing the service charter and the continuation of the learning was a very positive experience for all involved. The Master’s students helped decipher the mindset of the City business community, by conducting surveys among regular shoppers, tourists, visitors, occasional visitors and residents, and consulting broadly with many interested contributors. At the end of the overall process, the students presented a valuable service charter which will guide the consumer experience in the City into the future and set a precedent for similar charters throughout the country. The operationalization of this charter continued the

cycle of learning, as all of the 20 service providers who signed up to the charter initially undertook a short training course to facilitate its implementation. This has since expanded, with more businesses enrolling to be part of the scheme in the hope of a better overall economic future for the City. This training will be ongoing, with all protagonists engaging with those who experience the City routinely. The result of the overall collaborative learning process is a valuable service charter, guided by values such as pride of place, integrity, accountability, respect and excellence, which will lead to improved service delivery, customer experience and, ultimately, increased profits in a positive cooperative community, while having provided a unique and challenging experience for the Master's students. The study recommends that the next step and assessment should be to review the impact of the charter on the economic outlook and future of the City.

Tell me and I forget, show me and I remember, involve me and I understand . . .

(Benjamin Franklin - politician, writer, scientist, in Spronken-Smith, 2008).

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## APPENDIX A: CORK CITY CENTRE MAP



[Cork City Map].

[source:[http://www.johnthemap.co.uk/pages/cork/cen\\_cork.htm](http://www.johnthemap.co.uk/pages/cork/cen_cork.htm)]].



## ***Chapter 4***

# **DETERMINING FACTORS OF GENDER DIVERSITY IN THE SPANISH BOARDS**

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## **ABSTRACT**

The composition of the boards of directors is a key aspect for the development of companies. The increase of the women presence in the labor market is not translated as a significant increase in the gender diversity of the boards. In this work, the determinants of gender diversity in the boards of Spanish listed companies in the period 2001-2018 have been analyzed. Economic, financial and corporate governance factors have been considered. ROE is found as a determining and positive factor of gender diversity on the Spanish boards. The results show that the implementation of a gender diversity policy by the company, as well as a corporate social responsibility committee positively affect the percentage of women in the boards of directors of the listed firms. Industries show diverse and, sometimes, opposite effects among the factors considered. Our

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results can help regulators to propose policies and incentives to achieve larger gender diversity in the boards and management positions.

**Keywords:** gender diversity, corporate governance, financial data, listed firms, Spain

## INTRODUCTION

Historically, the labor market has been occupied by men. Specific measures promoted by the Governments, both at national and European community level, have favored the introduction of women into the training and labor world. Millán et al. (2015) show how women have been gradually entering the labor market as a consequence of the change in the family role.

However, this increase in the presence of women in the labor market is not projected in the top management positions. The vast majority of the literature identifies the presence of barriers that impede or hinder the professional development of women, configuring the so-called “Crystal Roof” (Gómez and Sánchez, 2009, p.118).

Biedma (2017) highlighted among these factors the difficulty that women had in the selection processes as compared to men. Gómez and Sánchez (2009) shared this approach, referring to both the selection process and the internal promotion process, either by a possible maternity or by the prejudice of unavailability, hourly and geographical. Martínez and Saavedra (2016) included among the barriers the possible gender stereotypes assumed by society. Heilman (2001) affirmed that the qualities attributed to women were linked to emotion, dependence or weakness, and those qualities had not traditionally been identified with the characteristics established for the directive positions: strength or independence. However, these managerial skills have also evolved. In this sense, Mateos de Cabo et al. (2006) argued the strength of women in some of the most valued skills for management positions, such as teamwork, customer orientation and efficiency in terms of time management. On the other hand, De Anca and Aragón (2007)

mentioned the effect of the environment as a barrier to female professional development.

The latest regulatory measures focus their effort on promoting female representation in the board. Through gender diversity, they intend that, in addition to social justice and equity, a greater degree of independence is achieved in the board. In this sense, according to data from the Women to Watch report (PricewaterhouseCoopers, 2012), in 2007, women represented only 6% of the board positions compared to 22% in 2017 for the biggest Spanish listed companies.

The benefits of gender diversity in the board have been studied, not only in terms of business results, but also in terms of social responsibility practices, which acquire great relevance in the 21st century. Brown and Brown (2001) found that the companies with the highest number of women on their board had a greater interest in the use of non-financial indicators, such as corporate social responsibility (CSR). The non-financial information disclosed by companies is, nowadays, a key and strategic factor for stakeholders. In this sense, Fernández-Feijóo et al. (2014) studied the importance of the composition of the board of directors in the quality of CSR information, finding that higher quality was related to boards composed up of at least three women.

The aforementioned justifies the assumption that gender diversity provides benefits to the firms as well as stakeholders. In this vein, governments and regulatory bodies, both nationally and internationally, have proposed measures that promote female representation in the boards.

The European Commission has made several efforts to try to promote gender equality in decision-making positions. The European Commission established a goal of minimum representation of 40% of women among non-executive members of the board for listed companies to be reached in 2020, urging countries to adopt binding measures.

If we observe the differences between EU countries, the set of countries where a mandatory quota system is applied is the only one that overcomes the 30% barrier of women in the boards (EIGE Gender Statistics Database, 2018). These countries are Austria, Belgium, Germany, France, Italy and Portugal.

Particularly, Spain is part of the group of countries with regulation without penalty. Biedma (2017) mentioned the need of state mandatory legislation and do not only dictate recommendations. On the other hand, Martínez and Saavedra (2016) stated that if these recommendations had been fulfilled the number of female directors on the boards of the companies belonging to the IBEX35 in 2015 would amount 188, very far from the real data (78).

The main goal of our study is to analyze the determinants that favor greater female representation in the boards of directors in Spanish listed companies, such as company's own characteristics, financial indicators and corporate governance initiatives. We analyze a sample of 51 Spanish listed companies belonging to 10 industrial sectors during the time period 2001-2018 and we use panel data models.

This study contributes to the extant literature and can be relevant for the regulatory bodies in order to promote the elimination of barriers or stereotypes that women face in promoting to top managerial positions. The results can also incentive companies to implement active policies.

After this introduction, the second section deals with the literature review and posits the hypotheses of the study. The third section presents the methodology and sample used. The fourth section discusses the main results obtained. Finally, we conclude with the main remarks.

## **LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT**

### **Influence of Financial Position on the Gender Diversity**

#### ***The Size of the Company***

Different proxies of size have been used in the literature. Hillman et al. (2007), Lückerath-Rovers (2013) and Saeed et al. (2019) used the logarithm of total assets as an indicator of the size of the company finding a positive relationship between the size of the company and the female representation in the board. Other studies use the market capitalization of the company as



a size proxy (Geiger and Marlin, 2012), finding a positive but not significant result.

On the other hand, Mateos de Cabo et al. (2006) found opposite results concluding that female representation on the board decreased as the size of the company increases. The authors used a combination of variables: net sales, total employees and total assets.

Based on the extant literature, we posit the following hypothesis:

*H1.1.* The size of the company influences the percentage of women in the board.

### ***The Profitability of the Company***

Two measures have been traditionally used for measuring profitability and their effect on gender diversity. Some authors use the financial profitability indicator (ROE), while others use the economic profitability ratio (ROA) as an indicator of the company's return.

Regarding previous studies that used ROE as a profitability indicator, Lückerath-Rovers (2013) suggested that the presence of women on the board was a distinctive feature of companies that achieved better financial results. Low et al. (2015) found that an increase in the number of female directors increases the financial profitability in a sample of more than 5,000 Asian societies. According to De Luis et al. (2007), this positive relationship could be explained in the sense that more profitable companies could enjoy greater freedom to experiment with the promotion of women to decision-making positions. However, Shrader et al. (1997) used a sample of the main US companies and did not find a significant effect of the percentage of women in the boards on the financial results, but a significantly positive effect when considering women managers.

ROA has also been commonly used by different authors. In this sense, Mateos de Cabo et al. (2006) did not find relationship between ROA and gender diversity on a sample of more than 1,000 Spanish companies, as well as Córdor and Esteban (2009).

Some authors have chosen to use both ratios, ROE and ROA, as independent variables in their studies. Jimeno and Redondo (2005) found a

positive relationship between the presence of women on the board and the value of the company, measured by both indicators. Hernández et al. (2016) focused on Spanish cooperatives and found also a positive and significant relation between gender diversity and both profitability variables.

As suggested by the previous literature, we draw the following hypotheses:

*H1.2.* Financial profitability (ROE) is related to the women percentage of the board.

*H1.3.* Economic profitability (ROA) is related to the women percentage of the board.

## **Influence of Corporate Governance on the Gender Diversity**

### ***The Board Size***

Regarding the relationship between the number of female members of the board and the board size, Mateos de Cabo et al. (2010) determined that the larger the board the greater the probability of female presence, in a sample of the 1,085 largest Spanish companies. Also Carter et al. (2003), in their study of 638 American companies found a positive significant effect of size board on gender diversity.

On the other hand, Agrawal and Knoeber (2001) stated that this positive relationship, may be due to the pressure of public opinion and their demand for diversity using a sample of 800 companies present in the Forbes' lists. Opposite, Singh and Vinnicombe (2004) explained the presence of women on the boards by their professional experience disagreeing with the reasons of public opinion and image.

Based on the aforementioned results, we posit the following hypothesis:

*H2.1.* The board size positively influences the percentage of women.

***The Influence of a Corporate Governance Committee, a CSR Committee and Gender Diversity Policy***

Both Spanish Organic Law 3/2007 and some non-binding recommendations of the European Commission urge companies to take measures aimed at promoting gender diversity. These measures involve the development of policies for the selection of board members that promote the increase of the percentage of women in the board. However, the integration of these regulations into business policies may not be sufficient to achieve the proposed objectives of gender equality and diversity. Santero et al. (2012, p.1911-1936) cite Kochan et al. (2003) who stated in their study that the legislative framework may not ensure the promotion of gender diversity in companies.

According to Stephenson (2004), a gender diversity policy helps companies attract female talent. Likewise, Bear et al. (2010) stated that having a greater number of female members in the board could lead to greater sensitivity to CSR, obtaining from their study a positive and significant relationship between the number of women in the board and the position of the company in CSR rankings. Given the growing importance of CSR by investors and consumers, that could be an incentive for companies to increase female representation in their boards. On the other hand, companies most committed to CSR could also be more committed to practices in favor of labor equality, incorporating such committees and policies in the organization.

Some authors argue that the success of these measures depends on whether they are implemented correctly or not. In this sense, Arboledas et al. (2007) informed about the risk that the company's internal policies or regulations end up being only a formal compliance and not a real strategy that fosters gender diversity in the board. According to the Women as Leaders report (PricewaterhouseCoopers and Isotes, 2014), an equality plan is not enough to advance in terms of gender diversity, but that the correct implementation of these initiatives is the key to progress. They highlight the commitment of senior management, the importance of involving the entire company and that the implementation process is led by top executives as fundamental factors for the success of these gender diversity policies.

Therefore, we consider the development of responsible corporate governance practices as a key factor of gender diversity and posit the following hypotheses:

*H2.2.* The presence in the company of a corporate governance committee positively influences the percentage of women on the board.

*H2.3.* The presence in the company of a gender diversity policy positively affects the percentage of women on the board.

*H2.4.* The presence in the company of a CSR committee has a positive influence on the percentage of women on the board.

## **MATERIALS AND METHODS**

### **Sample Description**

The sample is composed by 51 Spanish companies and considers the period 2001-2018. All financial data is in millions of euros. Observations with negative Total Equity have been discarded to ensure the interpretability of profitability ratios. The final data matrix is an unbalanced panel comprised by 546 firm-year complete observations.

Data has been obtained from the EIKON Database. The dependent variable is the percentage of women on the board (GENDER). The independent variables considered to proxy hypotheses H1.1 to H2.4 are: the board size (BOARD\_SIZE), the dummy variable CORP\_GOV\_COM that takes the value one when the company has a corporate governance committee and zero in any other case, the dummy variable DIV\_POLICY which is equal to one when the company applies a gender diversity policy and zero otherwise, the dummy variable CSR\_COM that takes the value one when the company has a corporate social responsibility committee and zero in any other case, variable SIZE measured by the logarithm of the Total Assets, the return on equity (ROE) calculated as net income after taxes/total equity and the return on assets (ROA) calculated as net income after

taxes/total assets. In addition, firms are classified per industry according to The Global Industry Classification Standard (GICS).

The descriptive statistics of the sample are presented in Table 1. Regarding GENDER, the average is 12.34%, finding in the sample boards without presence of women and a maximum of 45.45%. In addition, 23% of the observations have a corporate governance committee, 57% apply a gender diversity policy and 54% have a CSR committee.

**Table 1. Descriptive statistics of the sample**

Variable	N (obs.)	Mean	Std. Dev.	Min	Max
Total assets	546	73163.25	201868.00	104.49	1444305.00
Total equity	546	7523.54	13489.58	26.87	94489.00
Total liabilities	546	65639.71	189777.20	1.74	1349816.00
ROE	546	0.11	0.66	-13.23	1.29
ROA	546	0.04	0.08	-0.24	0.38
GENDER	546	12.34	10.11	0.00	45.45
BOARD_SIZE	546	13.68	3.58	4.00	24.00
CORP_GOV_COM	546	0.23	0.42	0.00	1.00
DIV_POLICY	546	0.57	0.50	0.00	1.00
CSR_COM	546	0.54	0.50	0.00	1.00

The sector with the highest representation in the sample (Table 2) is Financials (22.34%), followed by the Industrials sector (17.03%) and Utilities sector (14.84). The sectors with the lowest representation are Real State (2.56%), Materials (3.85%) and Information Technology sector (4.21%).

The sectors have been grouped into five major industries according to their similarity based on the description of GICS and coded as dummy variables as follows. Industry CONSUMER\_D\_S includes observations belonging to consumer Discretionary and Consumer Staples sectors, industry EN\_MA\_U includes those companies in the Energy, Materials and Utilities sector, industry FIN\_RE\_STATE is composed by companies classified as Financials and Real State sector, industry IND\_HEALTH is composed by observations belonging to Industrials and Health sectors, and industry INF\_COMM is composed by Information and Communication companies.

**Table 2. Distribution of sectors in the sample**

	N (obs.)	Percentage (%)
Communication Services	58	10.62
Consumer Discretionary	35	6.41
Consumer Staples	26	4.76
Energy	35	6.41
Financials	122	22.34
Health Care	38	6.96
Industrials	93	17.03
Information Technology	23	4.21
Materials	21	3.85
Real Estate	14	2.56
Utilities	81	14.84
Total	546	100

**Table 3. Correlation matrix**

	GEN- DER	SIZE	ROE	ROA	BOARD_ SIZE	CORP_GOV_ COM	DIV_ POLICY	CSR_ COM
GENDER	1.00							
SIZE	0.08*	1.00						
ROE	0.00	-0.03	1.00					
ROA	-0.02	-0.28***	0.37***	1.00				
BOARD_ SIZE	-0.10**	0.54***	-0.01	-0.22***	1.00			
CORP_ GOV_CO	0.05	0.18***	-0.02	-0.15***	0.16***	1.00		
DIV_ POLICY	0.27***	0.18***	-0.06	-0.02	0.14***	0.19***	1.00	
CSR_ COM	0.36***	0.30***	-0.07*	-0.15***	0.13***	0.19***	0.44***	1.00

\*\*\*, \*\*, and \* are statistically significant at 1%, 5%, and 10%, respectively.

The correlation matrix is calculated and shown in Table 3. No significant correlations with a correlation coefficient exceeding 0.65 are present. In order to assess if possible multicollinearity problems are identified in the sample, VIF values are estimated for all variables relying always below 2. Therefore, we can conclude that there are no multicollinearity problems affecting the models.

As regards to the correlations, the GENDER variable is positive and significantly correlated with SIZE, DIV\_POLICY and CSR\_COM. On the contrary, it is significant and negatively correlated with BOARD SIZE.

## **Mathematical Model**

Since the data matrix is an unbalanced panel, we compute panel data models, both considering Fixed Effects (FE) and Random Effects (RE). The FE model establishes less assumptions about the behavior of the residuals. The general expression of the model is as follows,

$$y_{it} = \alpha_i + \beta \cdot x_{it} + u_{it}$$

where  $\alpha_i = \alpha + v_i$  and  $v_i$  is constant for every firm  $i$ .

On the other hand, the RE model has the same general form, with the difference that  $v_i$ , instead of being a constant value over time, is specified as a random variable.

Between two significant FE and RE models, we calculate and apply Hausman test. In the Hausman test the null hypothesis corresponds to selecting the RE model. Therefore, if p-value <0.05 the null hypothesis is rejected and the FE model would be accepted, as we find significant evidence that the FE model provides more consistent estimation of the coefficients.

## **RESULTS**

First, we compute a model considering the total sample. The Hausman test yields a Chi2 of 169.11 (p-value = 0.000) so we fit a FE model. The coefficients of the model are estimated under robustness conditions and the model is globally significant (F-satistic = 13,450, p-value<0.01). Three explanatory variables turn out significant: ROE, DIV\_POLICY and CSR\_COM.

**Table 4. Fixed Effects panel data model**

	Coefficient	t-statistic	p-value
SIZE	2.583	1.450	0.152
ROE	0.377*	1.750	0.086
ROA	3.728	0.560	0.576
BOARD_SIZE	0.295	0.840	0.404
CORP_GOV_COM	0.911	0.450	0.653
DIV_POLICY	5.211***	4.290	0.000
CSR_COM	4.596***	3.520	0.001
constant	-21.589	-1.400	0.168
N	546		
Firms	51		
R2 within	0.321		
R2 between	0.000		
R2 overall	0.051		

\*\*\*, \*\*, and \* are statistically significant at 1%, 5%, and 10%, respectively.

ROE is positively significant, so the most profitable companies are characterized by having a higher percentage of women on the board. As suggested by Lückerath-Rovers (2013), the presence of women on the board of directors is a distinctive feature of companies that achieve better financial results. This result can be used as an incentive for companies to implement gender diversity strategies.

DIV\_POLICY is the corporate governance variable with the greatest influence on GENDER variable. The relationship between these variables is positive, suggesting that companies applying gender diversity policies have a greater share of female representation in the board. This result is consistent with the previous literature (Stephenson, 2004). In addition, the CSR\_COM variable is also positively significant, suggesting that those companies with a CSR committee have a higher presence of women on the board. This result may be in line with the hypothesis that having a greater number of female directors may lead to greater sensitivity on the part of the CSR management boards (Bear et al., 2010) as well as firms committed to CSR practices are more prone to gender diversity.

We also perform models by sectors (Table 5). The models show that the determining factors are similar, although with some differences among



sectors. Hausman test for Model 3 and Model 4 evidences more consistent results for RE fitting. The 5 models are globally significant.

**Table 5. Panel data models by industry**

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	t-s	Coef.	t-s	Coef.	t-s	Coef.	t-s	Coef.	t-s
SIZE	5.85	2.09*	9.73	2.87**	0.17	0.15	1.16	0.51	4.56	1.99*
ROE	-20.52	-3.49**	-53.12	-2.17*	2.40	1.67*	0.33	3.23***	-0.06	-0.03
ROA	95.84	1.20	160.31	1.67	-10.03	-0.63	14.06	1.75*	1.37	0.14
BOARD_ SIZE	-1.43	-1.71	-0.11	-0.23	-0.15	-0.24	1.38	3.35***	1.26	5.37***
CORP_ GOV_ COM	15.75	4.34***	2.47	0.50	-6.22	-2.57**	1.23	1.21	-2.83	-0.94
DIV_ POLICY	-4.00	-1.53	6.39	2.92**	4.19	1.94*	7.24	4.95***	4.17	2.07*
CSR_COM	2.24	1.01	2.07	0.56	3.88	2.21**	2.97	1.22	5.19	2.54**
constant	-18.23	-0.79	-84.30	-2.59	10.15	0.91	-17.92	-0.92	-52.21	-3.01
Model	FE		FE		RE		RE		FE	
N	61.00		137.00		136.00		131.00		81.00	
Firms	7.00		12.00		12.00		13.00		7.00	
R2 within	0.45		0.50		0.25		0.48		0.62	
R2 between	0.02		0.02		0.00		0.00		0.14	
R2 overall	0.15		0.08		0.15		0.05		0.02	

Coef. and t-s refer to the regression coefficient and t-statistic, respectively. \*\*\*, \*\*, and \* are statistically significant at 1%, 5%, and 10%, respectively. Model 1 to 5 include observations belonging to industry including consumer discretionary and consumer staples sectors, industry including energy, materials and utilities, industry composed by financials and real state sectors, industry formed by industrials and health sectors, and the industry composed by information and communication sectors, respectively.

Regarding the hypotheses related to the economic and financial characteristics of the companies, the size of the company shows a significant and positive relationship in Models 1, 2 and 5 as supported by the extant literature (e.g., Lückerrath-Rovers, 2013; Saeed et al., 2019). ROE shows a positive and significant relationship in Models 3 and 4, while turns out negatively significant in the case of Models 1 and 2. On the other hand, ROA turns positively significant only in Model 4.

The board size has a positive effect on the percentage of women in the board in the case of industrials and health sectors (IND\_HEALTH) and the

information and communication sectors (Models 4 and 5) in line with the results obtained by others authors (Carter et al., 2003; Mateos de Cabo et al., 2010).

The existence of a corporate governance committee (CORP\_GOV\_COM) shows opposite results depending on the industry. As regards to the industry including consumer discretionary and consumer staples sectors CORP\_GOV\_COM evidences a positive effect (Model 1), while in the case of financials and real state sectors CORP\_GOV\_COM evidences a negative effect (Model 3).

The existence of a gender diversity policy is positively significant in 4 of the 5 models, with the exception of Model 1. On the other hand, the existence of a CSR committee shows a positive effect on the gender diversity of the board for the financials and real state sectors (Model 3) and the information and communication industry (Model 5).

Based on the obtained results, it seems that a proactive attitude towards corporate governance practices is essential to eliminate the barriers and stereotypes that women face in the development of their professional career, especially as regards to the establishment of a gender diversity policy.

## CONCLUSION

The literature has shown that the incorporation of women promotes civic and democratic values such as social justice and equity, but also is an important contribution to the independence necessary for the proper behavior of the boards.

In this work we analyze the financial and corporate governance determinants of gender diversity in the boards of Spanish listed companies. Our results show that companies with greater financial profitability (ROE) are characterized by having a higher percentage of women in the board. In addition, having a gender diversity policy as well as a CSR committee also positively affects the percentage of women in the board.

The individual analysis of the industries shows different influence of the considered factors. However, we find that the size of the company and a

gender diversity policy are determining factors promoting gender diversity on the board in most of the industries.

Finally, it seems important to highlight that the actions undertaken by the company itself are of special relevance to achieve gender diversity in management positions, and this can serve as a guide for the proposal of policies and regulations that encourage and promote the incorporation of such measures.

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*Chapter 5*

**SUSTAINABLE DEVELOPMENT:  
THE POSITION OF THE BIG MEXICAN  
BUSINESS SECTOR**

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**ABSTRACT**

Human beings are consuming and polluting at a higher speed than the planet's capacity. However, there would be reasons for optimism from 2016: the interaction of the social, economic and environmental agenda has been recognized at the highest level. The document explores the position and role of the most important sector in Mexico regarding the aforementioned initiative. The conclusion is that not all companies decisively undertake the task, however, the vast majority declare positions in this regard. The statement is considered to be inconsistent with their practice, and future research should measure the individual impact of the concrete actions of the most relevant companies in the sector in question.

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**Keywords:** sustainable development, environmental economy, ecological economy, renewable resources and conservation

## INTRODUCTION

As of August 2016, all the fish consumed in the year, the oceans could not, nor will they be able to replace them; all the trees we cut down, the forests could not replace them; all the carbon dioxide we produced; the atmosphere and nature in general could not process it without detriment to their “natural” conditions. In other words, we are consuming and polluting at a faster rate than the planet Earth can produce, absorb or clean in one year (BBC Mundo, 2016).

Despite all kinds of skepticism, or ignorant denial, it is clear that we are devastating our home and the home of every living being on Earth, the only one possible so far. We are a big world on a small planet, where we have reached a saturation point. Unsustainability at all scales; from local deforestation to automobile pollution that deteriorates the planetary ceiling and risks the human future. Fifty years of exponential growth have accumulated to such an extent that we have reached planetary limits. The planetary stability that our species have enjoyed for 11,700 years and that allowed the rise of civilization can no longer be trusted (Rockström et al., 2016).

Despite what was stated in 2016, there would be reasons for optimism. It was argued that the Paris Agreement on climate change reached in 2015 and the Agreement on the Sustainable Development Goals for people and the planet represent a notable success (Rockström et al., 2016). In the same way, the interrelation of the social, economic and environmental agenda that has been recognized at the highest levels through the adopted approach to define the new set of global Sustainable Development goals was enthusiastically noted (Lambertini, 2016).

Likewise, with great hope it was reasoned that “we are beginning to understand that a diverse, healthy, resilient and productive natural



environment is the pillar of a prosperous, just and secure future for humanity” (Lambertini, 2016: 6). In the same way, it was pointed out that “this will be crucial if we want to win the many other human struggles for development, such as fighting poverty, improving health and boosting economies” (Lambertini, 2016: 6).

Likewise, as part of the Paris Agreement, cities, provinces, companies and investors were brought to the same tune, united in the same objective: a great wave of extraordinary climate action is observed by cities, regions, companies and civil society. It was noted that this climate action includes, and highlights, those carried out in more than 7,000 cities in more than 100 countries. It was also underlined that more than 5,000 companies from more than 90 countries adhered to this task. It was emphasized that the referred 7,000 cities harbored a combined population of more than 1.2 billion people and accounted for almost a third of world GDP. In the same way, the companies indicated represented much of the world market capitalization and more than 38 trillion dollars of income (UN, 2015). It seemed that the world understood and considered the serious environmental problems faced and accepted the need to substantially modify the development model followed up to now. In particular, the shift was perceived to be made according to the postulates of the so-called ecological economy.

In this sense, it is also manifested in the case of Mexico, through its Intentional Nationally Determined Contributions (INDC's), it is committed to reducing its Greenhouse Gas (GHG) emissions in 22% and 51% black carbon. For which; recognizing that a significant part of the emissions are carried out during the energy generation process; The commitment to produce clean energy has been assumed in 35% of the total energy consumed in the country by 2024 and 43% by 2030 (IMCO, 2016).

As noted above, climate action involves various sectors, including business, as was also noted, at the time of drafting the Paris agreement, there were already more than 5,000 companies in this task.

METHOD

In this sense, taking note of the broad commitment and involvement regarding the reduction of climate change and in general the promotion and search for a more sustainable development, environmentally speaking, this paper focuses on the position and role within the aforementioned initiative of the private sector most important and powerful in Mexico. Specifically, the case of the 13 Mexican companies listed in the Forbes Global 2000 is analyzed, which identifies the largest and most powerful public companies (to be listed on the stock exchange) in the world (measured by sales, profits, assets and market value) (Chen, 2015). However, the work only indicates sales and market value. On the other hand, it stands out, those 13 companies have total revenues of \$ 181.8 billion (Table 1), about 16% of Mexico’s national GDP.

Table 1. Largest Mexican companies

Ranking	Company	Sells (Millions, Dollars)	Value of the Market (Millions, Dollars)
1	América Móvil	63 700	74 500
2	Femsa	20 900	33 800
3	Banorte	8 100	16 900
4	Grupo México	9 300	23 700
5	Grupo Inbursa	4 000	17 700
6	Cemex	15 800	12 400
7	Grupo Televisa	6 000	20 400
8	Alfa	17 200	11 000
9	Grupo Bimbo	14 200	14 000
10	Liverpool	6 100	16 200
11	Grupo Elektra	5 600	6 500
12	Grupo Carso	6 200	10 100
13	Arca Continental	4 700	10 300
Total		181 800	267 500

Reference: Self-elaborated based on the 2015 Chen Data.

## DEVELOPING

In the first instance, the position of each of the companies regarding climate commitment will be defined based on their environmental commitment; at least declarative. This is reflected in its declared Mission and Vision (information included paragraphs below in environmental commitments). Secondly, it will be determined based on the presumed impact that the companies' activities have with respect to those identified by Rockström and collaborators as planetary limits:

1. integrity of the biosphere (or destruction of ecosystems and biodiversity);
2. climate change and its twin brother,
3. acidification of the oceans;
4. change in land use;
5. unsustainable use of fresh water;
6. disturbance of biogeochemical flows (nitrogen and phosphorous contributions to the biosphere);
7. alteration of atmospheric aerosols;
8. pollution generated by new substances, including:
9. ozone depletion of the stratosphere.

Environmental commitments of the largest and most powerful Mexican companies (ordered according to the Forbes Global 2000 classification):

### *América Móvil:*

Mission: "All our efforts are focused on continuing to be the agent of change in the region, offering new products and services that will contribute to positively transform the lives of our clients in the coming years."

Vision: Not found (Miranda, 201).

*Fomento Económico Mexicano S.A.B. de C.V., (Femsa):*

Mission: "Generate economic and social value."

Vision: "Passion to achieve our strategic objectives." (Fomento Económico Mexicano S.A.B. de C.V., 2017)

*Banorte:*

Mission: "Build trust and financial strength for all our clients."

Vision: "To be a great ally to grow strong with Mexico." (Banorte, 2017)

*Grupo Mexico:*

Mission: "Satisfy the needs of the markets in which we participate through large-scale and long-term projects, remaining at the forefront of technology and permanently committed to our people, the environment, our values and our social responsibility, maximizing the creating value for shareholders."

Vision: "To be the world leader in efficiency and profitability in the businesses in which we participate, with an orientation towards people and their integral development, guaranteeing the sustainability of our operations." (Grupo México, 2015)

*Grupo Inbursa:*

Mission: "A financial group committed to Mexico, integrated with the best human capital and created to care for and make the patrimony of our clients and partners in the most effective way." (Inbursab, 2007)

Vision: "To be leaders of the financial sector in Mexico with profitable growth, for the benefit of clients, collaborators and partners." (Inbursab, 2007)

*Cemex:*

Mission: “Create sustained value by providing industry-leading products and solutions to meet the construction needs of our customers worldwide.”

Vision: Not found. (Cemex, 2017)

*Grupo Televisa:*

Mission: “To be a world leader in the production and distribution of Spanish-language entertainment and information.”

Vision: “To satisfy the entertainment and information needs of our audiences, while meeting our demands for profitability through the highest global standards of quality, creativity and social responsibility.” (Grupo Televisa, 2017)

*Alfa:*

Mission: “To be a leading company in relevant markets, with profitable growth and a solid competitive position in a global, socially responsible environment, which develops highly qualified human capital and creates value for its target audiences.”

Vision: “ALFA must use its energy and creativity to grow rapidly and with high profitability, while achieving a global presence in those of its businesses where necessary. Its products must be leaders, innovative and with high attributes of customer satisfaction. It must have excellent prestige and recognition as a company that meets the highest standards of social responsibility.” (Bolsa Mexicana de Valores, S.A. de c.v., 2009)

*Grupo Bimbo:*

Mission: “Delicious and nutritious food in everyone’s hands.”

Vision: “In 2020 we transform the baking industry and expand our global leadership to better serve more consumers.” (Grupo Bimbo, 2017)

*Liverpool:*

Mission: “We provide families with a selection of products and services for clothing and home that exceed their expectations of quality, fashion, value and care, in a pleasant environment.”

Vision: “To be the department store company with the highest efficiency, growth, innovation, prestige, service, profitability and adaptation to specific markets.” (Liverpool Group, 2017)

*Grupo Elektra:*

Mission: “At Elektra we demand that we fully satisfy the needs and expectations of our customers, suppliers and employees. To achieve this, our keys are founded on renewal, control and constant updating, without neglecting the high sense of attention and service that distinguish us. Our main concern is not only to offer a wide range of products; if not, make use of all the resources that technology provides us to be purposeful, informative, practical and human.”

Vision: “Elektra has set itself a single objective: to be the main and most complete Point of Reference and Sale, both for customers and suppliers of the Group.” (Elektra Group, 2017)

*Grupo Carso<sup>1</sup>:*

Mission:

Sanborns: “To offer our customers the highest quality products and services, at the right price, in the right environment, seeking their widest satisfaction through careful personalized service. The client is the *raison d’être* of our work.”

Consumex: “To profitably satisfy the needs of our automotive industry customers, supporting them in the sale of their products through the design, manufacture and marketing of signal distribution, lighting, electrical and electronic energy distribution systems, as well as in logistics and deliveries sequential at the point of use.”

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<sup>1</sup> Only two of the corporate group companies are presented.

Vision:

Sanborns: “Consolidate and maintain the leadership of Grupo Sanborns in the market, integrating the objectives of its clients, staff, suppliers and shareholders.”

Condumex: “To be recognized by our clients and shareholders as their best option in meeting their expectations and needs for quality, price, service, technology and profitability.” (Grupo Carso, 2017)

*Arca Continental:*

Mission: “To be leaders in all occasions of consumption of beverages and food in the markets where we participate, profitably and sustainably.”

Vision: “To generate the maximum value for our clients, collaborators, communities and shareholders, satisfying at all times and with excellence the expectations of our consumers.”(Arca, 2017)

In the same way, regarding the presumable impact that the activities of the companies have with respect to the indicated planetary limits identified by Rockström and collaborators, in principle the economic sector in which these companies participate is identified (Table 2).

Thus, of the thirteen companies analyzed we have one (América Móvil) with activity predominantly in the information and communication technology (ICT) sector, two with main activity in beverages and food (Femsa and Arca Continental), two others linked to financial services (Banorte and Grupo Inbursa), also two with a strong presence in the field of infrastructure, mining and others (Grupo México and Grupo Carso), one related to the cement and aggregates industry (Grupo Cemex), one to entertainment and information (Grupo Televisa), two on food production and distribution (Alfa and Grupo Bimbo, although the former is highly diversified with a presence in several very different sectors) and finally, two linked to specialized trade (Liverpool and Grupo Elektra; although the latter also ventures into financial services).

**Table 2. Economic sector of participation**

Position	Company	Economic Sector
1	América Móvil	Information and communication technologies
2	Femsa	Drinks, shops and restaurants
3	Banorte	Financial services
4	Grupo México	Mining, transportation, infrastructure
5	Grupo Inbursa	Financial services
6	Cemex	Cement, ready-mix concrete and aggregates
7	Grupo Televisa	Entertainment and information
8	Alfa	Food, polyester, polypropylene, expandable polystyrene and caprolactam, aluminum components, and information and communication technologies
9	Grupo Bimbo Marinela, Bimbo, Barcel and Ricolino	Food products
10	Liverpool	Products and services for clothing and home
11	Grupo Elektra	Specialized trade and financial services
12	Grupo Carso	Conductors, electronics, energy, auto parts, infrastructure, construction and restaurants
13	Arca Continental	Food and drinks

Source: Self-elaborated with information from the selected companies.

**RESULTS**

In the aforementioned sense, regarding climate commitment and according to the missions and visions of the 13 companies mentioned, it is possible to determine that not all of them undertake the task in a decisive manner. The foregoing, despite the fact that the great majority (the exception would be Alpha) declare positions, in that sense, or in general terms, a vision of protection of the environment or assuming sustainability commitments; some even adhere to the United Nations Global Compact or Global



Compact, which among its ten principles includes the promotion of greater environmental responsibility (CINU, 2017).

Based on the aforementioned planetary limits, to a greater or lesser extent it seems evident that the thirteen companies analyzed with their activity and/or management contribute to exceeding them. In the case of the production, bottling and sale of beverages on a large scale, it is clear that it affects the integrity of the biosphere through the disturbance of ecosystems and biodiversity, only with the improper preparation and disposal of large quantities of food packaging, plastic, cardboard and others. The use of large volumes of fresh water also contributes to its unsustainable use.

On the case of the mining sector; including the cement and aggregates sector; its connection with affecting the integrity of the biosphere is also evident. This disturbs the integrity of ecosystems and biodiversity; the above, regardless of the continuous accidents that this activity generates. In general, of the thirteen groups or companies studied, it seems that those dedicated to the information, communication and entertainment sector would be the most environmentally friendly, followed by those focused on specialized trade and those on financial services.

It is notorious that the activity of these companies and all those involved in this study is not consistent with the postulates of the ecological economy: a new framework for the interrelationships between nature-economy and society, recomposition of natural cycles and integration of the material in economic analysis. As already noted, regardless of the impact generated by the information, communication and entertainment sector and those of specialized trade and financial services, it appears to be milder than that of the rest of the productive sectors involved in the analysis (through of the thirteen companies analyzed) it is evident that in general these economic groups do not carry out their activity under a new approach regarding the nature-economy-society interrelation. Not even thinking about the recomposition of the natural cycles and much less integrating the material to the economic analysis: there is no incorporation of ideas or concept of social

metabolism regarding the environmental impact that its activity generates or fosters.

## CONCLUSION

Despite the environmental commitment that the vast majority of the companies analyzed declare, out of ignorance, myopia or frank disinterest, in practice, progress towards true sustainable development is insufficient. The analysis of social metabolism is based on the accounting of materials and energy that an economy mobilizes for its operation and/or for the satisfaction of the needs of the population and allows, despite some methodological limitations, to obtain an image of the physical dimension of the previous and complementary economy to its monetary consideration. The analysis would be complete with the incorporation of the study of the information flows (goods and services) that are exchanged between economic agents (Martínez and Roca, 2000).

We are convinced that the negative environmental impact caused by human activity would be notoriously less if we reduce the prevailing consumer model. Sustained consumer model and even driven through the dominant socio-economic system, largely supported by the mass media, open and restricted. This is where the role of information, communication and entertainment companies is relevant.

In sum, despite the fact that the Mexican business sector, specifically the largest and most powerful groups; declares affirmative positions on its commitment to climate and sustainable development and protection of the environment, in general it does not assume the task decisively. Rather, the statement is perceived to be inconsistent with practice. This seems to be carried out from the same perspective that the contemporary environmental crisis has fostered, where it does not operate under an approach that leads to the recomposition of natural cycles, much less integrating the material into economic analysis and without observing the inclusion of social metabolism in their productive activity.

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*Chapter 6*

**ASSESSMENT AND TEMPORAL EVOLUTION  
OF RECREATIONAL BENEFITS  
OF THE XCARET PARK, MÉXICO**

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**ABSTRACT**

The purpose of this study is to estimate the recreational benefits generated by the “Xcaret” eco-park. The economic assessment of the recreational use of natural areas has been widely used, but is relatively new in Mexico, where the Public Administration heavily weighs the short-term benefits, despite the long-term ones. The Travel Cost Method was used with its zonal variant (ZTCM) for all the visitors during the 2004-2008 period. Information about all visitors was provided by the park’s administration. Five scenarios were created depending on the cost to visit “Xcaret”. Four models were fitted: regression lineal, multiple log-linear

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regression, Poisson regression and negative binomial regression. The best fitting Poisson regression, with the scenario that considered visitors of Mexican origin, weighted visiting the park by 33% of the total costs of multi-destination trips, and American visitors by 35%. The results showed that average annual consumer surplus (CS) was 978.37 Mexican pesos, regardless of the study year, which was estimated by the Poisson regression model for the 2004-2008 period. The annual average recreational benefits generated by the park for the study period (2004-2008) corresponded to 942 million Mexican pesos (68.4 million \$US). Improvements to the park are justified by the huge recreational benefits made in association with environmental assets.

**Keywords:** count data models, natural areas, poisson regression, travel cost method, valuation

## INTRODUCTION

According to the World Tourism Organization (WTO) the ecotourism is one of the most effective means for countries' enrichment in areas with high ecological levels and with few industrial development pathways. Moreover, it is important to highlight that tourism in 2012 accounted for 5% of the global gross domestic product, with more than a billion tourists and it generated revenue of 1,075 billion dollars. Baimai and Daniel (2009) argue that tourism has played an important economic role in many countries and it seems to be a potential strategy for the growth of developing countries, especially for those countries endowed with reputable natural beauty and very high cultural diversity. Furthermore, Mexico occupied number 10 in international tourists' arrivals in 2014 (29.3 million tourists), and number 22 in foreign exchange generated by tourism (16.2 billion dollars). Regarding, the Secretary of Tourism in Mexico (SECTUR), the Quintana Roo state received 9,028,000 international tourists, which represented 31% of international tourists welcomed all over Mexico in 2014. In addition to this fact, the National Institute of Statistics, Geography and Informatics (INEGI), tourism in Mexico reaffirmed its importance in the national context by contributing 8.9% of the gross domestic product in 2011. The INEGI also



stated that the gross domestic product of tourism reached 728 billion Mexican pesos in the same year, of which the Quintana Roo state generated 37.2%, according to SECTUR.

The United Nations Educational, Scientific and Cultural Organization, Mexico indicated 31 properties inscribed on the World Heritage List, of which 27 are cultural and four are natural. Along the same lines, the national commission of natural protected areas in Mexico managed 176 federal natural areas in 2013, which represents over 25,301,188 hectares. In the same year, there were 62 protected areas in coastal areas, of which 16 were located in the Quintana Roo state. The first recorded natural asset was the “Sian Ka’an” biosphere reserve in 1987, located in the Quintana Roo state. Sixty km north from “Sian Ka’an” the Xcaret park is located, and due to its proximity and the type of ecosystem it contains (mangroves, barrier reefs, bays, lagoons, marshes, swamps, rain forests and underground rivers called “cenotes”), it is strikingly similar from an environmental point of view.

The Xcaret park is in the central part of what it is conventionally called “Riviera Maya”, on the east Quintana Roo coast, and it comprises 130 km-long strip along the geographic corridor between the towns of Cancun and Tulum (Romero and Rafael, 1997). The Xcaret park is a leisure park that combines recreational activities by taking advantage of the natural resources in the place: 60 hectares of lowland rainforest combined with mangroves, located next to a small creek on 1 kilometre of rocky coastline and reef. On top of that, it uses a series of pseudo-natural resources constructed as part of a project. The park opened in 1992 with 40 hectares and it has extended since then. Xcaret is an area that combines mangrove forest jungle, seated together in a creek with a coral reef, and a series of typical karstic sinkholes and caverns that can be found in the Yucatan Peninsula (Checa-Artasu, 2009).

According to the Ministry of Tourism, from 2011 to 2012 the Riviera Maya had a hotel infrastructure of more than 40 thousand rooms built from beach hotel complexes, and predominantly of the “all inclusive” type, which had an annual average occupancy rate of around 82.6%. These hotel developments are adjacent to pristine beauty spots of high ecological content which should be valued by methods of economic valuation that consider the economic value generated from the benefits produced or possibly produced.

By contrast they could continue to be underestimated, abandoned, or even though, they could be improperly exploited (felling of forests, mangrove filling, groundwater contamination, among others.) until they disappear. Apart from this, it should be noted that the tourism industry is characterised by a very complex structure, which is manifested in many ways, and it can often strongly impact the natural and environmental resources of different tourist destinations (Pomeanu and Teodosiu, 2012).

The economic value is an anthropocentric, relative and instrumental value, often in monetary units, which is established and determined by people's individual preferences. The economic value consists in the ability to pay the perceived efficiency of the property in order to satisfy a need or aspiration (Enríquez, 2005). Environmental management involves taking actions that have a positive effect to establish a harmonious relationship between the conservation objectives of natural and cultural heritage and satisfying basic human needs. This also means sustainable development which cannot be achieved without proper environmental management (Sánchez, 2008). Accordingly, quite often environmental sanctuaries also become destinations for recreational purposes. Therefore, a social value derives from using these sites (Amoako-Touffour and Martínez-Espiñeira, 2012). The total economic value is a concept developed by economists of natural resources to classify values generated by ecosystems. They are defined as the sum of all the benefits they generate (Enríquez, 2005). Direct use values are a component of the total economic value and arise from demand of activities, such as recreation and tourism, among others. Concerning Valls-Donderis et al. (2015), sustainable forest management social criteria are more important than economic ones for most stakeholder groups, and the social dimensions of sustainability are more important where the economic role of forestry activities is marginal.

Economic valuation methods derive the value of public assets from the value of other assets (Farré and Duro, 2010). In the same vein, it is argued that as the benefits that visitors can acquire within a protected area are related to goods or services not traded in markets. As a result of this, it is possible to use economic valuation techniques on the environment to estimate the economic value of these protected areas (Amoako-Touffour and

Martínez-Espiñeira, 2012). Taking this into account, fire prevention plans have a social impact, the public prefers the economic valuation methods that have been employed as a tool to unveil social preferences for fire prevention management purposes (Varela and Soliño, 2015). Some methods for evaluating environmental goods have recently evolved, among which the travel cost method (TCM) is distinguished (Shammin, 1999).

The TCM has been applied to a variety of recreational activities, including hunting, fishing and forest recreation (Ward and Beal, 2000). It is one of the most widely used methods to assess tourism goods and services or scenic resources (Machín and Casas, 2006). This method is well-established as a technique to value the non-market benefits that arise from outdoor recreational activities in both developed and developing countries (Hanley and Spash, 1993).

The TCM has been extensively applied in Spain to assess natural parks. Riera (2000) applied this method to assess the “Mondragó Park”; Castillo et al. (2008) evaluated the “Sierra de María - Los Velez Natural Park” using the TCM; Creel and Farrell (2008) conducted eleven valuations of recreational parks located in Catalonia (NE Spain) with the same method. Martin et al. (2009) applied the TCM to assess the “Doñana Natural Park”; Farré and Duro (2010) estimated the value of the recreational use of the “Ebro Delta” by using the TCM and dividing the origin of all visitors into seven areas; Samos and Bernabeu (2013) used the TCM to estimate the economic value of the recreational use of a protected natural area in Castilla-La Mancha.

In Africa, Mugambi and Mburu (2012) estimated the benefits of tourism in the “Kakamega” forest in Kenya by the TCM, while Musamba et al. (2012) estimated the recreational value of wetlands around “Lake Victoria” in Tanzania using the same method.

In India, Sathya and Sekar (2012) determined the value of the benefits generated by mangroves located on the southeast coast by applying the TCM. In Indonesia, Hakim et al. (2011) applied the TCM to assess nature. In the USA, Edwards et al. (2011) found out the economic value of sighting migratory shore birds in “Delaware Bay”. Similarly, Prayaga et al. (2010) interviewed 311 fishermen to obtain the value of recreational fishery at the

“Great Barrier Reef” in Australia by the TCM. In China, Li et al. (2009) used a sample of 385 individuals to apply the TCM and to establish the recreational value of the “Qingdao Park”. Merlo and Boschetti (2001) used the TCM to include non-market values in a stepwise approach to the environmental accounting of forest and agricultural enterprises. In Mexico, Gómez and Ivanova (2013) used a sample of 133 surveys to assess the “Cabo del Este” placed in “Baja California” by the TCM. Hernández-Trejo et al. (2012) conducted 200 interviews with national and foreign visitors to the city of “La Paz” to assess the value of the recreational benefits provided by the aquatic biodiversity of “Holy Spirit Archipelago National Park”, in Baja California Sur. Flores and Nieto (2011) investigated the value of the recreational use of “Deer Island Bay” positioned in Mazatlan by conducting weekly counts of the number of tourists who entered the island in 2010. Besides in 2010, the Veracruz Reef System National Park was valued economically by Arceo et al. (2010) using the TCM. Along the same line, Hernández-Trejo et al. (2009) estimated the recreational value of the “Loreto Bay National Park” in California according to water sports and fishing with the TCM. Gandara (2006) estimated the economic value of the recreational services of the “Chipinque Ecological Park”, situated in the metropolitan area of Monterrey, Nuevo Leon, by the TCM. Finally, Martinez (2005) calculated the consumptive value of “Desierto de los Leones”, located in the city of Mexico, and he obtained data from 356 surveys.

Because of this fact, the main objective of the present study was to estimate the recreational benefits generated by the Xcaret park for the total visitors during 2004-2008 period. The secondary objectives were:

- To know the visitors’ number and the travel cost of each one.
- To estimate the demand function with different hypothesis of the data distribution: Normal, Poisson and Negative Binomial and to define the most appropriate one.
- To determinate if this demand function varies every year.

This research is going to start dealing with the explanation of what the Xcaret park is and for what the TCM is used. The rest of this paper is

organised as follows: the next section describes the TCM used to estimate recreational benefits, how to generate the demand curve, and as well as the information sources used. The following section presents the paper's main results and finally the discussions and conclusions.

## **MATERIAL AND METHODS**

### **Material**

The total number of visitors welcomed by the Xcaret park, as well as their places of origin, from 2004 to 2008 and the entry price were provided by the park's management company.

The countries that most visited the park were: Mexico and the USA, which generated about 70% of the total visits for the five study years. The origin zones (states where the trip started) for domestic tourists were 14, with 20 USA states of origin. Visitors from Canada, Spain and UK were also considered. All other tourists (from 9.43% to 16.19%) came from unknown origins, and they were not taken into account in the present study. Finally, 37 places of origin were considered, highlighting a 5-year time horizon, and the database used had 185 observations. Due to the distance travelled by tourists from their places of origin, and also to the data provided by the park's management, the conveyance considered for assessing the cost of the trip was traveling by plane. Besides, visiting the park was not the only reason for the trip; both domestic and foreign tourists visited other local sites apart from the Xcaret park. As it will be explained afterwards, the unavoidable cost of the multi-trips (MTC) of the visitors to "Riviera Maya" was estimated from adding flight costs and the costs invested in flight times. The unavoidable cost of travelling to the Xcaret park (XTC) consisted in adding the trip road cost (TRC) from the tourist hotel to the park, plus the cost of the time spent in the previous ground displacement (TRTC), as well as the cost of park admission (AC) and the time cost of the ride to travel in the park (RPTC).

$$XTC = TRC + TRTC + AC + RPTC \quad (1)$$

Therefore, the total cost of travel attributed to the Xcaret park (TC) is given by the sum of anon-specified percentage ( $W_x$ ) of MTC plus XTC.

$$TC = W_x \cdot (MTC) + XTC \quad (2)$$

Two websites were used to estimate the flight costs from the different domestic and foreign visitors' origins. The origin used in these quotes specified the state's largest city, while the target was always Cancun International Airport. According to the Ministry of Tourism, domestic tourists' average stayed in the region 3 nights, while it was 6 nights on average for foreign visitors.

Most studies estimate the cost of time as a proportion of visitors' salary, and 33% is probably the most widely used ratio (Hellerstein and Mendelsohn, 1993; Englin and Cameron, 1996; Bin et al., 2005; Hagerty and Moeltner, 2005). However, minor fractions of income have been proposed. Parsons (2003) indicates that a recreation demand of 25% is more or less accepted in the literature as the lower limit, and total salary as the upper limit. Nevertheless, neither of these two values has full support. According to Hellerstein and Mendelsohn (1993), Englin and Cameron (1996) and Bin et al. (2005), despite the fact that the literature most frequently uses an income fraction of 1/3, the used range varies between 0 and 1. Another contribution to the subject was made by McKean et al. (1996), who evidenced that the cost of time is less valued for long trips. In the present paper, the cost of time was estimated to be between 25% and 100% of the total labor income earned, and this fraction tends to be smaller for longer trips. The visitors' level of income was estimated from sources that are independent of the park. In the case of foreign tourists' official publications of Census Bureau were consulted, and for the national tourists' official publications of Instituto Nacional de Estadística Geografía e Informática were reviewed.

The cost of the time spent on touring the park was also included, just as several authors have proposed (Parsons, 2003; Cristeche and Penna, 2008).

For this paper, it was estimated at 8 hours in accordance with the park's management. The process of aggregating and weighting needs to determine zonal values, which means that certain determinants of demand, particularly socio-economic variables are not significant (Ward and Bell, 2000). This is why it has been decided to use each state or province provided by the park's management in the present paper as areas of origin. To solve the multi-trips problem, a decision was made to divide the total travel cost between the number of places visited and by assigning the same relative importance to each, as it is suggested by Del Saz (1997).

As the number of sites that tourists visited is unknown, four hypothesis or scenarios were put forward, which assumed that tourists visited between two and seven different places during their stay in "Riviera Maya", and by also assuming it likely that tourists visited at least one place every day and by conferring the same relative importance to each site. A fifth hypothesis was taken into account with varied  $W_x$  weighting (by giving a different relative importance to each site), and it was based on visitors' origins being from 10% to 35% of the total multi-trip costs. Mexican visitors weighted their visit to the Xcaret park with 33% of the total costs generated in the multi-trip, except for visitors from Mexico City and Nuevo Leon, who attributed only 10% of the total costs generated in the multi-trip to their visit to the park. Tourists from USA sources weighed their visit to the park with 35% of the total costs generated in the multi-trip, except for visitors from California and Texas, who attributed only 20% of the total costs.

## **Methods**

The TCM was originally suggested by Hotelling in 1947 to value national parks in the USA. The method was first applied in 1958 by Trice and Wood to estimate the recreational value of an American river. However, Clawson and Knetsch influenced this line of assessment in 1966 when they applied the valuation method to the "Yosemite National Park" in California.

According to Li et al. (2009), the TCM estimates the economic value of a recreational source by calculating the benefits of tourists when they

consume goods and services. It is based on the premise that for tourists to arrive at the site, they must pay transportation, incur other travel expenses, and they must invest time. These authors argue that, according to the fundamental principles of economics and research analyses, a negative correlation exists between the number of visits and the travel costs generated by visiting a natural site. In the same vein, Moons (2003) argues that the basic premise of this method is that the number of visits to the site lowers with increasing travel costs, which is primarily due to the distance traveled. The main goal of the TCM is to analyse the relationship between private goods and services and supplemental environmental goods by obtaining estimates of the use values of ecosystems and sites intended for recreation. In short, this method consists in associating the travel cost the assumed cost of visiting a natural public area. So, it is possible to estimate a demand function, which includes measuring the economic well-being that derives from using the park (Samos and Bernabeu, 2013). Therefore, the TCM assumes there is a weak complementarity ratio between the environmental goods and private goods needed to access it (Del Saz, 1997). It is possible to estimate a demand curve for the number of trips to the site, depending on the travel cost that visitors must incur as an approximate price of the site. Once the generated demand curve is required to estimate consumer surplus (CS) which, according Moons (2003), is the value that the visit actually has for each visitor, it remains above or below what has already been paid to enter the site. Hence the site's recreational value can be deducted from the amount of CS from each visitor who enters the site.

More often than not, the reason for travelling is intended to cover several destinations, which creates an enormous difficulty in separating travel costs between different destinations. Del Saz (1997) suggests that one way to solve the multi-destination travel problem is to equally divide the travel cost among all the visited sites.

The TCM has two modes: the individual mode (ITCM) and the zonal mode (ZTCM) (Riera et al., 2005). The latter uses secondary data from the information collected from all visitors who arrive at the site. It requires identifying the areas of origin of the visitors who travel to the site (Romero, 1997) and, after defining the areas, it is necessary to calculate the average



travel cost of each one (Farré and Duro, 2010). Although the ITCM is preferred to the ZTCM because of the second one offers a weak theoretical foundation in the patterns of behavior of aggregate demand models inconsistencies with the basic theory that the latter presents, the ZTCM can provide useful approximations when data are limited (Parsons, 2003). For this paper, and given the available information, a decision was made to use the ZTCM.

There are conflicting views about travel time; several authors like for example Azqueta (1994) state that the tour cost includes only the cost of the time spent on the trip. Azqueta (1994) mention that the time invested to tour the site generates no opportunity cost in income terms. In contrast, other authors (Amoako-Touffour and Martínez-Españeira, 2012; Samos and Bernabeu, 2013) state that even though time has been intended for recreation, it entails other alternative uses, which means that the time invested in a recreational activity should be considered. On the same subject, McKean et al. (1996) argue that when considering the cost of travel for complementary assets and the cost of time spent at the site being valued, the model's poor specification bias diminishes. Del Saz (1997) indicates that the marginal utility of a good generally depends on the consumed amount of other goods, and therefore recommends including the price of substitute goods in the estimated demand.

What happens in practice is that the real cost of travel time differs from the perceived cost of travel time as a visitor. According to the theory, the cost used to generate the demand curve is the perceived travel time cost as a visitor. There are many ways of conceiving the opportunity cost of the time invested in a recreational activity, in addition to lost work time (Beal, 1995). Yet given the complexity of estimating the cost of time, the value of time for TCM in the recreational demand is estimated mostly by a wage fraction (Parsons, 2003).

The economic theory does not suggest a particular distribution to be applied to recreational travel. Incorrect data processing generates divergent results, which can imply over estimating the site's recreational benefits (Nakatani and Sato, 2010). The non-negative nature of the data suggests using count data techniques to obtain the recreational demand function. So,

given the econometric problems that the TCM presents, the ultimate modification involves estimating the demand function from models of the non-negative discrete dependent variable (Count Data Models - CDM). Poisson and Negative Binomial distributions use non-negative integers.

In the present study, and in agreement with Suaza et al. (2002), the demand curve was estimated with two variables: TC and number of visits. In this way, the demand function to the park is obtained by a regression model that explains the number of visits dealing with the cost of the trip. The classical linear model (CLM) of regression used by De Frutos et al. (2009), estimated by ordinary least squares (OLS), is based on the hypothesis of the normality of both variables and residuals.

In this paper, the demand function would be:

$$Y = \beta_0 + \beta_1 TC + \epsilon \quad (3)$$

Y is the number of visits to the “Xcaret” park, or logarithm of number of visits, and TC is the travel cost associated to the “Xcaret” park and  $\beta$  is the parameter vector.

This hypothesis is not usually found when counting variables are used, which is the case of counting visitors to natural areas. Furthermore, the relationship between the number of visitors and the TC is not linear. Therefore, generalised linear models (GLM) are used, which are an extension of CLM.

A GLM model is specified with three components:

1. The random component that corresponds to dependent variable Y, which follows a distribution: normal, Negative Binomial and Poisson, among others, whose expectation is expressed by  $\mu$ .
2. The systematic component is expressed by  $\eta$  and corresponds to the vector of n components, and each equal:

$$\eta_i = \beta_1 + \beta_2 * X_{2i} + \dots + \beta_p * X_{pi} \quad (4)$$

3. The link function ( $g$ ) that relates the mathematical expectation of variable  $Y$  with the linear estimator is:

$$\eta_i = g(\mu_i) \quad (5)$$

Link functions are monotonic functions (with the inverse):

$$\mu_i = g^{-1}(\beta_1 + \beta_2 * X_{2i} + \dots + \beta_p * X_{pi}) \quad (6)$$

GLM allows different types of data distribution and errors to be specified; e.g.,: Poisson, and Negative Binomial. CDM such as Poisson and Negative Binomial models use an exponential form of the demand function. Estimations of parameters were obtained by maximum likelihood. To evaluate the models setting, the test of likelihood ratio was used with a confidence level or 95%.

Four scenarios were considered where each one attributes different percentages of the MTC (15%, 25%, 33% and 50%) to visit the “Xcaret” park. Also, an additional fifth scenario assigns different percentages of the MTC to visit the “Xcaret” park, which depends on visitors’ places of origin (Mexican visitors with 33%, except from Mexico City and Nuevo Leon with 10%; USA visitors with 35%, except for visitors from California and Texas, with 20%; Canada, UK and Spain visitors with 15%).

Five demand curves were plotted, which corresponded to all five proposed hypothesis (scenarios). In addition, for this, for each scenario four different settings were considered: CLM, log-linear regression, Poisson regression and Negative Binomial regression.

The criterion implemented to make the decision for different settings and scenarios was the Pearson correlation coefficient between the estimated visits in each model (CLM, log-linear, Negative Binomial and Poisson) and scenario and the observed visits. Additionally, the standard errors of models’ parameters, the % of deviance explained by the CDM and the adjusted- $R^2$  in CLM and log-linear model were considered in this study.

With the best scenario and data distribution, two additional approaches were made (see Table 1).

**Table 1. Two temporary models considered**

$X_1$	$X_2$	$X_3$	$X_4$	First model	Second model
0	0	0	0	$Y = \beta_0 + \beta_1 TC$	$Y = \beta_0 + \beta_1 TC$
1	0	0	0	$Y = \beta_0 + \beta_2 + \beta_1 TC$	$Y = \beta_0 + \beta_2 + (\beta_1 + \beta_{12}) TC$
0	1	0	0	$Y = \beta_0 + \beta_3 + \beta_1 TC$	$Y = \beta_0 + \beta_3 + (\beta_1 + \beta_{13}) TC$
0	0	1	0	$Y = \beta_0 + \beta_4 + \beta_1 TC$	$Y = \beta_0 + \beta_4 + (\beta_1 + \beta_{14}) TC$
0	0	0	1	$Y = \beta_0 + \beta_5 + \beta_1 TC$	$Y = \beta_0 + \beta_5 + (\beta_1 + \beta_{15}) TC$

Source: Own elaboration.

In the first one, a time component was included in the model, considering that the variation rate of the Y respect to TC was constant over time:

$$Y = \beta_0 + \beta_1 TC + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \epsilon \quad (7)$$

The second approach allowed this rate to vary over time:

$$Y = \beta_0 + \beta_1 TC + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_{12} TCX_1 + \beta_{13} TCX_2 + \beta_{14} TCX_3 + \beta_{15} TCX_4 + \epsilon \quad (8)$$

Where:

$X_1$ : Indicator variable equal to 1 if the measure was taken over 2005, 0 otherwise.

$X_2$ : Indicator variable equal to 1 if the measure was taken over 2006, 0 otherwise.

$X_3$ : Indicator variable equal to 1 if the measure was taken over 2007, 0 otherwise.

$X_4$ : Indicator variable equal to 1 if the measure was taken over 2008, 0 otherwise.

Finally, CS was obtained. According to Del Saz and Pérez (1999), if someone takes the hope of this distribution you get the number of trips for each travel cost and to obtain a measure of the expected value of the CS, it is necessary to integrate below this demand curve as Hellerstein and

Mendelsohn (1993) demonstrate. In the models which estimate the log visitors’ numbers (log-linear, Poisson and Negative Binomial), CS, according to the TCM, is the negative of the inverse of the TC coefficient (Englin and Shonkwiler, 1995; McKean et al. 1996); namely, the estimate of CS per visitor to the resort is given by:

$$CS = -\frac{1}{\beta_1} \tag{9}$$

**RESULTS**

**Models Specification**

Four different models (CLM, log-linear, Poisson and Negative Binomial) were fitted using the data from five hypothesis. The Pearson correlation coefficients between the estimated and observed value can be seen in Table 2.

As it can be observed in Table 2, the best results were obtained using the data from the fifth scenario. Moreover, concerning the fifth scenario, the highest Pearson correlation coefficient were achieved in the log-linear, Negative Binomial and Poisson models.

**Table 2. Pearson correlation coefficients between estimated and observed visits (or log visits**

Models	Scenario				5
	1	2	3	4	
Linear	1.75%	1.55%	1.41%	1.19%	56.90%
Log-linear	3.10%	2.88%	2.64%	2.14%	61.26%
Negative Binomial	9.48%	6.80%	4.40%	1.40%	60.45%
Poisson	2.26%	2.00%	1.82%	1.55%	61.11%

Source: Own elaboration.

Results of models using the data from the fifth scenario can be seen in Table 3.

Table 3. Results of models using the data from the fifth scenario

Parameter	CLM	Log-linear	Negative Binomial	Poisson
$\beta_0$	87,310.6 (7106.18)	12.1894 (0.276866)	27.9069 (2.87064E-12)	13.1453 (0.002359)
$\beta_1$	-17.7495 (1.89611)	-0.000735919 (0.0000738752)	-0.00112044 (1.04083E-15)	-0.000923773 (7.32548E-7)
Adjusted-R <sup>2</sup>	32.0101	34.806		
Explained deviation			4.0824	45.0823

Source: Own elaboration.

All the coefficients included on the Table 3 were significant at 5%.

The standard error of parameters was lower in CDM than log-linear model. Additionally % of deviance explained by the Poisson model (45.08%) was higher than with the Negative Binomial model (4.08%). Therefore, the Poisson model was chosen:

Visits = exp(13.1453 – 0.00092373 \* TC)

(10)

After fitting the Poisson regression model for the number of visits to the Xcaret park, the two temporary models are shown in Table 4.

Table 4. Adjusted values of the two Poisson regression temporary models

Parameter	First model		Second model	
	Estimation	Standard error	Estimation	Standard error
$\beta_0$	13.7794000	0.0048097	13.4777000	0.0190459
$\beta_1$	- 0.0010221	0.0000008	-0.0010487	0.0000017
$\beta_2$	0.3096620	0.0016097	0.0000180	0.0000026
$\beta_3$	0.0498743	0.0015523	0.0000237	0.0000025
$\beta_4$	- 0.1885730	0.0014895	0.0000289	0.0000024
$\beta_5$	- 0.5579240	0.0015521	0.0000525	0.0000022
$\beta_{12}$	NA	NA	0.363703	0.007908
$\beta_{13}$	NA	NA	0.120349	0.0077018
$\beta_{14}$	NA	NA	-0.101855	0.0074495
$\beta_{15}$	NA	NA	-0.388066	0.0073671
Explained deviation	52.39%		52.40%	

Source: Own elaboration

All the coefficients included on the Table 4 resulted significant at 5%.

In Table 5, demand functions for the Poisson temporary second model for each year are presented.

**Table 5. Demand functions for the Poisson temporary second model for each year**

Year	Model
2004	$\ln(Visits) = 13.4777 - 0.00104865 TC$
2005	$\ln(Visits) = 13.8450 - 0.00103061 TC$
2006	$\ln(Visits) = 13.5980 - 0.00102499 TC$
2007	$\ln(Visits) = 13.3759 - 0.00101978 TC$
2008	$\ln(Visits) = 13.0896 - 0.00099619 TC$

Source: Own elaboration.

**The Consumer’s Surplus**

The average (expected) CS was estimated using the Poisson model [4], which was applied to the total data of the visits made from 2004 to 2008. A value of 1,082 was obtained regardless of the study year:

$$CS = -\frac{1}{\beta_1} = -\frac{1}{-0.00092373} = 1,082 \text{ Mexican pesos}$$

The minimum and maximum expected benefits each year at the 95% confidence level were multiplied by the number of visits recorded to obtain an estimate value of the park in all the previously considered years (see Table 6).

The minimum park value was reached in 2005 and corresponded to 748.5 million Mexican pesos, while the maximum value was generated in 2008 and it corresponded to 1,077 million Mexican.

**Table 6. Annual values of the recreational benefits (\$) generated by the “Xcaret” park for the 2004-2008 period using the fitted simplified Poisson regression**

Year	Annual Value		
	Minimum	Maximum	Estimated
2004	971,741,628	977,858,453	974,790,445
2005	745,673,163	751,313,967	748,482,937
2006	856,710,379	862,708,785	859,699,119
2007	1042,010,370	1048,768,303	1045,378,415
2008	1074,015,516	1080,298,521	1077,147,856

Source: Own elaboration.

**Table 7. Consumer surplus (\$) and confidence intervals for two temporary models**

Year	First model			Second model		
	Estimated	Minimum	Maximum	Estimated	Minimum	Maximum
2004	978.37	976.95	979.81	953.61	950.62	956.61
2005	978.37	976.95	979.81	970.30	966.66	973.97
2006	978.37	976.95	979.81	975.62	972.23	979.04
2007	978.37	976.95	979.81	980.60	977.44	983.78
2008	978.37	976.95	979.81	1003.82	1000.90	1006.76

Source: Own elaboration.

**Table 8. Annual values of recreational benefits generated by “Xcaret” park using two temporary models Poisson regression**

		First Model		Second Model	
		CS	Annual Value	CS	Annual Value
Year	Visits				
2004	1,022,214	\$978.38	\$1,000,111,535.56	\$953.61	\$974,790,444.81
2005	771,394	\$978.38	\$754,714,803.22	\$970.30	\$748,484,680.31
2006	881,183	\$978.38	\$862,129,929.00	\$975.62	\$859,702,390.11
2007	1,066,056	\$978.38	\$1,043,005,577.26	\$980.60	\$1,045,377,799.93
2008	1,073,045	\$978.38	\$1,049,843,460.05	\$1,003.82	\$1,077,148,397.05

Source: Own elaboration.

If a time component was included in the model (expressions [7] and [8]), in Table 7 appears the estimation of the CS and an approximated confidence interval for this superavit for both models.



When the number of visits is considered and multiplied by the CS, estimated values of the park can be obtained (Table 8).

In the first model, CS is constant over the five years of this study. However, if the second model is analyzed an increasing trend in CS is observed. The estimated annual value generated for “Xcaret” park in 2008 is 2% higher in the second model than the first model.

## DISCUSSION

GLM obtained better results than CLM, which agrees with Devokta et al. (2005), Prayaga et al. (2010), Nakatani and Sato (2010) and Amoako-Touffour and Martínez-Espíñeira (2012). The Poisson model obtained the best fit. It should be claimed that this study used the data that corresponded to a 5-year time horizon to avoid taking annual approximations.

The present work estimated that the Poisson model had an explanatory power of 45.08%. Other works that have used the TCM to assess the recreational benefits of other sites in Mexico and the rest of the world have obtained regression models with an explanatory power from 25% to 83% (Shammin, 1999; De Frutos *et al.*, 2009; Li *et al.*, 2009; Hakim *et al.*, 2011; Mugambi and Mburu, 2012; Sathya and Sekar, 20012; Gómez and Ivanova, 2013). A CS of 1,082 Mexican pesos was obtained, independently of the study year which was estimated in agreement with Englin and Shonkwiler (1995), McKean et al. (1996) and Prayaga et al. (2010) by calculating the inverse of the coefficient of the travel cost from the fitted Poisson model. However, CS does not take into account the effect that the economic evolution of the countries of origin could have, or possible climatological incidents in a given year. Visitors’ number depends on these effects and for this reason in the values of recreational benefits generated by “Xcaret” park.

When time is involved in estimation, the deviation explained increased from 45.8 to 52.4%. Also, with these models, trends in the CS can be identified. During the first years, the CS in the second model is lower than the first. On the contrary, in the last years it occurs the opposite. Therefore,

the second model can identify an increase of CS in all the years. The total increment was 5.3% and 1.3% by year.

## CONCLUSION

This study showed that approximately 69% of all visits made to the “Xcaret” park were generated by visitors from Mexico and the USA, possibly because they are closed. Moreover, the park is worthy every time more by the Mexican population. The data from 2008 also revealed that domestic tourism has become important to the park as it generated 43.5% of total visits.

Given the dependence on the park value for the number of visits, in 2005 the lowest value was obtained in all the temporal models due to the lower visitors’ number caused by climatological accidents. However, it can be remarked that the temporary model shows an annual increase in the CS every year considered, indicating that the park value for visitors grows over time. This should be taken into account by the managers and administrators of the park in order to ensure their sustainability. Nevertheless, it should be needed consider an extension of the number of years to validate this growth.

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*Chapter 7*

**THE SPANISH ROYAL DECREE-LAW 18/2017  
ON NON-FINANCIAL INFORMATION:  
IS THE FIRM SIZE A  
DETERMINING FACTOR?**

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**ABSTRACT**

Reporting non-financial information has become a priority for companies that expect to satisfy different stakeholders. Responsible behaviours and create awareness of its need in the society stands out as a fundamental element for the shift towards a sustainable global economy. This paper analyzes the effect of the economic and financial profile of the firms and the entry into force of Spanish Royal Decree-Law 18/2017 on the probability and quality of reporting non-financial information in a sample of Spanish companies. In addition, we pay special attention to the size factor because the larger companies traditionally report more about corporate social responsibility. The results show that the entry into force

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of the Royal Decree-Law has led to an increase in non-financial information reported by companies as well as its quality. Besides, it has supposed a greater effort for smaller companies that presented deficiencies in non-financial reporting before the Royal Decree-Law.

**Keywords:** corporate social responsibility, non-financial information, Spanish Royal Decree-Law 18/2017, regression model, logistic model

## INTRODUCTION

Until the 1950s (Correa, 2007), information users based their decision-making on financial information. Starting in the 1970s, the need to differentiate non-financial information from financial information began to increase, and the idea of introducing a socially responsible policy in business is becoming increasingly popular. In the 1980s the idea of sustainable companies, which can grow economically while taking care of the environment and collaborating with society, began to develop. During that decade, the importance of non-financial information increases (Freeman, 1984), and although there is no obligation to report it, there is a growing awareness and pressure on the part of the society in a way that companies are encouraged to develop a corporate social responsibility policy. It was not until the 1990s that non-financial information began to become more important (Archel, 2003). Since 2000, and with the introduction of the first guide to the Global Reporting Initiative (GRI), the growth of non-financial information is exponential.

Disclosure of non-financial information brings benefits to both companies and stakeholders and society. Freeman (1984) introduced the concept of non-financial information and supported the idea that, since the company interacts day by day with its various stakeholders, the role of the non-financial report is keep the stakeholders informed. According to Freeman, stakeholders use this information to collaborate or interact more or less with a company, so the more the company answers the questions of the interested parties the more favorable the actions of the interested parties to the company. In the line of stakeholders, more recently, we come across

Lokuwaduge's theory (Heenetigala, 2017) which claims that companies can use non-financial information to influence and even manipulate stakeholders. On the other hand, Calace et al. (2017) determine that disseminating and providing such a non-financial report is essential to manage the shift towards a sustainable global economy, combining social justice and environmental protection.

The European Parliament and of the Council published in 2014 the Directive 2014/95/EU is (amendment to Directive 2013/34/EU). In Spain this directive is transposed in the Royal Decree-Law 18/2017 (RDL 18/2017), which amends several articles contained in the Commercial Code, the Law on Capital Companies and the Law on Auditing, which obliges companies that comply some characteristics to report and submit a section on non-financial information.

Historically, larger companies have been the first to apply financial and non-financial information transparency criteria (Hernández, 2017). Different authors have identified the size of the company as a determining factor in the decision to report non-financial information as well as in the content of the reports (Bonson and Bednarova, 2015; Rooster and Christensen, 2011).

Regarding the relationship between sustainability reports and size or industry, Gallo and Christensen (2011) conducted a study comparing sustainability reports in a sample of 911 North American companies showing that both size and industry are factors that have a significant impact on reporting.

Bonsón and Bednarova (2015) analyse corporate social responsibility reporting in Euro area countries and highlight the scarcity of reports related to social indicators in Member States' countries compared to environmental and corporate governance indicators, due to the lack of regulation in that dimension. The study shows that large companies, which are socially more visible and exposed to public opinion, tend to show a greater scope of non-financial information.

In the case of Spain, Castilla et al. (2018) analyse the impact of the implementation of the RDL 18/2017 on companies belonging to IBEX 35 index. We find evidence that the majority of firms use the Global Compact

and GRI guide. On the other hand, almost 50% of companies audit the report. The results show that companies that issue a separate report have a higher quality of non-financial information than those that include such information as part of the annual report. However, it should be noted that Castile et al. (2018) do not take into account the influence of the size of the company.

Thus, the main objective of this paper is to estimate the impact of the implementation of the Royal Decree-Law 18/2017 on Spanish companies and if analyse if the size of the company is a determining factor affecting that impact.

The paper is structured as follows. After this introduction, the second section addresses the regulatory framework of non-financial information in the European Union and, in particular, in Spain. The third section presents the sample used in the study. Section four shows and discusses the results of the linear regression and logistics models. Finally, the main conclusions are presented.

## **REGULATORY BACKGROUND**

According to Deloitte's report (2017) about 50% of the countries do not have regulation on non-financial reporting. When considering countries that have regulations, only 60% cover all dimensions (social, environmental, anti-corruption issues, etc.), more than 80% of them have mandatory regulation and 30% demand this information to be verified.

Europe tops the ranking with regard to regulation of non-financial information, as more than 80% of the countries have regulations on this matter and 75% of the regulations cover all dimensions.

At European level, Directive 2013/34/EU dealt with the non-reports to be submitted, but in a very limited way and on a voluntary basis.

Currently the European regulatory framework is ruled by Directive 2014/95/EU (amending Directive 2013/34/EU) legislating on the disclosure of non-financial information in large companies in EU countries, with the objective of increasing the transparency and sustainability.

Directive 2014/95/EU relates to GRI (The Global Reporting Initiative) in the sense that while it is not based on that international framework, it suggests, among others, GRI4 to the countries adapting the rules to their jurisdiction.

**Table 1. Transposition of Directive 2014/95/EU by Member States**

<b>Transposition of Directive 2014/95/EU</b>				
Countries	Scope	Verification	Sanctions for non-compliance	“Safe Harbour” Principle
Austria	According to the Directive	Voluntary Audit	Listed in the Business Code	YES
Belgium	Greater restriction: Turnover greater than 34M and total assets greater than 17M	Third Party verification	Specified in the Corporate Law	YES
Bulgaria	According to the Directive	Third Party verification	Between 250 and 1,500 euros for those responsible, and between 1,000 and 5,000 for the organisation.	YES
Chipre	According to the Directive	Third Party verification	Specified in the Corporate Law	YES
Croatia	According to the Directive	Voluntary Audit	Between 1,500 and 15,000 euros	YES
Czech Republic	According to the Directive	Voluntary Audit	As specified in the Accounting Code	YES
Denmark	No. of employees: 250	Third Party verification	Yes, in the Danish Financial Statements Act	NO
Estonia	According to the Directive	Voluntary Audit	No	NO
Finland	According to the Directive	Voluntary Audit	Yes, in the Finnish Accounting Act	YES
France	According to the Directive	Third-party verification if turnover or asset exceeds 100 million	May be imposed if an interested party requests information and is not available	NO
Germany	According to the Directive	Voluntary Audit	The highest between 10 million or 5% of turnover	YES

**Table 1. (Continued)**

<b>Transposition of Directive 2014/95/EU</b>				
Greece	It includes: Companies with more than 10 employees, turnover > 700,000 and/or assets > 350,000: Report on environmental performance and employees	Voluntary Audit	Both for lack of unjustified information and for delay in submitting it.	YES
Hungary	According to the Directive	Voluntary Audit	Specified in the Civil Code	YES
Ireland	According to the Directive	Voluntary Audit	Penalty of € 5, 000 and up to 6 months' imprisonment	YES
Italy	According to the Directive	Third Party verification	Penalties from 20,000 to 150,000 euros.	YES
Latvia	According to the Directive	Third Party verification	The largest between 10% of turnover or 142,300 euros	YES
Lithuania	According to the Directive	Voluntary Audit	Specified in the Code of Administrative Offences	YES
Luxembourg	According to the Directive	Voluntary Audit	Economic sanctions in the event of non-compliance	YES
Malta	According to the Directive	Voluntary Audit	1,164 euros to those responsible	YES
Netherlands	According to the Directive	Third Party verification	No	YES
Poland	According to the Directive	Voluntary Audit	Listed in the Accounting Act	YES
Portugal	According to the Directive	Voluntary Audit	From 50 to 1500 to the people responsible	YES
Rumania	According to the Directive	Third Party verification	Accounting Law 82/1991	YES
Slovakia	According to the Directive	Voluntary Audit	Listed in the Accounting Act	NO
Slovenia	According to the Directive	Voluntary Audit	In the Corporate Law	YES
Spain	According to the Directive	Voluntary Audit	No	YES
Sweden	No. of employees: 250	Voluntary Audit	It is contained in the Annual Report Act	YES
United Kingdom	According to the Directive	Third Party verification	To be determined on a case-by-case basis	YES

The new Directive narrows its scope, being addressed to firms with the greatest impact on society. Hence, companies in the public interest and with a number of employees greater than 500, will mandatory have to report non-financial information in the management report. Each Member State shall transpose the Directive into its legal system, being able to extend or harden it, but never reduce the level of restriction.

In general, Member States have adopted completely the Directive with even more restrictive conditions, with the exception of countries such as Finland, Slovenia, Austria, Hungary and Slovakia which have maintained the conditions of the Directive. With reference to the countries that introduced more restrictive measures, we can highlight Greece which has included companies with lower turnover, or countries such as Sweden and Denmark that have determined the number of employees at 250. Others, including Cyprus, France, the United Kingdom or Italy, include verification by a third party.

In the Spanish case, the Institute of Accounting and Auditing (ICAC), was responsible for the transposition, through the development of RDL 18/2017.

The Spanish companies affected by the RDL 18/2017 will be entities in the public interest that also meet the following characteristics: (i) average number of employees greater than 500, (ii) meet two of the following circumstances during two financial years (ii.a) Total assets over 20,000,000 euros, (ii.b) Net sales over 40,000,000 euros and (ii.c) Average number of employees greater than 250.

The state of non-financial information must contain information on social, environmental, human rights and anti-corruption issues.

The non-financial statement can be submitted as part of the management report within the annual report or in a separate report. The RDL does not include the obligation to submit the report to external auditing. On the other hand, RDL 18/2017 specifies that key indicators for comparability between companies and sectors should be included.

Article 2 of Directive 2014/95/EU contained a mandate to the European Commission to develop non-binding guidelines on the methodology applicable to the presentation of non-financial information, including key

indicators of non-financial results, general and specific to the industry. The non-financial reporting guidelines were thus adopted by the Communication Commission (2017/C 215/01). In addition, in Spain were previously some guides such as the one developed by the National Securities Market Commission (CNMV) or the integrated information model of the Spanish Association of Accounting and Business Administration (AECA).

According Blasco and King (2017), about 80% of the largest Spanish companies that report non-financial information prepared it based on the GRI standard. For this type of company, the adaptation of the regulations is easier, in the case of those that do not use any reference framework the transposition will be more tedious.

Subsequently, Law 11/2018 entered into force on January 01, 2018. This Law replaces DR 18/2017 and extends its scope since it reduces the number of workers from 500 to 250 as of 2021. In addition, the new Law is more specific in terms of the content of the information to be detailed and eliminates the opt-out clause.

## **METHODS**

This work analyses a sample of 40 Spanish companies under the scope of RDL 18/2017, considering two groups of companies of different sizes (large and small companies). The group of large companies, includes the 20 largest companies that meet the selection criteria (with an average total assets of 162,429 million euros and an average turnover of 12,425 million euros). The group of small companies considers 20 companies that, despite meeting the selection criteria, have a smaller size and average total assets of 10,426 million euros and an average turnover of 593 million euros. Companies from the main sectors have been chosen, guaranteeing their representation in both groups of companies.

Financial data (in millions of euros) have been downloaded and data on non-financial information have been hand-collected from the company management report.



The data considered correspond to the years 2016 and 2017, which are the year before and after the entry into force of RDL 18/2017. The final data matrix has 70 observations (40 companies x 2 years, minus the observations with negative equity, and a company evidenced as an outlier in the models).

The analyses consider different variables of financial nature, as well as variables of non-financial information. The financial variables considered are Return on Assets (ROA) calculated as  $\text{Net income} / \text{Total Assets}$ , Return on Equity (ROE) calculated as  $\text{Net income} / \text{Total Equity}$ , the natural logarithm of Total Assets (LNASSETS), the LEVERAGE calculated as  $\text{Total Liabilities} / (\text{Total Liabilities} + \text{Total Equity})$ .

We defined some dummy variables relating to non-financial information as follows. The GRI variable will take the value one when the company follows the GRI standard to report non-financial information and zero in any other case. The variables INF\_ENVIRON, INF\_SOCIAL, INF\_HUMAN and INF\_CORRUPTION will take the value one when the company reports information regarding the environmental, social, human rights and corruption dimension, respectively, in its non-financial information report and zero in any other case. The variables IND\_ENVIRON, IND\_SOCIAL, IND\_HUMAN and IND\_CORRUPTION will take the value one when the company includes specific indicators to the environmental, social, human rights and corruption dimension, respectively, in its non-financial report and zero in any other case.

Based on the information variables and financial indicators, two other quantitative variables are computed that are intended to be an indicator of the quality of the information reported based on the number of dimensions covered by the report or the number of dimensions reporting indicators. Thus, the variable Q\_INF is calculated as the sum of the variables INF\_ENVIRON, INF\_SOCIAL, INF\_HUMAN and INF\_CORRUPTION, which will take values between 0 and 4, with 4 being the value indicating that 4-dimensional information is reported. The variable Q\_IND is calculated as the sum of the variables IND\_ENVIRON, IND\_SOCIAL, IND\_HUMAN and IND\_CORRUPTION, ranged between 0 and 4, with 4 being the value indicating that indicators are reported in the 4 dimensions.

**Table 2. Descriptive statistics of the sample**

Variable	Panel A: Small firms				
	N	Mean	Std. Dev.	Min	Max
RD	30	0.433	0.504	0	1
TOTAL_ASSETS	30	13738.48	22195.07	77.45	57270.02
TOTAL_EQUITY	30	1213.029	1788.391	30.93	5491
NI	30	88.312	162.061	-77.28	604.87
LEVERAGE	30	0.699	0.258	0.037	0.948
ROA	30	0.004	0.079	-0.164	0.319
ROE	30	0.094	0.455	-0.713	2.238
GRI	30	0.167	0.379	0	1
Q_INF	30	1.9	1.918	0	4
Q_IND	30	0.2	0.551	0	2
INF_ENVIRON	30	0.567	0.504	0	1
INF_SOCIAL	30	0.467	0.507	0	1
INF_HUMAN	30	0.433	0.504	0	1
INF_CORRUPTION	30	0.433	0.504	0	1
IND_ENVIRON	30	0.1	0.305	0	1
IND_SOCIAL	30	0.1	0.305	0	1
IND_HUMAN	30	0	0	0	0
INF_CORRUPTION	30	0	0	0	0
	Panel B: Large firms				
	N	Mean	Std. Dev.	Min	Max
RD	40	0.5	0.506	0	1
TOTAL_ASSETS	40	209734.7	404178.2	10129.77	1740776
TOTAL_EQUITY	40	36755	83215.08	872.88	409734
NI	40	1546.382	1718.416	-203.49	8207
LEVERAGE	40	0.745	0.161	0.332	0.94
ROA	40	0.03	0.036	-0.019	0.164
ROE	40	0.098	0.085	-0.233	0.252
GRI	40	0.525	0.506	0	1
Q_INF	39	3.359	1.135	0	4
Q_IND	40	1.35	1.21	0	4
INF_ENVIRON	40	0.95	0.221	0	1
INF_SOCIAL	39	0.846	0.366	0	1
INF_HUMAN	40	0.85	0.362	0	1
INF_CORRUPTION	40	0.675	0.474	0	1
IND_ENVIRON	40	0.55	0.504	0	1
IND_SOCIAL	40	0.525	0.506	0	1
IND_HUMAN	40	0.2	0.405	0	1
INF_CORRUPTION	40	0.075	0.267	0	1

On the other hand, we consider the dummy variable RD, which takes the value one when the observation refers to the year 2017, after the entry into force of RDL 18/2017, and zero in any other case. The dummy variable SMALL takes the value one when the observation belongs to a firm classified as small, and zero in any other case.

As noted in Table 2, companies with negative total equity that have been removed from the final data matrix correspond to the small firms' group. In the final sample, 43% of the observations belong to 2017, after the entry into force of RDL 18/2017. Small and large firms have a similar leverage LEVERAGE and ROE, but small businesses have a substantially smaller average ROA than large ones.

Paying attention to the proportion of observations that follow the GRI, we notice that 52% of large companies follow the GRI while only 16.7% of small ones do. It is also noteworthy the difference between large and small firms in terms of the average Q\_INF and Q\_IND.

It should be noted that the average for information and indicator variables for different dimensions is always higher in large companies than in small ones. In particular, no small company reports human rights or corruption indicators (IND\_HUMAN, IND\_CORRUPTION) either before or after the entry into force of RDL 18/2017. Therefore, descriptive statistics (Table 2) seem to indicate a possible effect of the firm size on the content of the non-financial report.

According to Table 3, Q\_INF is positive significantly correlated with RD, suggesting that after the entry into force of RDL 18/2017 the firms increase the number of dimensions included in the report. On the other hand, Q\_IND is negative significantly correlated with SMALL showing a direct and negative relationship between the size and reporting indicators of the different CSR dimensions. Finally, note that as ROE and ROA are highly correlated they are included separately in the models in order to avoid collinearity problems (these potential collinearity problems do not exist in the case of the interactions).

**Table 3. Correlation matrix of quantitative variables**

	RD	SMALL	LEVE- RAGE	ROA	ROE	GRI	Q_INF	Q_IND
RD	1.00							
SMALL	-0.07	1.00						
	(0.59)							
LEVERAGE	0.02	-0.11	1.00					
	(0.85)	(0.36)						
ROA	0.15	-0.22	0.01	1.00				
	(0.23)	(0.07)	(0.92)					
ROE	0.14	-0.01	0.12	0.85	1.00			
	(0.24)	(0.96)	(0.32)	(0.00)				
GRI	0.34	-0.37	0.09	0.02	-0.06	1.00		
	(0.00)	(0.00)	(0.47)	(0.86)	(0.65)			
Q_INF	0.73	-0.43	0.05	0.25	0.14	0.38	1.00	
	(0.00)	(0.00)	(0.71)	(0.04)	(0.26)	(0.00)		
Q_IND	0.32	-0.51	-0.01	0.07	-0.02	0.52	0.43	1.00
	(0.01)	(0.00)	(0.96)	(0.55)	(0.84)	(0.00)	(0.00)	

P-value indicated between brackets.

## RESULTS

### Probability of Reporting According to GRI

In this section we deal with the probability that the companies follow the GRI standard when reporting non-financial information. We compute two different models, one considering the interaction between financial variables and the dummy variable SMALL (Model 1) and another considering the interaction of financial variables and RD (Model 2). Both logistic models result globally significant, but Model 2 explains a larger proportion of variability of GRI (pseudo R<sup>2</sup> = 0.31, Table 4).

As regards to Model 1, RD evidences a positive significant relation with GRI. In other words, after the entry into force of the RDL the companies have a higher probability of reporting their non financial information according to the GRI.

**Table 4. Logistic models for GRI**

	Model 1			Model 2		
	Coef.	z	P>z	Coef.	z	P>z
<b>RD</b>	<b>2.348</b>	3.050	<b>0.002</b>	4.281	1.120	0.264
<b>RD*SMALL</b>	-1.413	-1.010	0.312	-0.378	-0.210	0.834
<b>SMALL</b>	-2.386	-0.560	0.574	-1.094	-0.880	0.379
<b>LEVERAGE</b>	-1.324	-0.580	0.559	2.860	1.040	0.299
<b>LOGASSETS</b>	0.342	0.540	0.590	0.428	0.870	0.386
<b>ROE</b>	<b>-6.842</b>	-1.710	<b>0.088</b>	<b>-7.003</b>	-1.920	<b>0.054</b>
<b>SMALL*LEVERAGE</b>	1.000	0.290	0.774	-	-	-
<b>SMALL*LOGASSETS</b>	0.119	0.130	0.899	-	-	-
<b>SMALL*ROA</b>	-6.990	-0.400	0.689	-	-	-
<b>SMALL*ROE</b>	7.227	1.450	0.148	-	-	-
<b>RD*LEVERAGE</b>	-	-	-	<b>-9.450</b>	-2.250	<b>0.025</b>
<b>RD*LOGASSETS</b>	-	-	-	1.011	1.000	0.319
<b>RD*ROA</b>	-	-	-	-20.834	-1.410	0.159
<b>RD*ROE</b>	-	-	-	<b>10.929</b>	2.440	<b>0.015</b>
<b>CONS</b>	-1.048	-0.290	0.774	-4.651	-1.740	0.082
<b>Pseudo R2</b>	0.247			0.310		

ROE is negatively significant at 10% in Model 1 and 2 (Table 4). This effect could be explained by two different reasonings: on one hand, the more profitable the firm the lower the efforts needed when reporting financial information; on the other hand, the most profitable companies have their own standards and formats for reporting non-financial information and do not need to follow external guidelines as GRI. However, after the entry into force of the RDL this effect decreases (RD\*ROE) maybe as consequence of the suggestion of GRI in the European Directive.

In addition, Model 2 evidences that after the RDL, Leverage has a negative effect on the probability of reporting according to GRI (RD\*LEVERAGE), understood as the more leveraged the company the less probability to report non-financial information following the GRI suggestions.

As a robustness check, all models are computed including ROA instead of ROE, however the results does not improve and ROA never turns significant.

## Analysis of the Content of Non-Financial Information

In this section, we consider the content of the non-financial information reported in the sense of the different dimensions that should be covered: environmental, social, human rights and corruption.

First, we compute two linear regression models for the dependent variable Q\_INF. Model 1 considers the interaction of the financial variables with the dummy variable SMALL, while Model 2 considers the interaction of the financial variables with the dummy variable RD, analyzing the possible change of the effect of the financial characteristics of the firm after the entry into force of the RDL.

Secondly, according to Bonsón and Bednarova (2015), it is expected that environmental may be the CSR dimension most reported by the companies. Hence, we develop an specific logistic model for the probability of reporting environmental information (dependent variable INF\_ENVIRON). The three models result globally significant.

**Table 5. Linear regression models for Q\_INF**

	Model 1			Model 2		
	Coef.	z	P>z	Coef.	z	P>z
RD	<b>1.395</b>	3.910	<b>0.000</b>	<b>2.423</b>	2.040	<b>0.046</b>
RD*SMALL	<b>2.287</b>	5.840	<b>0.000</b>	<b>1.916</b>	3.260	<b>0.002</b>
SMALL	-1.376	-1.070	0.288	<b>-1.916</b>	-3.260	<b>0.002</b>
LEVERAGE	-0.693	-0.660	0.509	-0.636	-0.780	0.441
LOGASSETS	0.305	1.200	0.233	0.331	1.180	0.241
ROE	-0.914	-0.450	0.652	-0.432	-0.410	0.685
SMALL*LEVERAGE	0.643	0.580	0.566	-	-	-
SMALL*LOGASSETS	-0.318	-1.180	0.243	-	-	-
SMALL*ROA	2.732	1.380	0.173	-	-	-
SMALL*ROE	0.515	0.250	0.802	-	-	-
RD*LEVERAGE	-	-	-	0.636	0.780	0.441
RD*LOGASSETS	-	-	-	-0.331	-1.180	0.241
RD*ROA	-	-	-	0.000	1.000	0.320
RD*ROE	-	-	-	0.432	0.410	0.685
CONS	1.786	1.450	0.153	1.577	1.330	0.189
R2	0.814			0.813		

As regards to the effect of the RDL, the variable RD turns positively significant in Model 1 and 2 (Table 5). This result evidences that the RDL has had a positive effect on increasing the dimensions reported in the CSR reports of the companies. On the other hand, Model 2 evidences that previously to the entry into force of RDL, small companies tend to report less CSR dimensions than large companies. However as shown by the interaction RD\*SMALL, after the RDL, the small companies smooth the differences with the large firms.

In Table 6 we present a logistic model showing the effect of the main characteristics of the companies and the size effect on the probability of reporting environmental information (dependent variable INF\_ENVIRON).

**Table 6. Logistic model for INF\_ENVIRON**

	Coef.	z	P>z
<b>SMALL</b>	9.552	1.210	0.225
<b>LEVERAGE</b>	-3.188	-1.230	0.220
<b>LOGASSETS</b>	<b>3.412</b>	2.390	<b>0.017</b>
<b>ROE</b>	-6.863	-0.650	0.514
<b>SMALL*LEVERAGE</b>	2.684	0.690	0.493
<b>SMALL*LOGASSETS</b>	<b>-3.429</b>	-2.190	<b>0.028</b>
<b>SMALL*ROA</b>	14.853	1.120	0.264
<b>SMALL*ROE</b>	5.425	0.500	0.614
<b>CONS</b>	-8.783	-1.140	0.253
<b>Pseudo R2</b>	0.298		

As regards to report environmental information, the size of the company turns significant as suggested by LOGASSETS. Hence, in general, as more assets has a company the larger the probability of reporting environmental information. However, that effect is eliminated when we focus on small companies (SMALL\*LOGASSETS).

Note that from the RDL all the companies in the sample report environmental information. Therefore, this variable is not considered in the model.

The models for the other 3 CSR dimensions are not significant, as one would expect according to Bonsón and Bednarova (2015).

All models have been replicated including variable ROA instead of ROE, however the results does not improve and ROA never turns significant.

## Reporting of Non-Financial Information Indicators

In this section, we focus on the quality of the information reported for the different CSR dimensions. We use as a proxy of the quality the number of CSR dimensions that report indicators (Q\_IND). Hence, we compute linear regression models for the dependent variable Q\_IND, considering the interaction of the financial variables with the dummy variable SMALL (Model 1) and the interaction of the financial variables with the dummy variable RD (Model 2). The two models result globally significant.

**Table 7. Linear regression models for Q\_IND**

	Model 1			Model 2		
	Coef.	z	P>z	Coef.	z	P>z
RD	<b>0.985</b>	2.970	<b>0.004</b>	0.965	0.690	0.494
RD*SMALL	-0.609	-1.480	0.143	-0.417	-0.570	0.570
SMALL	0.734	0.430	0.671	<b>-0.535</b>	-2.180	<b>0.033</b>
LEVERAGE	-1.553	-1.480	0.144	<b>-0.876</b>	-1.910	<b>0.062</b>
LOGASSETS	0.572	1.660	0.102	0.279	1.540	0.130
ROE	0.117	0.050	0.961	-0.527	-1.040	0.305
SMALL*LEVERAGE	1.387	1.180	0.242	-	-	-
SMALL*LOGASSETS	-0.530	-1.370	0.175	-	-	-
SMALL*ROA	-3.283	-0.850	0.398	-	-	-
SMALL*ROE	0.223	0.090	0.927	-	-	-
RD*LEVERAGE	-	-	-	-1.838	-1.250	0.218
RD*LOGASSETS	-	-	-	0.308	0.710	0.478
RD*ROA	-	-	-	-10.924	-1.270	0.209
RD*ROE	-	-	-	<b>2.416</b>	1.690	<b>0.097</b>
CONS	-0.739	-0.450	0.658	0.235	0.370	0.710
R2	0.422			0.436		



As regards Model 1, a positive effect of the RDL is shown. We can conclude that after the RDL the firms increase the quality of their information in the sense that they report indicators for more CSR dimensions.

On the other hand, Model 2 states that there is an existing negative significant difference between small and large companies (Table 7) as small companies tend to report indicators for less CSR dimensions. Leverage also turns negatively significant, suggesting that more leveraged firms report the non-financial information with less quality. In addition, after the RDL the more profitable the company the more complete the information reported in terms of including CSR indicators (interaction RD\*ROE).

Secondly, we develop an specific logistic model for the probability of reporting indicators for the environmental information (dependent variable IND\_ENVIRON, Table 8). The logistic model results globally significant. In addition, according to Bonsón and Bednarova (2015), the models for the other 3 CSR dimensions result non-significant.

**Table 8. Logistic model for IND\_ENVIRON**

	Model 1			Model 2		
	Coef.	z	P>z	Coef.	z	P>z
<b>RD</b>	1.073	1.600	0.109	-2.834	-0.550	0.580
<b>RD*SMALL</b>	<b>24.205</b>	5.530	<b>0.000</b>	<b>18.603</b>	5.240	<b>0.000</b>
<b>SMALL</b>	<b>-27.992</b>	-5.740	<b>0.000</b>	<b>-20.069</b>	-6.080	<b>0.000</b>
<b>LEVERAGE</b>	-3.033	-1.200	0.231	-3.401	-0.930	0.351
<b>LOGASSETS</b>	0.266	0.430	0.664	-0.152	-0.190	0.850
<b>ROE</b>	-4.682	-1.110	0.269	-5.996	-1.280	0.199
<b>SMALL*LEVERAGE</b>	-4.335	-0.970	0.332	-	-	-
<b>SMALL*LOGASSETS</b>	1.219	1.080	0.278	-	-	-
<b>SMALL*ROA</b>	<b>-68.683</b>	-3.050	<b>0.002</b>	-	-	-
<b>SMALL*ROE</b>	<b>14.702</b>	2.610	<b>0.009</b>	-	-	-
<b>RD*LEVERAGE</b>	-	-	-	-3.957	-0.840	0.400
<b>RD*LOGASSETS</b>	-	-	-	1.432	1.260	0.208
<b>RD*ROA</b>	-	-	-	<b>-32.654</b>	-2.170	<b>0.030</b>
<b>RD*ROE</b>	-	-	-	<b>10.931</b>	2.070	<b>0.038</b>
<b>CONS</b>	1.124	0.380	0.701	3.531	0.820	0.414
<b>pseudo R2</b>	0.333			0.343		

As regards to the size of the firm, SMALL result negatively significant indicating that small firms have smaller probability to report environmental indicators. However, after the RDL that size effect is smoothed ( $RD*SMALL$ ) suggesting that small firms have performed a big effort to adapt to the RDL. Those size effects are confirmed by Models 1 and 2.

As regards profitability, the results evidence a negative effect of ROA and a positive effect of ROE, both for small companies as compared to large firms ( $SMALL*ROA$ ,  $SMALL*ROE$ ) and before and after the RDL ( $RD*ROA$ ,  $RD*ROE$ ).

As a robustness check, all models are computed including ROA instead of ROE, however the results does not improve and ROA never turns significant.

## CONCLUSION

The entry into force of the Spanish Royal Decree-Law 18/2017 makes compulsory for some companies reporting non-financial information within their annual reports or in a separated document from fiscal year 2017.

In this work, we study the determinants and characteristics that are related to the non-financial information report before and after the entry into force of the aforementioned regulation. In addition, the size of companies is included as a key factor, since traditionally large companies have been disaggregating non-financial information even before the mandatory regulation.

The results show that smaller companies have suffered with greater intensity the arrival of the RDL. The vast majority of small businesses did not report non-financial information nor provided detailed information on the different CSR dimensions (environmental, social, human rights and corruption) before the RDL. On the other hand, larger companies reported non-financial information prior to the RDL. After the entry into force of the RDL, the results show that the quality of the information in terms of reporting CSR indicators increases and the differences between small and large firms have been smoothed.

In addition, ROE is evidenced as a critical factor both in the probability of following the GRI guidelines and the quality of the reported information.

However, this work is not without limitations. Among them, we find the limited sample size that can hide significant effects of the independent variables on the quality and diversity of the non-financial information reported by the firms under the RDL. Future research should focus on a larger sample size, consider more years before and after the entry into force of non-financial information regulations in Spain, and include corporate governance variables.

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## *Chapter 8*

# **EMERGING FINANCING INSTRUMENTS: GREEN BONDS**

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## **ABSTRACT**

This paper analyzes the issuance of green bonds: an emerging alternative financing instrument to traditional fixed income financing instruments (bonds). They offer companies and institutions the possibility of obtaining public and private financing. Their valuation implies quantifying the binomial return-risk and studying the particular characteristics that define it.

A database was built that contained all the global green bond issues during the 2007-2017 period. Subsequently, univariate and bivariate descriptive statistical techniques, and the CAPM financial model, were applied that allowed the return-risk of green bonds to be assessed.

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Here our results demonstrate how the green bond market is an emerging and rapidly developing financing market. Indeed in 2017, green bond issues grew 9.54% more than in the previous year in volume financing terms, and more than 1,000% compared to 2007. Moreover, 84% of the green bond issues carried out by different entities did not exceed the bond's 10-year maturity. The highest credit ratings were given by Moody's financial agency for American entities.

The geographic location of green projects (financed through green bonds) showed that approximately 70% took place in America (40%) and 31% in Europe. The bond's maximum coupon was 11.75% and the minimum one was 0.00%, with a median value of 2.75%. Lastly, the CAPM model was applied to the issues made in the euro and US dollar currencies to determine yields on 5-year maturity bond issues, while the US dollar issuances reached higher yields than the euro ones (8.78% vs. 7.067%). Green bonds issued in dollars and euros resulted to be defensive securities for investors.

**Keywords:** green bonds, CAPM, credit rating, return-risk, coupon, financing markets

## INTRODUCTION

Like any other bond, a green bond is a fixed-income financial instrument issued to raise capital from investors through the debt capital market. The issuer normally provides a fixed amount to investors over a set time period (maturity) by repaying the principal when the bond matures and paying the agreed interest rate. A green bond differs from a normal bond insofar as its "green" certification is obtained through the bond issuer, but it can also receive certification from a third party. Certification commits issuers to use the capital obtained by transparently and exclusively selling the (main) bond green to finance or refinance green projects or assets with environmental benefits (ICMA, Green Bond Principles: Guidelines for the voluntary process for issuing the Green Bond, 2015).

Green certification involves emerging entities that generate market indicators for this asset type, which allows it to be analysed and measured. Although the Organisation for Economic Cooperation and Development

(OECD) does not define what a green investment or a green bond actually constitutes, it has analysed “green infrastructure” and “green investments” specifications (OECD, 2013), and has provided a general quantitative basis for evaluating the extent to which infrastructure systems can be modified as “low-carbon and climate-resistant (LCR) systems” (Kennedy and Morlot-Corfee, 2011).

The use of bonds to directly finance large-scale LCR infrastructures or to finance loans is no new concept. In 2007, a market for specific “certified” or “green” bonds emerged. Green bonds not certified by agents outside an issuing company are bonds whose issuance intends to finance LCR industries, sectors and solutions. However, supplies of green certification are still lacking (Olsen-Rong et al., 2015).

Encouraging continued bond issuance and market demand has led to more agreements about the green bond concept (Ceres, 2015). However, the green bond market has emerged without green standards and standardisation. According to Bartel et al., (2015), issuers face reputational risks and possible so-called “green washing” charges if the raised capital is not used for the agreed purposes, or if issuers are unable to demonstrate that funds were raised by financing projects with positive impacts.

Efforts to organise and determine the market-promoted and government-promoted green bond market have paid off with the emergence of Green Bond Principles (GBP), a voluntary self-regulatory initiative published in the ICMA (International Capital Market Association) proposal to enact clarity and dissemination on the market, “Climate Bond” norms, and other principles and standards verified and supported by the public sector, including public financial institutions and development banks.

This study analyzes the emergence and characteristics of global green bond markets. Apart from quantifying the size and dynamic trends of the green bond market, this study models and compares the return expected from green bonds issued in dollars and euros.

## **The Emerging Market for Green Bonds**

In 2007, the European Investment Bank (EIB) issued a €600m Climate Awareness Bond, the first in a series. In 2008, the World Bank (IBRD) began trading green bonds and issued \$300 million.

The fact that green bonds have identical financial characteristics to conventional bonds, such as the relatively simple green certification principle and the use of benefits implicit in certification, they have been the fundamental elements behind this market's growth. These financial assets attract a wide range of issuers and investors to join the market given the advantages offered by green bonds. Green bonds are classified into six different forms that can be issued by several entities and as distinct structures or "types". Following the types of Green Bond, we describe:

1. Corporate bond: use of income from the bond issued by a corporate entity. This category includes the bonds issued by "YieldCo" Vehicles (corporate structure based on generating dividends, integrated into the company's assets) to finance asset acquisitions.
2. Project bond: a bond backed by one project or more for which the investor is directly exposed to the project risk.
3. Asset-backed value (VRA): a bond guaranteed by one specific project or more, generally using only assets, except for covered bonds (included in this category). For covered bonds, the primary recourse is the issuing entity, with a secondary recourse to a group of underlying hedging assets in the event of default by the issuer.
4. Supranational, subsovereign and agency bond (SSA): bonds issued by international financial institutions (IFI), such as the World Bank and the European Investment Bank. SSA bonds have similar characteristics to corporate bonds in relation to use of income. The agency's bonds are included in this category (e.g., issuance by export and import banks), as are subsovereign national development banks (e.g., the German KfW).



5. Municipal bond: bonds issued by a municipal government, region or city. A national government entity can also generally issue a sovereign bond, but none have yet been issued.
6. Financial sector bond: a type of corporate bond issued by a financial institution to raise and finance capital (provide loans) in green activities (e.g., ABN AMOR or Agricultural Bank of China). This type of bond is considered for OECD purposes in maintaining a distinction between financial sector bond issues that finance loans and those that directly finance green investments.

The geography of the green bond market is expanding and diversifying. Green bonds have been issued in 47 countries, in 28 currencies and on 14 G20 markets (forum of 19 countries, plus the European Union). A classification of countries per continent where green bonds have been issued (until 2018) is provided below:

- Europe: Germany, Austria, Denmark, Slovenia, Spain, Estonia, Finland, France, Holland, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Norway, Poland, United Kingdom, Russia, Sweden, Switzerland, Turkey.
- Africa: Ivory Coast, Morocco, South Africa.
- America: Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, USA, Mexico, Peru.
- Asia: China, South Korea, United Arab Emirates, Philippines, India, Indonesia, Japan, Malaysia, Singapore, Taiwan.
- Oceania: Australia, Fiji, New Zealand.

The speed at which green bond markets develop and mature depends on many variables, including regulatory factors (e.g., policies that create demand for green projects) and market conditions (e.g., developments in interest rates and the credit cycle). These conditions will differ in the areas in which green bonds have been issued; subnational, national and regional markets add to an investor base of a green bond demand with a global perspective. Furthermore, the evolution of the green bond market faces a

series of specific challenges and barriers for it to further evolve and grow. Policymakers have an available set of options to overcome these barriers, and to help to develop a sustainable green bond market with integrity. OECD modeling scenarios suggest that if policymakers and market participants concertedly drive the development of the green bond market, they will be able to rapidly increase and finance the indebted capital that will be necessary for a shift to a low-carbon economy.

Barriers may differ in importance terms across geographical areas, with particular challenges for developing and emerging economies, where governments need more fundamental and general actions. For example, lack of an internal debt capital market and other favourable conditions for issuance should be addressed in line with longer term financial market development priorities. While this represents a barrier for the green bond market to grow, it also represents an opportunity for synergies if approached together (CBI/UNEP, 2015).

A list of common barriers that hinder the green bond market's growth may include:

- Lack of a portfolio of infrastructure projects corresponding to long-term government commitment to low-carbon development.
- Lack of commonly-accepted green definitions.
- Investors with limited capacity to analyse green investments.
- Scale and mismatch among projects, bonds and institutional investors.
- Lack of adequate aggregation mechanisms: non standard projects and cash flow instability.
- Low credit ratings for potential green bond issuers and green projects, especially in emerging economies..

## **Green Bond Benchmarks**

As the green bond market has expanded and investor appetite has increased, so has the need for comparable performance data and to set benchmarks for performance. Market indices are broadly defined as metrics,

often statistics, that track the performance of a specific group of securities or investment vehicles. In 2014, a number of banks, rating agencies and service providers launched green bond indices. These indices aim to reduce the information barriers that investors face by providing clear returns and risk data.

Many institutional investors are required to invest exclusively in “eligible reference” securities. Thus having a green bond included in a reference index may be an important attribute to attract conventional investors. In November 2015, four “families” of green bond indices were available for investors, each with different calculation methodologies and distinct eligibility thresholds for green bonds, including currency, size, rating, and extra-financial characteristics such as third-party opinions.

The four indices are detailed below (ICMA, The GBP Databases and Indices Working Group, 2017):

1. The Bloomberg Barclays MSCI Green Bond Index: this index includes the local currency debt markets followed by the Barclays Global Aggregate Index. Sectors: Corporate, government, treasury and stock bonds are eligible for the Index. Euro and Dollar currencies are the eligible currencies for this index.

To be classified as a green bond, the use of a security value must firstly belong to at least one of the six eligible environmental categories defined by MSCI: alternative energy; energy efficiency; pollution prevention and control; sustainable water; green buildings; climate adaptation. The issuer’s activities fall within one environmental category defined by MSCI or more.

Reports are monitored and bonds may be removed if the issuer does not issue reports at least annually, or if annual reports indicate that more than 10% of proceeds have been used for ineligible projects.

The fixed minimum issue amounts are established for all the local currency markets that match the Bloomberg Barclays Global Aggregate Index.

The credit rating includes Moody's, S&P and Fitch. The coupon rate includes the fixed rate. There is no minimum 1-year expiration time.

2. The Bank of America Merrill Lynch Green Bond Index is designed to measure the performance of the debt issued by governments and corporations, where funds are used only for the projects that favor climate or other environmental sustainability objectives. It includes debt from corporate and semi-public issuers, but excludes securitized assets. Eligible emerging market currencies are selected annually. Qualified bonds must have a defined use of income that is destined to projects favoring climate change or other environmental sustainability purposes. The general debt obligations of the corporations involved in green industries are not included. Credit quality includes Moody's, S&P and Fitch. Fixed rate coupons are included. Maturity is at least 18 months from the date of issue until final maturity. Eligible bonds: zero coupon bonds, perpetual callable values, and capital values where conversion may be mandatory by the regulatory authority;
3. The S&P Green Bond Index and the Green Project Bond Index are multicurrency indices that include bonds issued by government, multilateral and corporate issuers. They include only those bonds whose income is used to finance environmental projects. The S&P Green Bond Index was developed in collaboration with S&P Dow Jones Indices and Infrastructure Credit Alpha Group LLC.

The index is weighted by market value. Total return is calculated including interest return, which reflects return due to interest paid and accrued, as well as the price return that reflects gains or losses due to changes in prices at the end of the day and repayments of the principal. For a bond to be eligible, the issuer must clearly present the bond's "green" certificate and the reason for it. Green bonds issued from any country and in any currency are eligible for inclusion in the index. Bonds must be marked "green" by the Climate Bond Initiative (CBI). Prices are obtained from Thomson Reuters and S&P Securities Evaluations (SPSE). The

credit rating includes Moody's, S&P and Fitch. The coupon type includes fixed, zero, step-up (default schedule), fixed-variable and variable. The expiration minimum is 1 month. The Index components in May 2017 were 1981 bonds.

4. The Solactive Green Bond Index is a weighted market value index based on a series of rules that reflect the green bond market. The index is calculated as a total return index in US dollars. The weighted market value with the maximum weight is limited to 5% of the bond. It is calculated as a Total Performance Index in US dollars. Bonds must be indicated as "green" by the agency "Climate Bonds Initiative (CBI)". The minimum amount is 100m US dollars. Minimum maturity is 6 months. It includes inflation-linked bonds, convertible bonds and municipal bonds. The index is rebalanced monthly at the end of each month. The Index components in May 2017 were 205 bonds.

Beginning in 2015, green bonds were listed on the London, Oslo and Stockholm Stock Exchanges and in Mexico's stock plans to launch the first green bond segment outside Europe, (Woodgate, 2016).

## **METHODS**

A study of the international market for green bond issues was carried out worldwide during the 2007-2017 period. Firstly, a database including all green bond issues during the study period (2007-2017) was built using primary and secondary sources of information. The following variables were considered for building the database: the volume of issues, the market on which the issue took place, the type of activity being financed, duration and cost of financing.

Then univariate (mean, median) and bivariate (Pearson's test and Pearson's Chi-square test) analyses were applied to the quantitative and qualitative variables. In order to model the performance of green bond

issues, the Capital Asset Pricing Model (CAPM) was applied for the 5-year bonds issued in dollars and euros.

## **Sources of Information**

A compilation of all the green bond issues during the 2007-2017 period was made from primary and secondary sources of information. The World Bank was consulted as a primary source of information.

The following secondary sources of information were also consulted:

- Climate Bonds Initiative: all the entities that issued green bonds from January 2007 to November 2017 were included. The following information was available for each issue that took place: amount issued, the currency in which debt was issued, issue date, expiry date and, lastly, the climate bond certification issued by certain world organizations and agencies (Climatebonds, 2018).
- Cbonds: information on the coupon corresponding to each issued bond was obtained (Cbonds, 2018).
- Moody's: the agency that is able to assign each issued green bond its corresponding credit rating on the market (Moody's, 2018).
- Climate Bond Certificate: the granting of this certificate guarantees bond issuers (governments, investors and financial markets) that investments really help to mitigate climate change. For each issued green bond, whether a climate bond certificate was issued by one of the following entities was verified: Bureau Veritas; DNG-GL; EY; KPMG; Oekom Research AG; Sustainalytics; Video Eyris; Zhongcai Green Financing Consultants Ltd; Carbon Trust; Emergent Ventures India (EVI).

With the acquired information, a database was created and consisted of 1352 green bond issues issued by 399 entities worldwide during the period from 2007 to 2017. This gave a matrix of 1353 rows by 12 columns, which collected the following information for each issuance:

- Entity: it refers to the entities that carried out bond issues during the study period (2007-2017).
- The entity's legal status: it refers to the public or private nature of the entities that carried out bond issues. To this end, the following classification was considered: public entities and private entities.
- The entity's nationality: it refers to the country of origin of the entity issuing the green bond.
- Place of project: the country where the project is undertaken.
- Activity sector: economic activity to which the issuing entity of financing belongs. Entities were classified by the following sectors of economic activity. financial sector, energy sector, construction sector, transport sector, industrial sector, education sector.
- Amount issued: the total amount of issued debt.
- Currency: the unit in which the green bond was issued.
- Issue date: it refers to the time when debt was issued.
- Maturity date: the time when debt was amortised.
- Period: useful green bond life.
- Coupon: the interest rate that materializes in the payment to its holder of a certain percentage of the nominal title value. Of 1352 issues, information was obtained on the coupon value for 714 issues.
- Credit rating: professional and independent assessment made by a credit institution or agency about an issuer's capacity to fulfill contractual obligations, where triple "Aaa" symbolizes the highest credit quality down to a "C", which indicates the opposite; that is, an imminent default situation. In our case, we chose Moody's, which is a risk-rating agency.
- Climate Bond Certificate: bonds are certified when the projects they finance manage to reduce carbon emissions.
- Time: the year in which the bond issue is carried out by understanding that  $t = 0$  is 2007 until  $t_n = 10$  in 2017.

## Methodology

Different statistical tools were employed to carry out a descriptive statistical analysis: mean, median, Pearson's Linear Correlation Coefficient ( $r_{xy}$ ) and Pearson's  $\chi^2$  test.

The mean is a good measure of data's central tendency data when distribution is symmetric. The arithmetic mean is expressed by the following mathematical expression:

$$\mu = \frac{\sum X}{N} \quad (1)$$

The median is better than the mean when distribution is skewed and is always an appropriate measure of "typical" data, even when there is often very little data with very extreme values. The mathematical expression for the median is as follows:

$$\text{Me}(a) = \frac{a\lfloor \frac{l+1}{2} \rfloor + a\lceil \frac{l+1}{2} \rceil}{2}, \quad (2)$$

Where  $a$  is an ordered list of  $l$  numbers and  $\lfloor \cdot \rfloor$   $\lceil \cdot \rceil$  denote the floor and ceiling functions, respectively.

To measure the degree of linear correlation between variables, Pearson's Linear Correlation Coefficient ( $r_{xy}$ ) and Pearson's  $\chi^2$  test were used.

Pearson's correlation coefficient is an index that is easy to use and interpret. Its absolute value ranges from 0 to 1. If we have two variables, namely  $X$  and  $Y$ , and we define the linear correlation coefficient between these two variables as  $r_{xy}$ :

$$0 \leq r_{xy} \leq 1 \quad (3)$$

then  $r_{xy}$  is defined by the following expression:

$$r_{xy} = \frac{\sum ZxZy}{N} \quad (4)$$



Pearson's  $\chi^2$  test is a non parametric test used to demonstrate independence between two variables by presenting data in contingency tables. The Chi-Square formula is defined by the following expression:

$$\chi^2 = \sum i \frac{(o_i - e_i)^2}{e_i} \quad (5)$$

The closer the Chi-Square value approaches zero, the tighter the two distributions are.

Finally, the financial asset pricing model (CAPM) was applied, explained by this mathematical expression (X):

$$R_i = R_f + \beta * (R_m - R_f) \quad (6)$$

where:

$R_i$ : is the expected rate of return on the capital of asset "i".

$R_f$ : represents the return on the risk-free asset. Public debt assets in the short term are considered risk-free.

$\beta$ : measures the sensitivity of a security's performance to variations in market performance. The most sensitive securities to market movements involve a higher risk, and their  $\beta$  value is higher than 1, which indicates that they are aggressive securities. If they are less than 1, they are defensive securities

$R_m$  (Market Yield): expected return rate of the market on which the asset is listed. For example, in Spain it is simplified using IBEX35, which is the main stock market index in relation to the Spanish stock market prepared by Spanish Stock Exchanges and Markets.

Therefore, we can see that the expected return on the asset is determined by the  $\beta$  value as a measure of systematic risk.

## RESULTS

The results of our analysis are provided below. First, the descriptive univariate and bivariate statistical analysis results are shown. Second, the

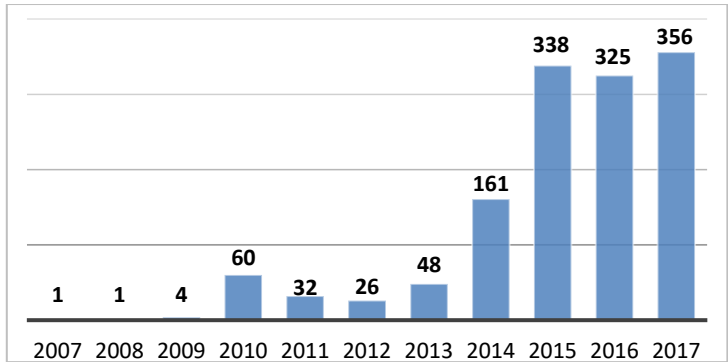
modeling of the expected rate of return of the bonds issued in dollars and euros is provided after applying the CAPM model.

Univariate Analysis

Figure 1 shows information on the emergence of the green bond market during the 2007-2017 period. From the total issuances (n = 1352) during this period, evolution was not upward for certain years like 2008, 2011, 2012 and 2016; 2007 was the first year of issue and evolution was slow until 2010, when 60 green bonds were issued and became known worldwide as a financing tool. Between 2010 and 2012, issuances decreased until 2013 when they started to grow again to reach 356 issuances in 2017.

Figure 1 shows that issues increased by 1400% in 2010 compared to 2009, followed by 2014 when the number of issues grew by 235%.

Regarding the distribution of issuances per activity sector, in Table 7 the percentage of issuances made by private entities was much higher than those by public entities (93% and 7%, respectively). Private issuances are classified in 54% of cases as entities operating in the financial sector, 27% in the energy sector, 5% in the construction sector, 3% in the industrial sector, 3% in the transport sector and, finally, only 1% in the education sector.



Source: the Authors.

Figure 1. Trend of the green bond issues for the 2007-2017 period.

**Table 1. Number of issuances by sectors of economic activity**

Sector	No. of issuances
<i>Private</i>	<i>1,258</i>
- Financial	728
- Energy	362
- Construction	69
- Industrial	45
- Transport	34
- Education	20
<i>Public</i>	<i>94</i>

Source: the Authors.

After considering the geographical distribution of the projects financed with green bond issues according to continents for the 2007-2017 period, 40% of these issues financed green projects in America (9 countries), followed by Europe with 31%, Asia with 21%, Oceania with 6% and Africa with only 2% (Table 2).

The United States led green bond issues with 548 green bond issues (40.53%), followed by China, France and Sweden with 9.99%, 9.39% and 8.43%, respectively.

**Table 2. Number of issuances of green bonds per continent**

Continent	No. of projects
America	548
Europe	416
Asia	282
Oceania	78
Africa	28

Source: the Authors.

Regarding the entities that led the green bond issuance market, we highlight (Table 3) the World Bank (USA), from the financial sector, with 137 issues and with projects in 19 countries, of which the United States topped the list with 59 green projects (43%). Secondly, the company SolarCity (USA), from the energy sector, had 128 issuances and ran all its projects in the United States. Lastly, the Cr dit Agricole bank (France), with

87 issues, carried out green projects in 11 countries, France stands out with 19 projects (21.84%).

**Table 3. Top Rank of Entities per number of issues**

Entity	No. of green bonds issues
World Bank (USA)	137
SolarCity (USA)	128
Crédit Agricole (France)	87

Source: the Authors.

Regarding duration of issues (Table 4), such information was obtained for 1241 bond issues (91% of the sample issues). The most recurring bond duration was 5 years (25.54%), followed to a lesser extent by periods of 3, 10 and 4 years with percentages of 14.99%, 12.01% and 7.74%, respectively. Duration did not exceed 10 years for 83.88% of the issuances with known duration.

The minimum issuance period was 1 year compared to a maximum period of 47 years, which means a range of 46 years. The average period was 8 years, while 50% of the entities issued bonds for a period not exceeding 5 years according to the median: 25% of the entities issued bonds with less than 4 years maturity.

**Table 4. Rate of green bond issues by maturity (n years)**

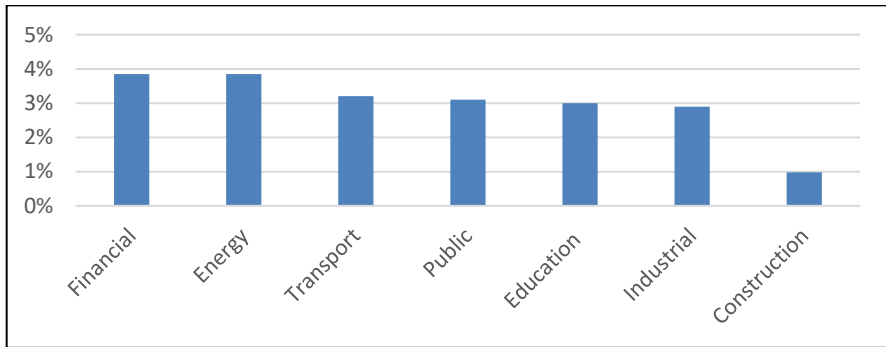
N years	N0. of issues	Frequency
5	317	25.54%
3	186	14.99%
10	149	12.01%
4	96	7.74%
7	88	7.09%
2	66	5.32%
6	57	4.59%

Source: the Authors.

Coupon value ranged between 0% and 6%, and its average value was 3.32% with a median of 2.75%. The minimum coupon offered was 0.00%,

compared to a maximum coupon of 11.75% offered by the World Bank issued in Brazil.

Figure 2 represents the average coupons obtained in each sector of our sample with 714 issuances of 1352 issuances. The financial and energy sectors were the most appealing with 3.75% and 3.72%, respectively, while the least appealing sector for investors was the construction sector.



Source: the Authors.

Figure 2. Mean coupon per activity sector.

Table 5 shows the average coupon per continent in a sample of 714 coupons spread across five continents. The highest average coupon and the highest risk level was 4.39% in Africa, and the lowest average coupon was 3.28% in Europe.

**Table 5. Mean coupon per continent**

Continent	Mean coupon
Africa	4.39%
Asia	4.35%
America	3.90%
Oceania	3.62%
Europe	3.28%

Source: the Authors.

Table 6 shows the different currencies in which green bonds were issued, as well as the total issues in each currency. Green projects do not

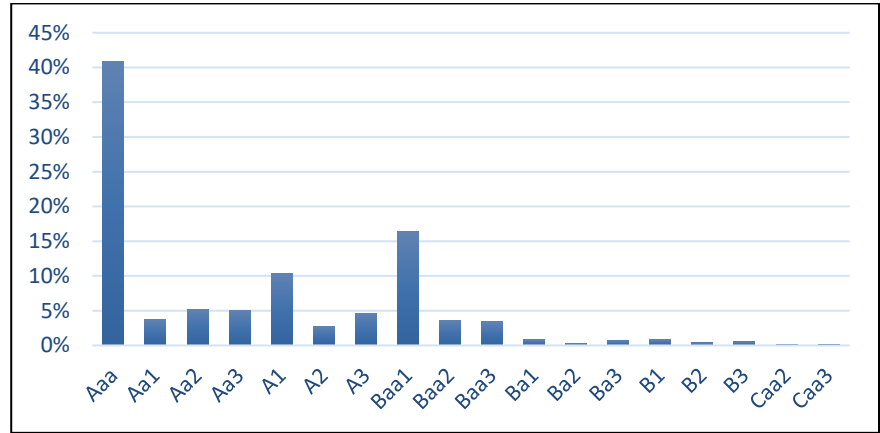
necessarily take place where funding is obtained. Issuers go to those markets that offer them better financing conditions to minimise costs. This means that if an issuer undertakes a project in a certain country, it will not necessarily obtain financing in that country. In our case, the US dollar and euro were the two currencies that generated the most issues with 561 and 196, respectively.

**Table 6. No. of Green bond issues per currency**

Currency	No. of issues
USD	561
EUR	196
SEK	141
CNY	116

Source: the Authors.

It is noteworthy that the US dollar represented more than 40% of bond issues. Issues in euros represented 14.50%, followed by the Swedish SEK and the Chinese Yuan with 10.43% and 8.58%, respectively.



Source: the Authors.

**Figure 3. Rates of Green bonds per Credit Rating.**

Regarding credit ratings, the majority of issues obtained a rating within the Aaa-Baa3 interval; 518 issues were rated “Aaa” according to Moody’s,

which was the highest long-term credit quality, and 207 entities obtained a “Baa1” rating.

Most of the issues that achieved the highest credit rating (Aaa) concentrated in private entities in the United States, while those with the lowest credit rating were in Europe.

**Table 7. Mean and median amounts issued in green bonds per currency (expressed as dollars)**

EUR	Mean volume	\$ 534,513,177.11
	Median volume	\$ 546,475,000.00
USD	Mean volume	\$ 203,691,248.24
	Median volume	\$ 65,000,000.00
SEK	Mean volume	\$ 95,025,441.03
	Median volume	\$ 70,055,811.13
CNY	Mean volume	\$ 280,770,357.53
	Median volume	\$ 109,857,770.03

Source: the Authors.

Table 7 presents an analysis of the volume issued by the four most frequent currencies on our green bond market (USD, EUR, SEK, CNY). The maximum volume was issued in the Chinese CNY currency, with \$3,071,064,430.93. The minimum volume issued was in euros with \$1,066,100.00.

## Bivariate Analysis

Then a bivariate analysis of the most significant quantitative and qualitative variables of our study was carried out to analyze the degree of the relation between pairs of variables, as well as the quantification and significance of that relation.

No statistically significant linear relation was found for the variables Period (Years) and Coupon, or for the variables Amount issued and Coupon.

The most significant qualitative variables in our study were also analyzed by Chi-Square tests to determine the possible dependence between

all these variables to subsequently interpret that relation. Table 8 details the results of the statistical analyses.

A statistically significant relation was found for the variables Entity, Country of origin and Country where the project funded by green bonds took place. Most entities usually issue bonds in one place and do not take risks in several countries.

A statistically significant relation emerged between the variable Nationality of the entity and Currency. This is interpreted as so: depending on the origin of an entity (country), issuing green bonds in its national currency is a preference.

In addition, a statistically significant relation appeared between the variables Entity and Credit rating. This outcome informed us that the majority of entities did not change their credit valuation during our study period (2007-2017).

**Table 8. Chi-squared test**

	Chi-squared test	Parameters of freedom	Asymptotic significance (2-sided)
Entity country- Project country	43337.730	18894	0.000
Entity country-Currency	18956.301	11256	0.000
Entity country-Credit rating	25561.429	7638	0.000

Source: the Authors.

**CAPM Model**

The market performance of the 5-year bond issues in dollars and euros was modeled through CAPM. Firstly, the risk-free return or  $R_f$  (American debt in \$) and market return were obtained. The yields of the secondary market of the 5-year American bond were considered for  $R_f$ ; the returns of the American “Standard and Poor’s” indices were taken for 5 years as market returns ( $R_m$ ).

Table 9 indicates that the adjusted determination coefficient (adjusted  $R^2$ ) for the US Dollar was 0.152, which meant that our independent variable explained only 15% of the green bond performance, and other variables



outside our model explained the rest of the security's performance (Table 9).

**Table 9. CAPM for the green bond issues in dollars**

	Coeff.	Error	t	Probability	Inf 95%	Sup 95%
Constant	0.1435	0.0065	21.8509	2.60479E-37	0.13048	0.1565
$\beta$	0.5455	0.1322	4.1264	8.34153E-05	0.2828	0.8082
adjusted R <sup>2</sup> : 0.1526; N: 90.						

Source: the Authors.

A Beta value of less than 1 ( $\beta = 0.5455$ ) meant that our 5-year bond issues (in dollars) were defensive. If there was a 1% variation in the returns of Standard and Poor's (American market), it reflected less variation in our bond issues' profitability.

The same model was repeated for the bond issues for a 5-year period in euros ( $n = 31$ ). Thus, an average yield of 1.67% was obtained for the set of bonds. In order to calculate  $R_f$  (German debt in €), the secondary market returns of the German 5-year bond were considered, and the 5-year returns of the German DAX market were contemplated for  $R_m$ .

Table 25 indicates the goodness of fit of regression, where the adjusted determination coefficient (adjusted R<sup>2</sup>) was 40.60%, which meant that  $R_m - R_f$  explained 40% of green bond performance. Thus, the euro obtained a better fit and more significance than the US dollar.

Once again, the 5-year bond issues in euros ( $\beta = 0.7542$ ) were defensive compared to the German market. If a 1% change took place in the returns on the DAX (German market), it only represented a 0.7542% change in our bonds' yields (Table 10).

**Table 10. CAPM for the green bond issues in euros**

	Coeff.	Error	t	Probability	Inf 95%	Sup 95%
Constant	0.0798	0.0237	3.3693	0.0021	0.0313	0.1283
$\beta$	0.7542	0.1626	4.6378	6.9340	0.4216	1.0868
Adjusted R <sup>2</sup> : 0.4060; N: 31.						

Source: the Authors.

## CONCLUSION

Sustainability has become a priority objective on the political agenda of the United Nations (UN) and national governments, which has resulted in world leaders agreeing in 2015 to adopt SDG (“Sustainable Development Goals”) as part of solving sustainable development by 2030.

In this context, green bonds play an important role in financing sustainable economy as they provide a mechanism for agencies that require financing and imply more investors focusing on green economy.

This study shows how the sector of project financing through issuing certified green bonds is emerging, but it lacks standardization.

If investors and bond issuers provide a sufficient volume of green bonds on world capital markets, they will generate sufficient liquidity and a better understanding of the prices and risks assumed by such assets. A better understanding of both these instruments and the indices constructed for green bonds could lead to these instruments being more widely adopted in global bond portfolios. While green bonds are expected to be the dominant form of financing for the foreseeable future, there are other alternatives. More focused approaches, such as those seen in REDD (Reducing Emissions from Deforestation and Forest Degradation) and SDB (Sustainable Development and Business), also allow finance to play a key role in developing alternative mechanisms to finance environment-focused projects. These types of creative approaches to environmental problem solving show that many environmental problems can be approached with the financial community’s creativity and foresight (Anderson and Ratiu, 2015).

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## *Chapter 9*

# **REAL CONVERGENCE IN THE EUROPEAN UNION: AN EMPIRICAL ANALYSIS**

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## **ABSTRACT**

This chapter deals with the importance of the economic convergence for the European Union. The European Union is made up of 28 countries. However, in 2016, a British referendum decided to leave the United Kingdom from the European Union. The number of member states thus decreased to 27 in 2020. Before the widest EU's enlargement in 2004, European Union was rather homogeneous group of countries. Nevertheless, with further enlargements, European Union consists of member countries, whose economies are very different regarding to their size and performance. The main objective of this chapter is to evaluate the

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development of the convergence process in the European Union. The theoretical part of the chapter is devoted to the theory of the economic convergence. The empirical part of the chapter deals with the analysis of the real convergence mainly. According to the analysis, we can state that the 13 EU member countries which became EU member in 2004 and later (EU-13) converge to the average of 15 countries that entered the EU before 2004 (EU-15). From the analysis of convergence of the EU-15 we can draw conclusions about some divergence tendencies also.

**Keywords:** beta convergence, European Union, real convergence, sigma convergence

## INTRODUCTION

The European Union consists of 28 countries. However, in 2016, a British referendum decided to leave the United Kingdom from the European Union. The number of member states thus decreased to 27 in 2020. Before the enlargement in 2004, the widest in EU's history, European Union was relatively homogeneous group of countries. However, with enlargements of 2004, 2007 and 2013, contemporary European Union consists of member countries, whose economies are very dissimilar both in terms of their size and in terms of their performance, see for instance Suchacek (2013). Some new EU member states have already entered the euro area and 19 members of the European Union use in 2017 the euro. The varying size of individual economies such as these is illustrated by these facts, based on Eurostat (2019) and annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs Ameco (2019).

In the three largest EU member states being involved in 42,0% of the total population of the European Union in 2016, 52,7% of the European Union's gross national income (GNI) at current prices, 52,1 % of the gross domestic product (GDP) at current market prices was created in 2016, correspondingly, 48,0% and 47,4% of the European Union's GNI and GDP adjusted by purchasing power standard (PPS). In a similar way, in the five largest EU member states being involved in 62,9% of the total population of the European Union in 2016, 71,6% of the European Union's GNI at current

prices, 70,9% of the GDP at current market prices was created in 2016, correspondingly, 67,8% and 67,0% of the European Union's GNI and GDP adjusted by PPS. In contrast, in the group of seven smallest EU member states (Lithuania, Slovenia, Latvia, Estonia, Cyprus, Luxembourg, Malta), in which 1,97% of EU citizens dwell in 2016, only 1,24% of the European Union's GNI at current prices, 1,39% of the European Union's GDP was generated, correspondingly, 1,60% and 1,73% of the European Union's GNI and GDP adjusted by PPS.

For the EU as a whole, three last enlargements are of course related to the enlargements to new countries with a much lower GDP per capita. In 2016 GDP per capita in purchasing power standard EU-28 was in the most developed EU economy (Luxembourg) 5,6 times higher than in the economy with the lowest value of this indicator (Bulgaria). GNI per capita in purchasing power standard EU-28 was 3,7 times higher. If Luxembourg is excluded because GDP per capita computations are distorted by the high number of cross-border workers then GDP per capita in the most developed EU economy in 2016 was 3,7 times higher, and GNI per capita was 3,1 times higher in comparison with the lowest level. But generally, economic growth among the poorer countries which was adopted as an EU member in 2004 and later (EU-13) is faster than the rest of the EU countries, i.e., the 15 countries (EU-15) that entered the EU before 2004.

Not only for these reasons the economic convergence EU member states are constantly at the forefront of intense interest by representatives of economic theories and economic policy makers. The final goals of the EU include, as specified in article 3 of the Consolidated Version of the Treaty on European Union, convergence of economic performance and economic and social cohesion. However, an important question arises relative to the current and future trends concerning nominal both real convergence under circumstance both the financial crisis following the collapse of Lehman Brothers and euro area sovereign debt crisis.

The concept of convergence has many dimensions. The term economic convergence means a process in which economies of different countries or regions become more similar to each other. If differences of economic variables among the countries or regions are diminishing, economies tend to

reach a similar level of development and wealth. Studies about convergence of the nominal variables used mainly the convergence criteria laid down by the Treaty on the Functioning of the European Union (the four Maastricht convergence criteria) which measure nominal convergence (inflation rate, long-term interest rates, budget deficit to GDP ratio, and public debt to GDP ratio). Nominal convergence, however, will not be subject of empirical evidence in this chapter. The literature on real convergence comprehends such different aspects as long run convergence in per capita/per employee incomes and productivity, convergence in unemployment rates, convergence in economic structures and synchronization of business cycles.

This chapter focuses on real convergence. We will attach our attention to real convergence measured in terms of incomes in per capita in purchasing power standards (PPS). Sustainable real convergence is the process whereby the income per capita levels (real GDP per capita, real GNI per capita) of lower-income economies catch up with those of higher-income economies on a durable basis. For convergence to be sustainable, long-term potential per capita growth must be consistent with an expansion of demand. Indeed, economic growth that results from external factors (e.g., strong global demand shock), or a more benign shock (e.g., the decline in interest spreads bounded to the euro adoption), may prove to be unsustainable if not matched by higher growth potential.

Although in practice it is necessary to monitor the interdependence of real and nominal convergence, because the links between real convergence and nominal convergence are rather complex, can go in both directions, and may be different in the short run and long run.

Being aware of some limited power of expression, the indicators of GDP per capita both GNI per capita in purchasing power standard (PPS EU-28) will be applied in this chapter. Thence for the conversion of GDP per capita from local currency into a common unit, the conversion with exchange rates, which does not consider the purchasing power of different national currency units, is not used. Consequently, for international comparisons the artificial currency unit PPS is used, which reflects purchasing power parity and eliminates price level differences between countries.



## **METHODS**

### **Real Convergence**

As stated above, in the broadest sense, the real convergence is understood as the convergence of economic level of a compared country to a reference country or group of countries. The real convergence is then a process of reducing the gap in the economic level of countries. If there is a reversal process, i.e., expansion of the gap, it can be stated that a process of divergence emerges. In the context of growth theories, we can talk about narrowing a technological gap and adjustment of producing structure.

The real convergence can be realized via two channels. The first one is a growth of labour productivity which will outstrip growth in reference countries. The second channel is the growth rate of economic activity and employment rates of population that may occur as a result of demographic changes of economically active population. The main factor of the real convergence is the labour productivity growth, which is measured via the development of GDP per worker or per hours worked.

The real convergence can be expressed via economic indicators, such as convergence of economic level (GDP per capita), convergence of price levels, business cycles harmonization and structural similarity of economies. In this chapter we understand the process of real convergence mainly as a convergence of macroeconomic indicators in real terms over a time, namely in the particular economies. Due to this fact the issue of convergence of price levels will be brought closer in the following subchapter.

### **Economic Level**

The economic level is usually expressed via gross domestic product calculated per capita. In case of evaluation of the economic level relationship between two economic entities in time it is possible to formally write the process of convergence as follows:

$$\frac{y_{1,t}}{y_{2,t}} < \frac{y_{1,t+1}}{y_{2,t+1}}, \text{ for } y_{1,t} < y_{2,t}, \quad (1)$$

where  $y$  is the income per person of country 1 and 2 at time  $t$  and  $t+1$ .

This relation can be described in such way that the relative space of economic levels per capita in time declines. In literature, it is possible to meet similar definition, which is based on the absolute difference:

$$|y_{1,t} - y_{2,t}| > |y_{1,t+1} - y_{2,t+1}|, \quad (2)$$

where  $y$  is the income per person of country 1 and 2 at time  $t$  and  $t+1$ .

If inequality (2) is satisfied, the convergence occurs. In the case of an opposite sign in notation (2), we speak about divergence.

Problematic when using the indicator of economic level within the framework of international comparison seems to be the necessity of its conversion to a same monetary and price basis. Via a market exchange rate only the conversion to the same monetary level would be ensured. However, the economic reality shows that in different countries there is a variety of goods and services valued differently which leads to a situation when the price level of compared economies differs. Generally, less developed countries achieve lower price level in comparison with developed countries. For the purposes of international comparison of the chief indicator of economic level there are therefore special indicators designed. The key unit of currency conversion which eliminates differences in price levels of particular countries is the purchasing power parity (PPP). The unit measures prices of goods and services in the national currency to prices of comparable goods and services in the currency of a compared country, whereby a transfer of monetary and price basis is ensured. By modification of PPP unit, it is possible to obtain the so-called product volume indices in the purchasing power parity PPPs (Volume Indices) which eliminate differences in the volume of products and services among different countries.

For the purposes of comparison within the EU countries an artificial currency unit on the basis of euro has been created and it has been named Purchasing Power Standard (PPS). To calculate PPS the volume indices PPPs are used, via which averages of individual goods and services in particular EU countries are derived. Averaged units are then referred to as Purchasing Power Standard PPS. Purchasing Power Standard is therefore a fictional unit which reflects different price level of EU member states.

Purchasing Power Standard indices therefore serve for a spatial comparison of volumes of GDP per capita. They can be used for comparison of real economic power of particular countries as well or for the international level comparison of economic labour productivity. However, the advantage of these indices undoubtedly is in the ability to transfer compared macroeconomic indicators to a consistent price basis.

The economic level in particular countries can vary depending on the level of labour productivity that is measured via GDP per worker indicator. Labour productivity depends both on the age composition of a population, therefore the proportion of people in the productive age in the total population and the utilization of labour resources (i.e., the rate of economic activity and unemployment rates) is monitored. Within the real convergence a cost competitiveness of particular countries, which depends on the labour productivity, is monitored. The cost competitiveness is monitored via the so-called unit labour cost measured as average labour costs in euros per unit of GDP in PPS.

## **Harmonization of Business Cycles**

Within the evaluation of achieved level of real convergence many other indicators are monitored. These indicators are for example, indicators of business cycles harmonization that indicate the extent to which business cycles in compared economies are evolving identically, more closely for example Aguiar-Conraria and Soares (2011), Cerqueira and Martins (2009), Furceri (2005).

Monitoring the similarity of business cycles on the example of EU is important mainly due to the fact that since a particular country has joined the Euro area a common monetary policy, which substitutes existing monetary policy of particular central banks, is implemented. The common monetary policy, after introduction of the common currency, depends on the average economic development in the Euro area. Therefore, this jointly applied monetary policy may have negative effects on the country which is in a different cycle phase. These negative effects or costs resulting from the loss of their own monetary policy will be lower for economies that will show higher level of business cycle harmonization with monetary union.

One of the methods for examining harmonization of business cycles of a particular economy with business cycle of monetary union is the usage of correlation coefficient that examines harmonization of annual rates of the real growth of GDP in the national economy with annual growth rates in the monetary union. This coefficient may take values from  $-1$  to  $1$ . If the coefficient nears  $1$ , it means that there is a strong similarity of business cycle of a particular economy and monetary union. Contrary, if the coefficient nears  $-1$  the business cycles have adverse progress.

## **Structural Harmonization of Economies**

Another monitored indicator of achieved level of the real convergence is the structural harmonization of economies. The structural harmonization of economies is understood as similarity of structures of economic activity among acceding and existing economies of the monetary union. The higher the similarity of the economy structure is, the lower the risk of asymmetric economic shock is.<sup>1</sup> The structural harmonization of economies can be studied, for example via Landesmann structural coefficient. Using this

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<sup>1</sup> The asymmetric shock is generally defined as a situation when a particular event affects only a certain part of the monetary union (national economy) or an event that activates different impacts, mainly in economic growth and employment, in particular parts of the monetary union (national economies).

coefficient proportions of six sections of economy<sup>2</sup> in total value added in compared countries are compared. The coefficient obtains values from 0 to 1 and if the coefficient nears 0, it is possible to expect higher similarity of the economic activity structure.

The progress of convergence process and the convergence level of monitored economies can be observed beside the indicators of cyclic and structural harmonization via many other indicators, for example level of openness and interdependence of economies, harmonization or disharmony of economic shocks, level of financial market integration etc.

## **Nominal Convergence**

The nominal convergence concept can be understood as an analogy of real convergence, so as a convergence of nominal constants, for example GDP in nominal terms, nominal wages (wider concept of convergence). The wider concept of convergence often includes meeting the four Maastricht convergence criteria which are defined condition for countries to enter the Euro area and adopt euro as the common currency. We can then understand the nominal convergence in the following levels:

- price convergence (narrow definition),
- convergence of all nominal constants, such as prices, wages, pensions (broad definition),
- the Maastricht convergence criteria.

In the narrowest sense the nominal convergence can be understood as a convergence of prices. The indicator that is used for monitoring convergence of price level among economies is the Comparative Price Level (CPL). This index indicates price level percentage of observed economy in comparison

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<sup>2</sup> Individual sections are classified according to the NACE classification: A, B – agriculture, forestry and fishing, C, D, E – industry, F – building industry, G, H, I – wholesale and retail trade, repairs, accommodation, transport and communication, J, K – financial intermediation, real estates, renting and business activities, L to P – other services.

to the economy price level which was selected as the basis for comparison. It is possible to detect relative price levels of different segments of GDP (e.g., only consumption, investments) or the relative price level of entire GDP. Therefore, CPL indicates how many units of money in a particular country it is necessary to spend on the purchase of identical basket of goods and services. This index is expressed in percent and its calculation is determined from shared values of the purchasing power parity and exchange rates. The process of price convergence can then, analogously as the real convergence, be formally written as follows:

$$\frac{CPL_{1,t}}{CPL_{2,t}} < \frac{CPL_{1,t+1}}{CPL_{2,t+1}} \text{ for } CPL_{1,t} < CPL_{2,t}, \quad (3)$$

where CPL is the index of comparative price level of country 1 and 2 in the period  $t$  a  $t+1$ . Then it is possible to express the price convergence via absolute difference in the following way:

$$|CPL_{1,t} - CPL_{2,t}| > |CPL_{1,t+1} - CPL_{2,t+1}|, \quad (4)$$

where CPL is the index of CPL of country 1 and 2 in the period  $t$  a  $t+1$ .

However, the empirical part of this work, on the input data base, will include analysis of interactions between the real and nominal convergence, the following text will briefly mention the issue of the Maastricht convergence criteria.

## **The Maastricht Convergence Criteria**

Legal conditions for adopting a common currency are informally called the Maastricht convergence criteria. Their name is directly linked to the Maastricht Treaty, where the criteria was for the first time taxatively defined. This treaty represents the completion of decade of efforts to achieve the

monetary union within countries of existing European community (EC). The major changes of this treaty include mainly the name transformation from European community to European Union, moreover supplementation of existing economic pillar with two more pillars and already mentioned definition of the criteria which is necessary to meet for the Euro area entry. Especially Germany has warned that the monetary union cannot be entered by any state, but only by the state which is sufficiently prepared to adopt the common currency to avoid later distortions of the monetary union stability.

The convergence criteria then represent the nominal convergence which creates economic conditions expressed by measurable indicators. In case of meeting these criteria, the particular state can enter the Euro area. Compliance of the Maastricht criteria should be long-lasting, not nonrecurring. Then the Maastricht treaty has established that the condition for the common currency adoption is not only the meeting of the convergence criteria, but also the compatibility condition of statutes of the national central bank with the European central bank (ECB) and the European system of central banks<sup>3</sup> (ESCB).

The convergence criteria consist of fiscal criteria and the monetary criteria. In the current legislation, the convergence criteria are anchored in Article 140 of Treaty on the functioning of the European Union and further in the additional protocols to the Treaty on European Union and Treaty on the functioning of the European Union as amended by the Lisbon Treaty (further only the Treaty):

- protocol No. 13 on the convergence criteria and
- protocol No. 12 on the excessive deficit procedure.

Comparing these criteria mainly macroeconomic stabilization of a particular country and economic development convergence of countries that

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<sup>3</sup> The European Central Bank (ECB) was established on 1 June 1998 and started to execute its competences on 1 January 1999, i.e. since the date of the Euro area formation. The ECB takes responsibility for executing the monetary policy in the Euro area. ECB has a legal subjectivity and is headed by the president of the ECB. The European System of Central Banks (ESCB) consists of the ECB and further of national central banks of EU member states, including those which did not enter the Euro area.

form the monetary union is monitored. The macroeconomic stabilization achievement is in the interest of every country regardless of its involvement in integration groupings. Contrary, the convergence of economic development of countries forming the monetary union is related to the loss of independent national currency, monetary policy and exchange rate also.

The main reason for establishing the convergence criteria has been an apprehension that the future monetary union would have adverse inflationary impacts on engaged economies. This idea comes from a thesis that if the monetary union has been entered by countries with different preferences regarding inflation rate, then probably countries with lower inflation would lose when entering the monetary union, particularly in the sense that the monetary policy of ECB would reflect an idea of the inflation level of all monetary union countries (not only countries with low inflation). Due to this fact an increase would probably occur in the entire monetary union (in countries with lower inflation as well).

### **Balassa-Samuelson Effect and Nominal Convergence**

The previous text dealt with the individual convergence criteria and reasons for their implementation that should have a positive effect on economic health of countries striving to achieve them. However, these criteria were criticized for various reasons:

- limited possibilities to assess the real convergence of observed economies,
- time horizon for the evaluation of meeting the Maastricht criteria that are considered for a relatively short time period,
- their zero-explanatory power to assess susceptibility and potential existence of adaptation mechanisms of compared countries when exposed to asymmetric shocks.



We need to draw attention to the fact that it is also important to focus on the context with Balassa-Samuelson effect (B-S effect), see Balassa (1964), Samuelson (1964), that has its foundation especially for countries of Central and Eastern Europe (countries which catch up with the economic level of developed countries of the EU).

This effect comes from a fact that within the economic integration there is a higher labour productivity in the sector of internationally tradable goods than in the sector of internationally non-tradable goods.<sup>4</sup>

The price development of internationally non-tradable goods is in a short and long period influenced by many factors. One of these factors is the exchange rate evaluation in nominal terms; this factor can have via tourist traffic an impact on internationally non-tradable goods. Another factor may be a change of nominal income. Its growth will cause with a minor delay demand inflationary pressures in internationally non-tradable goods (satisfying a condition that there is higher income elasticity in prices of internationally non-tradable goods than in prices of internationally tradable goods).

The price growth of internationally non-tradable goods can be explained also via labour productivity growth and growth of wages. Due to the labour productivity growth there is a growth of wages in the sector of internationally tradable goods. However, this wage contagion streams to the sector of internationally non-tradable goods where the labour productivity is lower. Therefore, in the sector of non-tradable goods it leads to the growth of wages without an adequate productivity growth and these facts are forcing manufacturers in the sector of non-tradable goods to increase prices. The result is that it leads to a pressure on inflation growth from internationally non-tradable goods. According to the International Monetary Fund the B-S effect, in countries with higher labour productivity growth, can be calculated to 1,5–2 p. p. of price level growth, see Mandel and Tomšík (2008). Consequently, the very existence of B-S effect complicates the meeting of

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<sup>4</sup> The tradable goods generally include products of manufacturing industry, such as machinery and equipment, articles of food, clothing, footwear, communication equipment and services, drugs. The non-tradable goods generally comprise services, for example health care, social services, education, public administration etc.

Maastricht criteria of price stability in most candidate countries of the Euro area, as De Grauwe (2009) states.

Analytical report dealing with a study of the relationship between price level and economic level, see the ČNB (2008), shows that the price level in the Czech Republic in 2007 was below the level which would correspond to the achieved economic level, namely by about 17,5 percentage point. International comparison, performed by Čihák and Holub (2001), proves rather the existence of close relationship between the average price level and GDP per capita in purchasing power parity. Empirically, ergo, they confirm the relationship between these quantities almost one to one which is in line with the results of Balassa-Samuelson model. What is the cause for the lower price level in the Czech Republic in relation to the average price level in the Euro area?

In the article of Čihák and Holub (2001), among other things, it is stated that the relation between GDP in the purchasing power parity and price level does not have to have a unit slope, for it depends on the share of nontradable goods in GDP and the share of capital on the production of these goods. Obstfeld a Rogoff (1998) developed the original B-S model with the real dimension in the sense that in the reality it is not possible to strictly distinguish between tradable and nontradable goods because their distinction in praxis is almost impossible. In fact, every final good contains tradable and nontradable element. Due to this finding Čihák and Holub (2001) formed the so-called coefficient of price deviations which measures the bias of relative prices of tradable goods to nontradable goods in a monitored economy towards a reference country. The cause of the low-price level in the Czech Republic has been observed mainly in abnormally low regulated prices (mainly in health service and education) and the existence of monopolistic competition which in foreign markets reaches lower monopolistic surcharges because of perceiving the production of domestic market structure as a less qualitative relatively to the production of monopolistic firms of developed countries. Also, high labour productivity (on the level of majority of developed countries) in the sector of nontradable

goods which lowers unit labour costs in this sector and therefore the entire price level of the country, was considered to be statistically significant.

An important finding, reminded by Mandel and Tomšík (2008), cannot be left out. It is that at a fixed rate the B-S effect is fully poured into price increases, in a floating exchange rate it is divided between the nominal currency evaluation and price level growth. The second example is typical for the Czech Republic, while in early 1998 the Czech National bank moved to the inflation targeting regime and left the development of nominal exchange rate on the interaction of supply and demand on exchange market. Convergence of price level in the Czech Republic is done through the exchange rate channel.

Another important factor influencing price level growth in the sector of internationally nontradable goods is the share of budget revenues in GDP. This situation is typical for economically backward countries or transforming countries, where expenses, for example expenses for housing, health care, education and public transport are financed within the social policy. On the other hand, these economies are characterized by their high-tax business activities. The growth of regulated prices causes not only price growth in the sector of internationally nontradable goods, but also reducing budgetary resources, with the contribution of reducing the tax burden.

The following Table 1 shows an overview of selected studies of Balassa-Samuelson effect in various European countries.

In addition, there exist other theories, which deal with relation between productivity and appreciation. One of them is called the Dutch Disease. It is named after situation in the Netherlands in 1950s and 1960s.<sup>5</sup> It deals with relationship between the increase in the economic development of a specific sector (natural resources are commonly used) and a decline in other sectors. The theory claims that, an exogeneous shock (discover new resources) in one sector will lead to growth of productivity of this sector and therefore to growth of real appreciation in whole economy. The other sectors, nevertheless, face the same appreciation without growth of productivity. These sectors are, therefore, less competitive in foreign markets. This can

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<sup>5</sup> The Groningen natural gas field was discovered in 1959.

lead to stagnation of economy. Paradoxically, this stagnation is caused by positive economic shock.

**Table 1. Selected studies of Balassa-Samuelson effect**

Author (year)	Chronological and cross- sectional dimension	Method	The dependent variable	The expl. variable	Estimation of the B-S effect*
Égert (2002)	1993–2001 CZ, HU, PL, SK, SI	Cointegration test, VAR	Inflation differentials (vis-a-vis DM) of nontradable goods	Relative productivity	0,2–0,6 (CZ) 2,6–3,5 (HU) 1,5–3,3 (PL) –0,2– –0,4 (SK)
Błaszkiwicz et al. (2004)	1995–2003 CZ, EE, PL, LT, SK	Panel (FMOLS a PMG)	The price ratio of nontradable and tradable goods	Relative productivity	0,4–0,6 (panel) 0,5–0,6 (CZ) 0,8–1,0 (EE) 0,8–0,9 (LT) 1,2–1,3 (PL)
Mihaljek and Klau (2008)	1996–2008 BG, HR, CZ, EE, HU, LV, LT, PL, RO, SK, SI	OLS	The price ratio of nontradable and tradable goods	Relative productivity	–2,9–4,7 (domestic) 0,0–4,6 (inter- national)

Note: (\*) the impact of productivity growth in the sector of tradable and nontradable goods on the relative prices of nontradable goods, indicated in percentage points per year (internal B-S effect); CZ – the Czech Republic, EE – Estonia, LT – Lithuania, PL – Poland, SK – Slovakia. Source: Reiner and Winkler (2009).

## **The Relation between Nominal and Real Convergence**

There is a lot of professional contributions on the issue of the real and nominal convergence relationship, for example Vášáry and Halmai (2010), Égert (2007), De Grauwe and Schnabl (2005), Kutan and Yigit (2004), Hein and Truger (2005). Some economists consider real and nominal convergence

as mutually supporting processes, others point to their rivalry. Economists who understand the real and nominal convergence as mutually supporting processes, based on the thesis that a stable macroeconomic environment defined by the Maastricht convergence criteria, can act as a stimulating factor of business activities. Then by supporting the business activities, better conditions for faster economic growth are created.

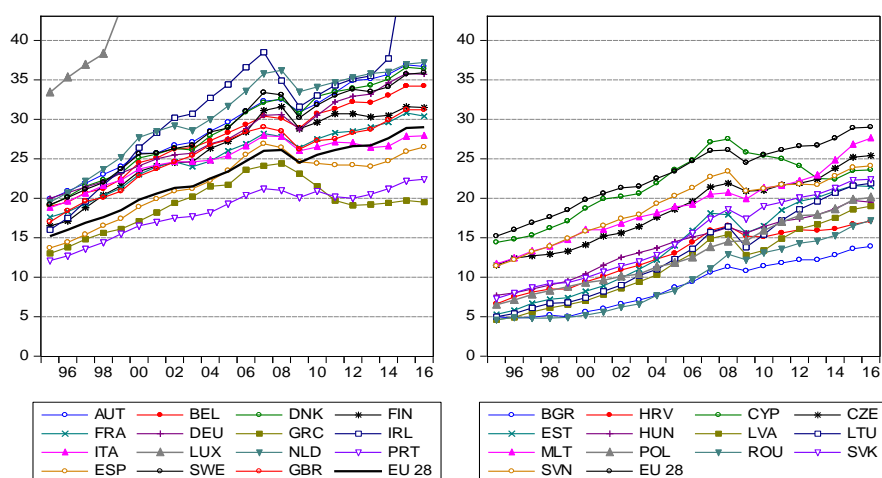
Mandel and Tomšík (2008) however believe that approximation on the nominal level, which leads to entry into the Euro area, does not necessarily contribute to the increase of real convergence. Contrary it may increase the convergence of nominal indicators at the expense of real convergence indicators. Lower inflation and lower public finance deficit can be achieved at the cost of lower economic growth and vice versa. It can be then deduced that the pursuit of rapid convergence of price level to the level prevailing in the EU and at the same time increasing of the real convergence can be seen as rival and therefore mutually exclusive goals.

However, there are opinions that support rapid integration into the monetary union because they suppose that there is a support of the real convergence. It is based on the idea that there is an elimination of exchange rate risk and currency crisis in the monetary union. Generally, currency crises are very expensive and they can hinder economic growth and thus the real convergence. This idea is based on the criteria endogeneity of optimum currency area theory which postulates that countries meet the criteria of optimality of monetary area easier after joining the monetary union, for details see De Grauwe and Schnabl (2005), Horvath and Komárek (2002).

The issue of the relationship of nominal and real convergence is expressed by representatives of European institutions, such as the former governor of the ECB Jean-Claude Trichet in 2002 who pointed out that meeting the nominal convergence criteria must be maintainable in the future, not only at the time of the entry into the Euro area and the sustainability of their fulfilment assumes sufficient progress in real convergence. Nominal and real criteria, according to him, are interdependent and therefore they must be monitored simultaneously.

## DEVELOPMENT OF GDP PER CAPITA

Figure 1 depicts the development of GDP per capita in purchasing power standard (PPS EU-28) in the 28 countries that now make up the EU (the EU-28) over the period 1995 to 2016. Left panel shows the development in the 15 countries that entered the EU before 2004 (EU-15), right panel captures the development in the 13 countries which was adopted as EU member in 2004 and later (EU-13).



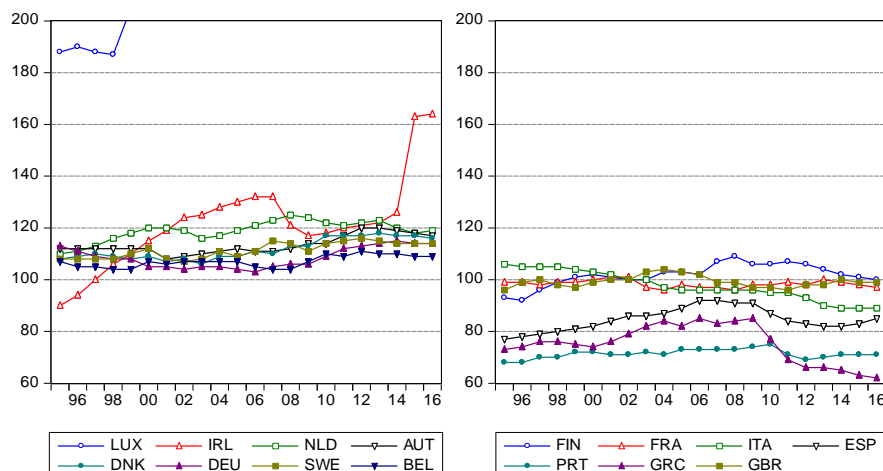
Note: Luxembourg (LUX) is not included for the 2002-2016 period in order to show the other countries better. Its GDP per capita surpassed 77000 PPS in 2016. Ireland (IRL) is not included for the 2015-2016 period. Its GDP per capita achieved 51300 PPS in 2016. The bold line without symbols shows the average EU-28 GDP per capita.

Source: Eurostat (2019).

Figure 1. Development of real GDP per capita in the EU-28 in 1995-2016 (in 1000 PPS EU-28).

As shown in Figure 1 difference between countries with the highest and lowest GDP per capita in absolute terms in the EU between 1995 and 2016 increased from 28 800 PPS in 1995 to 46 400 PPS in 2004 and 63 500 PPS in 2016. In the case when Luxembourg is excluded from comparison because GDP per capita computations are distorted by the high number of

cross-border workers differences increased from 15400 PPS in 1995 to 25000 PPS (in 2004) and 37400 PPS (in 2016).



Note: Luxembourg (LUX) is not included for the 1999-2016 period in order to show the other countries better.

Source: Eurostat (2019).

Figure 2. Development of real GDP per capita in the EU-15 countries towards EU-15 level in 1995-2016 (EU-15 = 100).

Differences in GDP per capita levels between EU-15 countries with the highest and lowest GDP per capita increased between 1995 and 2016 in absolute terms (from 21300 PPS to 35900 PPS in 2004 and 57900 PPS in 2016) both in relative terms. This fact shows also Figure 2, which shows GDP per capita in relation to the EU-15 average.

If we in the EU-15 do not consider Luxembourg with the highest GDP per capita, the differences between the highest and lowest GDP per capita are 7900 PPS in 1995, 14500 PPS in 2004 and 31800 PPS in 2016. In relative terms, however, differences in GDP per capita increased slightly from 1,65 times in 1995 to 1,8 times in 2004 and 1,94 times in 2014. In period 2015-2016 the difference between the highest and lowest GDP per capita increased to 2,6 times. When including Luxembourg differences are of course much higher.

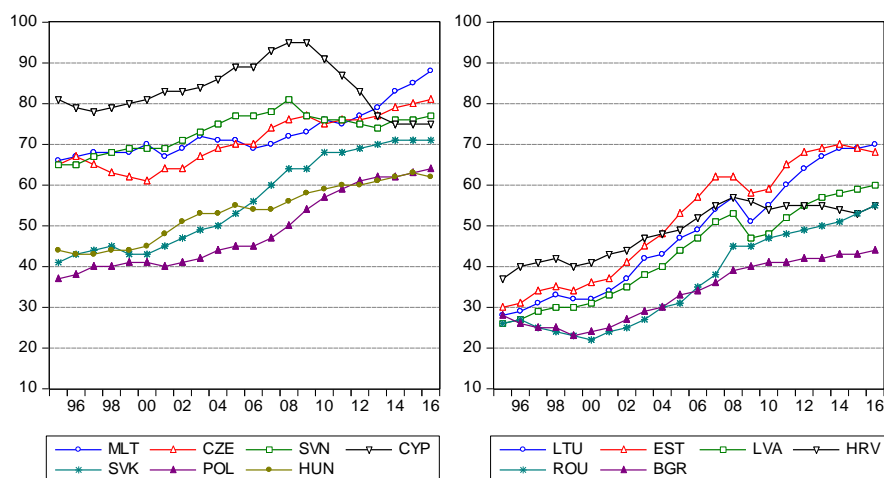
In contrast, the differences in GDP per capita levels between EU-13 countries increased only in the period from 1995 to 2004. After 2004 the differences in absolute terms between EU-13 countries decreased from 14200 PPS to 13700 PPS. In relative terms differences between EU-13 countries GDP per capita decreased the whole period from 1995 to 2016, although in some cases did not change. Differences between EU-13 countries in relative terms decreased from 3,13 times in 1995 to 1,99 times in 2016. Development trends of differences between EU countries in terms of GNI per capita in purchasing power parity (not reported here) in the period 1995-2016 are simile.

Figure 2 proves also evident divergence in the level of GDP per capita between the original six founding members of the EU, which started to appear after 2002. If we draw our attention to the catching-up and seven most indebted countries in the EU-15 in 2013 (i.e., Greece, Portugal, Italy, Ireland, Belgium, Cyprus, and Spain) an extremely high growth rate of GDP per capita was shown by Ireland. The level of 89% reached by the EU-15 in 1995 was outdone in 2007 at the level of 131% above the EU-15 average, but then there was a reduction to values of around 117% of the EU-15, where it is at today. However, in terms of GNI per capita Ireland reached only the level 106% of EU-15 average and after 2007 was a reduction to values around 92% of the EU-15 average. Spain demonstrated also a successful development of GDP per capita up to 2007 and it reached a level of 93,5% of the EU-15. In the case of Greece, the only successful development was recorded in the period 2000-2004 and Portugal came very slightly closer to a level of the EU-15 during the reporting period 1995-2010. Since 2009, the level of GDP per capita in the latter three countries in relation to the EU-15 average has been decreasing and these economies are diverging.

The EU-13 countries show a much lower GDP per capita in purchasing power standard. Figure 3 shows the development of GDP per capita in these countries in the period 1995-2016 in relation to the EU-15 average. Generally, what is valid is that they get closer from below to the level of the EU-15 average. For the period 1995-2010 also Sopek (2013) states that in the whole period 1995-2010 all new member states and Croatia were below the all 27 EU member states average, but they recorded GDP per capita



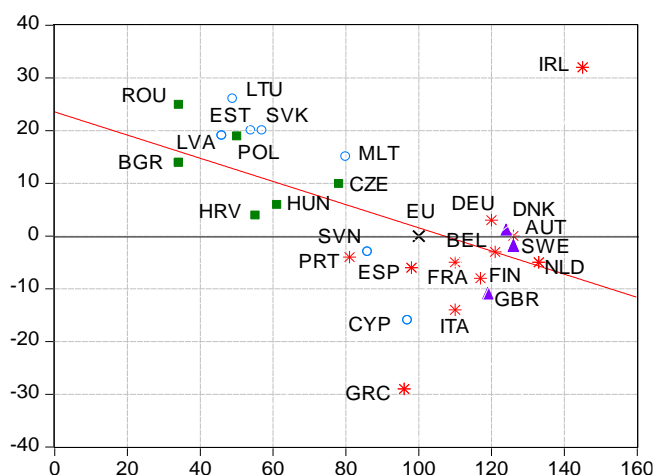
growth comparable to the EU-27 average. The possibilities of convergence from below are considerable for these countries. At present, they are gradually beginning to approach the level of Portugal or Greece, which these countries demonstrated in 1995. The exceptions among the new EU member states EU-13 are Cyprus, Malta, Slovenia and the Czech Republic, whose initial level of GDP per capita was higher.



Source: Eurostat (2019).

Figure 3. Development of real GDP per capita in the EU-13 countries towards EU-15 level in the period 1995-2016 (EU-15 = 100).

Among the five Central European Countries (CEC-5) only countries with the lowest baseline level of GDP per capita (i.e., Poland, the Slovak Republic, and Hungary) converge towards the EU-15 GDP per capita level throughout the period 1995-2011. The Czech Republic diverged slightly in the late 90s and again after 2009, Slovenia shows a slight divergence from 2008. Similar development tendencies are also documented by Siljak and Nagy (2018), Rapacki and Prochniak (2019) and others.



Note: X-axis: GDP per capita in 2004. Y-axis: difference in relative position 2004-2016.  
Source: Own calculations based on Eurostat (2019).

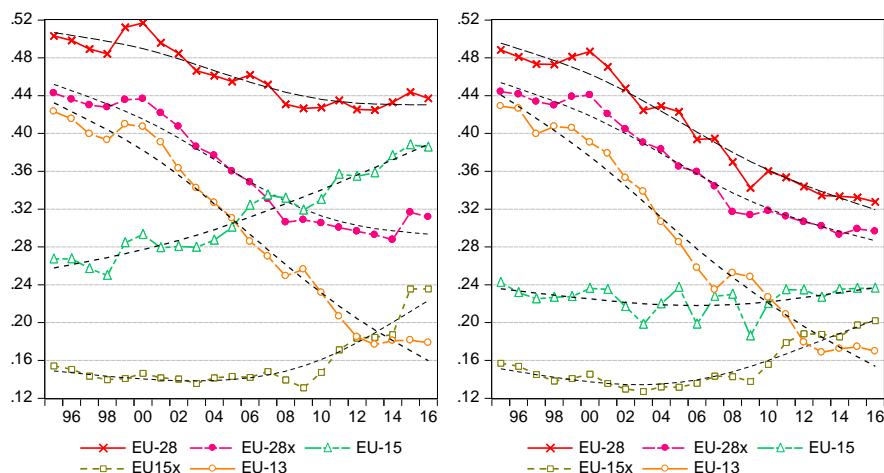
Figure 4. GDP per capita growth relative to the EU-28 in the period 2004-2016 (GDP per capita in PPS, EU-28 = 100).

In the period 2004-2016 some degree of real convergence took place among EU-28 countries. However, developments in the EU-13 were different from those in the EU-15. As shown in Figure 4, both the EU-13 countries outside the euro area (green squares) and the EU-13 countries that have adopted the euro (blue circles) performed better than the EU-15 (euro area countries red stars, non-euro area countries purple triangles). Lithuania, Romania, Estonia, Slovakia, Latvia and Poland have recorded the highest degree of convergence among the EU countries so far, followed by other EU-13 countries (Malta, Bulgaria, the Czech Republic, Hungary, Croatia).

## Sigma Convergence

Sigma convergence simply refers to a reduction of disparities in levels of real income per capita among countries in time. Development of the coefficients of variation GDP per capita in the European Union in the period 1995-2006 is portrayed in the left panel of the Figure 5, development of the

coefficients of variation GNI per capita is shown in the right panel of the Figure 5.



Source: Own calculations based on Ameco (2019).

Figure 5. Development of coefficients of variation in the period 1995-2016 (left panel: GDP per capita in PPS, right left panel: GNI per capita in PPS).

Sigma convergence of the EU countries is shown in more variants. As GDP/GNI per capita of Luxembourg began rising rapidly in the 80's and from 1995 it reached 191% of the EU-15 average GDP per capita (in PPS EU-28), sigma convergence (coefficients of variation of the real variables per capita) is assessed both for the whole EU-28/EU-15, and for the EU-28x/EU-15x, e.g. EU-28/EU-15 excluding divergent Luxembourg.

The Figure 5 shows that before 2000 convergence of the EU-15x (EU-15 excl. Luxembourg) almost stopped, and then continued up to 2003. The following stagnation was replaced by a sharp sigma divergence that returned the EU-15 back to the level achieved in the past in 1997. What is also depicted are the lines for the EU-13 (member countries which adopted EU in 2004 and later), whose downward trend shows the acceleration of sigma convergence after 2000, which lasted up to 2009.

In order to verify the sigma convergence hypothesis, we estimate trend lines for the coefficients of variation development by using Hodrick-Prescott

filter (trend lines also displayed in Figure 5) both the linear trends for the coefficients of variation development in the period 1995-2016 and in sub-period 2004-2016. Results of linear trend regressions (using the method least squares) for development of coefficients of variation based on GDP per capita (in PPS EU-28) are presented in Table 2. In all cases except EU-15 is parameter of trend line slope negative, thus sigma convergence exists or more precisely the hypothesis is verified. The slope of the trend line for the EU-15 is positive, but the parameter is statistically insignificant.

**Table 2. Trend lines estimations of coefficients of variation (GDP per capita PPS, 1995-2016 and 2004-2016)**

Depend. var.		Coeff.	Std.	t-Stat.	Probab.	R2
Time period			Error			adj. R2
CV GDP_EU	Interc.	0.5066	0.006	83.67	0.0000	0.788
1995-2016	Slope	-0.0043	0.000	-8.61	0.0000	0.777
CV GDP_EU	Interc.	0.4526	0.006	77.42	0.0000	0.390
2004-2016	Slope	-0.0022	0.001	-2.65	0.0225	0.334
CV GDP_EUx	Interc.	0.4513	0.008	55.98	0.0000	0.893
1995-2016	Slope	-0.0085	0.001	-12.94	0.0000	0.888
CV GDP_EUx	Interc.	0.3512	0.010	36.78	0.0000	0.597
2004-2016	Slope	-0.0055	0.001	-4.04	0.0020	0.561
CV GDP_EU-15	Interc.	0.2474	0.005	48.30	0.0000	0.920
1995-2016	Slope	0.0063	0.000	15.15	0.0000	0.916
CV GDP_EU-15	Interc.	0.2963	0.005	57.17	0.0000	0.908
2004-2016	Slope	0.0076	0.001	10.42	0.0000	0.900
CV GDP_EU-13	Interc.	0.4445	0.007	61.24	0.0000	0.965
1995-2016	Slope	-0.0138	0.001	-23.40	0.0000	0.963
CV GDP_EU-13	Interc.	0.3132	0.008	41.22	0.0000	0.933
2004-2016	Slope	-0.0132	0.001	-12.33	0.0000	0.926

Note: The abbreviation EUx is used for EU-28 except Luxembourg.

Source: Own calculations based on Ameco (2019).

The development of sigma convergence measured in terms of the GNI per capita (right panel of the Figure 5) demonstrates very similar features to development of sigma convergence measured in the GDP per capita. As can be seen from Table 3, sigma convergence in the EU exists or more precisely the hypothesis is verified only for EU-28, EU-28 except Luxembourg, and

EU-13. The trend line slope parameter for the EU-15 in the case of GNI is positive but not statistically significant for both the whole period 1995-2016 and subperiod 2004-2016.

**Table 3. Trend lines estimations of coefficients of variation (GNI per capita PPS, 1995-2016 and 2004-2016)**

Dependent var.		Coeff.	Std.	t-Stat.	Prob.	R-sq.
Time period			Error			R-sq.adj.
CV GNI_EU	Interc.	0.5026	0.006	83.78	0.0000	0.945
1995-2016	Slope	-0.0091	0.000	-18.52	0.0000	0.942
CV GNI_EU	Interc.	0.4147	0.007	59.73	0.0000	0.869
2004-2016	Slope	-0.0084	0.001	-8.52	0.0000	0.857
CV GNI_EUx	Interc.	0.4567	0.006	80.90	0.0000	0.946
1995-2016	Slope	-0.0086	0.000	-18.76	0.0000	0.944
CV GNI_EUx	Interc.	0.3654	0.006	59.49	0.0000	0.853
2004-2016	Slope	-0.0069	0.001	-7.98	0.0000	0.839
CV GNI_EU-15	Interc.	0.2255	0.006	36.98	0.0000	0.000
1995-2016	Slope	0.0000	0.000	0.01	0.9956	-0.050
CV GNI_EU-15	Interc.	0.2149	0.008	27.05	0.0000	0.163
2004-2016	Slope	0.0016	0.001	1.46	0.1711	0.087
CV GNI_EU-13	Interc.	0.4421	0.007	61.30	0.0000	0.967
1995-2016	Slope	-0.0143	0.001	-24.40	0.0000	0.966
CV GNI_EU-13	Interc.	0.2911	0.008	38.60	0.0000	0.914
2004-2016	Slope	-0.0115	0.001	-10.83	0.0000	0.906

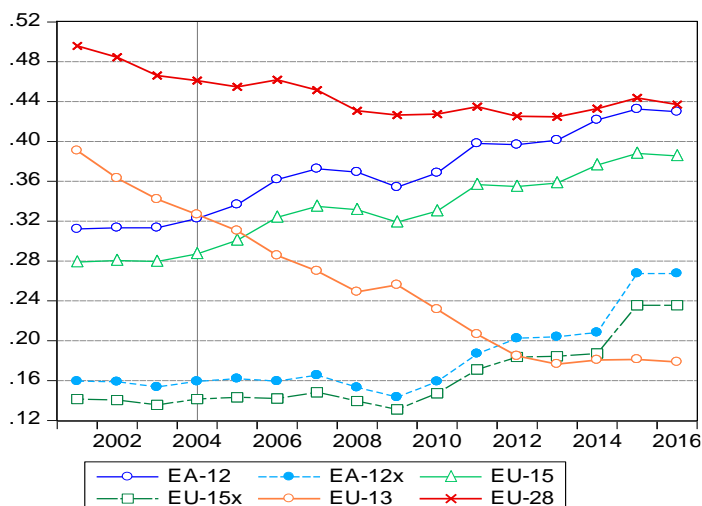
Note: The abbreviation EUx is used for EU-28 except Luxembourg.

Source: Own calculations based on Ameco (2019).

What clearly follows from the comparison of sigma convergence of GDP per capita both GNI per capita is that the economic growth and business cycles in EU-15 countries are not synchronized.

Between 1995 and 2016 some degree of real convergence in GDP per capita took place among the 28 countries that now make up the EU-28 (see Figure 6). EU-13 countries performed over the period better than EU-15 countries both euro area countries that adopted the euro before 2002 (EA-12). Since 2001, we can observe divergence trends in both EA-15 and euro area (EA-12). Moreover, the sigma-convergence in the EU-13 shows from

2013 also stagnation. Therefore, it is advisable to monitor both short-term and long-term development trends.



Source: Own calculations based on Ameco (2019).

Figure 6. Sigma divergence in EU-15 - development of coefficient of variation for GDP per capita (2001-2016).

## Beta Convergence

Beta convergence occurs when less developed countries grow faster than more developed countries, meaning that there is a negative relationship between initial GDP (or GNI) per capita level and its growth rate. In order to verify beta convergence hypothesis, regression equation was estimated by using the method least squares.

Estimates were again performed alternatively for four groups of EU member states: the EU-28, the EU-28 excluding Luxemburg, the EU-15, and the EU-13, i.e., for 13 countries which was adopted as EU member in 2004 and later.

The results of equation estimations for beta convergence of GDP per capita both beta convergence of GNI per capita in the European Union for

the period 1995-2016 are shown in Table 3 and Figure 7. For detailed results see Appendix – Part 1.

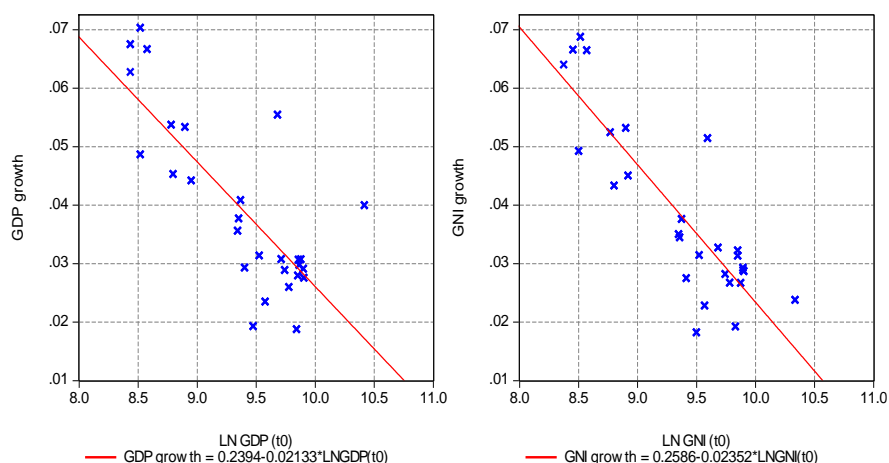
**Table 4. Beta convergence in the European Union, 1995-2016**

	Variable	Coefficient	t-Statistic	Prob.	Adj. R2
GDP EU	Interc.	0.239360	7.868657	0.0000	0.610412
	Slope	-0.021328	-6.580576	0.0000	
GDP EUx	Interc.	0.270490	9.551224	0.0000	0.716559
	Slope	-0.024755	-8.168834	0.0000	
GNI EU	Interc.	0.258585	10.34000	0.0000	0.739771
	Slope	-0.023520	-8.817871	0.0000	
GNI EUx	Interc.	0.268958	10.21196	0.0000	0.743803
	Slope	-0.024666	-8.745536	0.0000	

Note: The abbreviation EUx is used for EU-28 except Luxembourg.

Source: Own calculations based on Ameco (2019).

The third column in Table 4 shows the estimates of the regression equation. The  $\beta$  coefficients are negative, which indicates beta convergence for both the GDP per capita and GNI per capita in the EU-28 or in the EU-28x (EU-28 excluding Luxembourg).



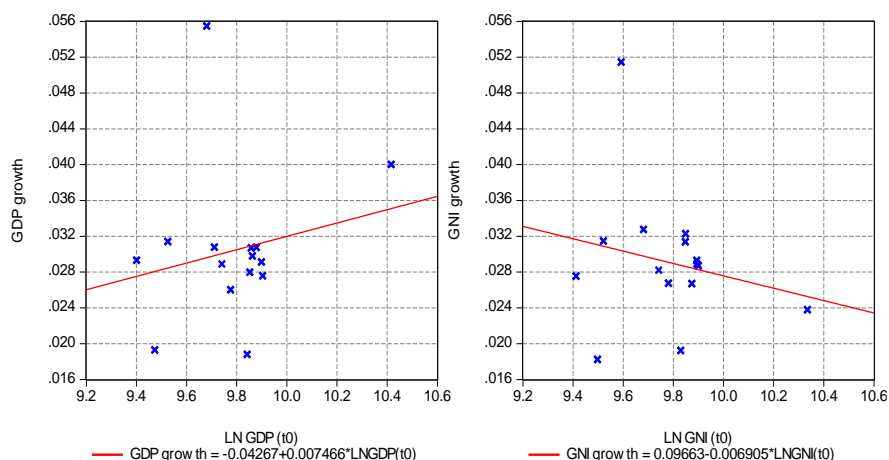
Source: Own calculations based on Ameco (2019).

Figure 7. Beta convergence among the EU-28 countries in the period 1995-2016 (GDP per capita, GNI per capita).

Results of the empirical analyse of beta convergence in Table 4 also show that the exclusion of Luxembourg from the convergence analysis affects the results. The beta coefficient in absolute value increases and the speed of convergence increases. The coefficient of determination increased to 71,7 %, which means that the initial level of income in this model can account for 71,7% variation in GDP growth rates between countries and 74,3% variation in GNI growth rates respectively. Slavík (2007) came to similar results, too.

Calculations of beta convergence in the period 1995-2016 also show, that the speed of beta convergence obtained in analyse without Luxembourg is higher.

The results of beta convergence estimations for GDP/GNI per capita both in the EU-15 and in the EU-13 for the period 1995-2016 are shown in Table 5 and Figures 8 and 9. For detailed results of estimations see Appendix - Part 2.



Source: Own calculations based on Ameco (2019).

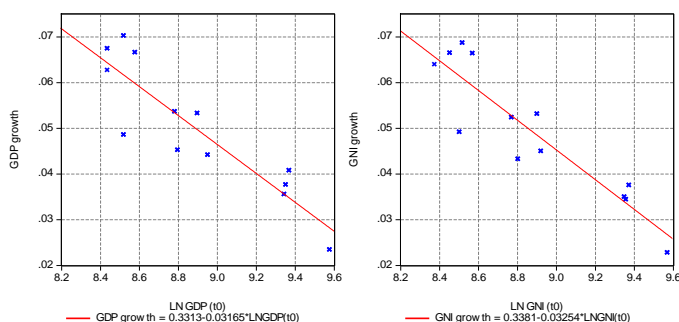
Figure 8. Beta convergence/divergence among the EU-15 countries in the period 1995-2016 (GDP per capita, GNI per capita).



**Table 5. Beta convergence in the EU-15 and EU-13 countries, 1995-2016**

	Variable	Coefficient	t-Statistic	Prob.	Adj. R2
GDP EU-15	Interc.	-0.042668	-0.445564	0.6632	-0.030731
	Slope	0.007466	0.763280	0.4589	
GNI EU-15	Interc.	0.096627	1.080025	0.2998	-0.031720
	Slope	-0.006905	-0.754705	0.4639	
GDP EU-13	Interc.	0.331295	8.061868	0.0000	0.792853
	Slope	-0.031648	-6.850542	0.0000	
GNI EU-13	Interc.	0.338088	8.765118	0.0000	0.821451
	Slope	-0.032536	-7.497223	0.0000	

Source: Own calculations based on Ameco (2019).



Source: Own calculations based on Ameco (2019).

Figure 9. Beta convergence among the EU-13 countries in the period 1995-2016 (GDP per capita, GNI per capita).

From the analysis of convergence in the EU-15 countries we can draw conclusions about some divergence tendencies. In the case of the GDP per capita growth we can see a positive beta coefficient, which indicates beta divergence. However in the case of the GNI per capita growth we can see beta convergence.

## CONCLUSION

Based on the analysis, we can state that the EU-13 member countries converge to the EU-15 average. Convergence rate of the CEC-5 is somewhat

lower than the speed of convergence of the new EU member states as whole. This is probably due to a higher initial level of GDP per capita in PPS in CEC-5 countries. The speed of convergence and difference in GDP per capita as compared with the EU-15 imply that convergence to the EU-15 average will be a long-term process.

From the analysis of convergence of the EU-15 countries we can draw conclusions about some divergence tendencies. These are smaller, once the outlying observations (Luxembourg) have been excluded from the analysis. In our opinion, we can only proceed in this way in the case of relatively small economies, whose share of GDP across the whole EU is very small.

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## APPENDIX

Statistics for used beta convergence models – Part 1				
	EU-28	EU-28X	EU-28	EU-28X
Dependent Variable:	GDP GROWTH	GDP GROWTH	GNI GROWTH	GNI GROWTH
Method:	Least Squares	Least Squares	Least Squares	Least Squares
R-squared	0.624841	0.727461	0.749409	0.753657
Adjust. R-squared	0.610412	0.716559	0.739771	0.743803
S. E. of regression	0.009375	0.008148	0.007681	0.007625
Sum squared resid	0.002285	0.001660	0.001534	0.001453
Log likelihood	92.05972	92.59562	97.63791	94.38980
F-statistic	43.30398	66.72985	77.75485	76.48440
Prob(F-statistic)	0.000001	0.000000	0.000000	0.000000
Mean dependent var	0.039523	0.039504	0.038438	0.038980
S. D. dependent var	0.015020	0.015305	0.015058	0.015064
Akaike info criterion	-6.432837	-6.710787	-6.831279	-6.843689
Schwarz criterion	-6.337680	-6.614799	-6.736122	-6.747701
Hannan-Quinn criter.	-6.403746	-6.682245	-6.802188	-6.815146
Durbin-Watson stat	2.059046	2.582876	2.299851	2.410683

Statistics for used beta convergence models – Part 2				
	EU-15	EU-15	EU-13	EU-13
Dependent Variable:	GDP GROWTH	GNI GROWTH	GDP GROWTH	GNI GROWTH
Method:	Least Squares	Least Squares	Least Squares	Least Squares
R-squared	0.042893	0.041975	0.810115	0.836330
Adjust. R-squared	-0.030731	-0.031720	0.792853	0.821451
S. E. of regression	0.008661	0.007639	0.006418	0.006131
Sum squared resid	0.000975	0.000759	0.000453	0.000413
Log likelihood	51.02377	52.90672	48.27128	48.86652
F-statistic	0.582597	0.569579	46.92993	56.20835
Prob(F-statistic)	0.458925	0.463880	0.000028	0.000012
	EU-15	EU-15	EU-13	EU-13
Dependent Variable:	GDP GROWTH	GNI GROWTH	GDP GROWTH	GNI GROWTH
Mean dependent var	0.030405	0.029122	0.050043	0.049186
S. D. dependent var	0.008531	0.007521	0.014102	0.014510
Akaike info criterion	-6.536503	-6.787563	-7.118659	-7.210234
Schwarz criterion	-6.442096	-6.693156	-7.031744	-7.123319
Hannan-Quinn criter.	-6.537509	-6.788569	-7.136524	-7.228099
Durbin-Watson stat	2.980165	3.307791	1.110056	0.865975



*Chapter 10*

## **TAX COMPETITION AND BAILOUTS IN THE EUROZONE: SOLIDARITY OR INJUSTICE?**

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### **ABSTRACT**

This chapter deals with the controversy generated about the fairness of bailouts within the Euro area, mainly in countries with a better budgetary balance, which are normally also those that impose a higher tax burden. More specifically, it is questioned whether such bailouts respond to the necessary solidarity between the partners of the area or whether they can be considered unjust if the states use taxation as a weapon of unfair competition to snatch new investments from the rest of the member countries. Based on a panel of 2,844 listed companies in the Eurozone in the period 2005-2016, this paper analyses whether the rescued countries show a different corporate tax burden after having received financial assistance. We first compare the effective tax rate (ETR) between countries for the period analysed. Next, we apply Generalized Moments Method (GMM) to analyze two models and finally, an individual analysis is carried

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out for each rescued country (Greece, Portugal, Ireland, Spain and Cyprus) to assess possible significant differences in the tax burden before and after the bailout. The results show that when considering the rescued countries altogether the ETR increases both the year of the bailout and the year after. However, the evolution of the individual rates does not evidence the same results. In particular, only Spain shows statistically significant differences between the ETR before and after the bailout.

**Keywords:** Eurozone, effective tax rate, bailout, corporate income tax

## INTRODUCTION

Since the founding treaty in Maastricht in February 1992, the European Union has come a long way, one of the most important milestones of which is the creation of the Eurozone with the introduction of the single currency.

However, the ambitious amendment of Article 3 of the Treaty of Rome provides for the free movement of goods, persons, services and capital (c) and the need to ensure that competition in the internal market is not distorted (g). That amendment has facilitated the emergence of some undesirable effects such as tax competition between countries. The Commission of the European Communities set up, at the end of 1990, a committee of experts to assess whether differences in corporate and trade taxes between countries could lead to distortions affecting the functioning of the internal market. However, tax harmonisation remains a pending issue in the European Union.

This lack of harmonisation is particularly relevant within the Eurozone since the adoption of the euro has required the transfer of the monetary policy to the European Central Bank (ECB). That leads to the loss of the economic intervention mechanisms for the Member States, which are now practically limited to fiscal policy.

Certainly, the adoption of the Directive (EU) 2016/1164 on combating tax evasion and the possible temporary application of a tax similar to the so-called “Google tax,” while not being strictly harmonising measures, could have a positive effect on reducing this harmful tax competition between Member States. However, to move forward we will have to wait and see if



the words of the new European Commissioner for economic affairs, Paolo Gentiloni, placing among his tasks the monitoring of European efforts to harmonise business taxes have tangible results.

In this context, the Eurozone has had to rescue some of its member states as a result of the debt crisis and the impact of the bursting of the housing bubble on its financial systems. This has fuelled the debate over tax disparity, since some of the rescued countries, such as Ireland and Cyprus, had statutory tax on corporate profits substantially lower than the average of the Eurozone and, in particular, some of the most powerful countries.

So, is it reasonable that countries that require greater taxation from their companies must rescue other member states with lower tax rates that, in addition, give them an advantage in raising new investments? Is it solidarity or injustice?

These are obviously complicated questions since they ignore many other related topics to belonging to the Eurozone. The main objective of this chapter is to analyse whether these differences in statutory rates are reflected in the effective taxation that companies borne. And where appropriate, if the rescued countries have been forced to increase their tax burden after the aid received.

Thus, in the first place, a review of the effective tax burden on profits of listed companies in the Eurozone countries will be made. Subsequently, the work will focus on analysing the evolution of taxation in the five member states that were rescued or that received financial assistance for their banking system: Greece (05/2010, 02/2012 and 08/2015), Ireland (11/2010), Portugal (05/2011), Spain (06/2012) and Cyprus (03/2013).

The remainder of the paper is as follows. After this introduction we review the most recent previous literature regarding the use of the effective tax rate as an instrument to measure the tax burden. Next, we define the variables, sample and methodology used. Then we present the results and, finally, the main conclusions.

## **THEORETICAL BACKGROUND: TAX HARMONIZATION AND EFFECTIVE TAX RATE**

The report issued in 1992 by a committee of experts chaired by Dutch Ono Ruding, noted that all Member States tax systems practiced discrimination between domestic and foreign investment (European Commission 1992). Tax diversity especially affected free competition and the location of investments, as well as the possible use of hidden incentives and the consequent erosion of tax transparency.

Therefore, the harmonization of corporate income tax would not have the same effect on all countries, because welfare would increase in some countries but at the expense of others (Budryte 2005).

More than a decade after the report, the European Commission (Mors et al. 2004) proposed an alternative system based on the consolidation of the tax base, also used in the United States and Canada, known as the Common Consolidated Corporates Tax Base (CCCTB). Studied by Bettendorf et al. 2009, its results show that tax competition does not disappear with consolidation but takes a different way. Therefore, the authors argue that the consolidated tax base must be complemented by harmonization of rates.

This harmonization of corporate tax would reduce the fiscal competition between different countries to attract foreign investments, among others. However, this is an extremely complex issue since taxation is probably the most important economic policy tool that governments still retain in the Eurozone. In addition, the agreement reached by the Eurocamara in March 2013, known as the two-pack, to increase community control over the general budgets of the Eurozone states as of 2014 increased its complexity.

Some countries have been using the income tax so far, as a way to encourage certain economic activities through incentives or bonuses that allowed to substantially reduce the real taxation of companies (Holtzblatt et al. 2016; DeZoort et al. 2018). The overall reduction of statutory rates in recent years (Leibrecht and Hochgatterer 2012) has also been manifested in the Eurozone (European Commission 2019).

The possibility of adopting a common tax system in the future continues to be an open debate (Mooij and Nicodeme 2008; Bettendorf et al. 2009; Fuest and Peichl 2012; European Commission 2019). In the crisis scenario crossed by the European Union in recent years, the initial responses to address it differed in nature and proportion (Hemmelgarn and Nicodeme 2010, 16-18) and did not reach their goal. This, among other consequences, forced the community rescue of some of the countries with lower statutory tax rates.

On the one hand, this financial assistance came from the European Financial Stabilisation Mechanism (EFSM), activated for Ireland, Portugal and Greece (European Union 2010). On the other hand, the European Financial Stability Facility (EFSF) was temporarily activated for these countries but has ceased to be used since the creation of the European Stability Mechanism (ESM), which has provided financial assistance to Spain, Cyprus and Greece. This latter mechanism consolidates and merges the previous two, established temporarily after the sovereign debt crisis and coexists with these today<sup>1</sup>.

Both, the starting situations and the total amount of aid were different (Abad 2012). In addition, the supports implied important reforms in the budgetary, economic, structural and supervisory fields (Krajewska 2014; European Commission 2015).

Accordingly, the interest in quantifying the true level of tax burden applied by the states has been increasing. Particularly, since the beginning of the 1970s, the *Securities and Exchange Commission* (SEC) required listed companies to report a reconciliation between statutory and effective tax rates. Numerous studies have been carried out using the ETR as an indicator, although with different formulations for calculation based on the objectives.

This policy change highlighted its usefulness for analysis (Kaplan 1975, 187-188). From that moment, the ETR began to play an important role in the design of corporate fiscal policies and tax legislation itself (Callihan 1994).

Regarding its definition, most authors have chosen to ignore the influence of deferred taxes (Wang 1991; Gupta and Newberry 1997; Calvé et al. 2005; Fernández and Martínez 2011; Rego and Wilson 2012;

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<sup>1</sup> For more detail: Council Regulation (EU) 407/2010.

Fernández and Martínez 2014; Dyreng et al. 2017; Salaudeen and Eze 2018; Fonseca et al. 2019), while others consider them (Zimmerman 1983; Collins and Shackelford 1995; Liu and Cao 2007; Salaudeen and Akano 2018; Poly 2019).

In addition, the taxable base is another discussion point. Most of the research has chosen to use the Profit before Tax as a taxable base (Romero et al. 2009; Fernández and Martínez 2014; Martínez et al. 2015; Dyreng et al. 2017; Salaudeen and Akano 2018; Salaudeen and Eze 2018; Fonseca et al. 2019). Others, use figures related to the accounting profit such as Earnings Before Interests and Taxes (EBIT) or Earnings Before Interests, Taxes, Depreciations and Amortizations (EBITDA) such as Noor et al. (2010), Hsieh (2013) or Dyreng et al. (2017).

Regarding the objective, we can highlight two main lines of research. On the one hand, there are numerous studies focused on comparing corporate tax burden between countries, states or provinces (Nicodeme 2007; Romero et al. 2009; Álvarez et al. 2011; Fernández and Martínez 2011; Molina 2012; Fernández and Martínez 2014; Chen et al. 2016; Bustos et al. 2017).

On the other hand, we find those focused on measuring the influence of economic and financial variables on corporate tax burden such as size, indebtedness, economic profitability, capital intensity, inventory intensity and industrial activity (Calvé et al. 2005; Hsieh 2013; Huang et al. 2013; Delgado et al. 2014; Fernández and Martínez 2014; Salaudeen and Akano 2018; Salaudeen and Eze 2018; Fernández et al. 2019; Fonseca et al. 2019; Greeff 2019; Poli 2019). As Wilde and Wilson (2018) point out, this line of study has evolved and researchers have proposed other approaches and incorporated new variables (Feeny et al. 2006; Richardson and Lanis 2007; Huang et al. 2013; Salaudeen and Akano 2018; Salaudeen and Eze 2018; Fernández et al. 2019; Fonseca et al. 2019).

Furthermore, other researchers support the study of these indicators with the analysis of a specific regulatory change (Manzon and Smith 1994; Calvé et al. 2005; Richardson and Lanis 2007; Wu et al. 2007; Noor et al. 2010; Huang et al. 2013).

## METHODS AND VARIABLES

### Variables and Hypotheses Development

According to the previous section and in line with the objectives of the present chapter, partial average effective tax rate has been defined. Thus, we call ETR to the ratio between the income tax expense and profit before tax (Gupta and Newberry 1997; Hanlon and Shevlin 2002; Buijink et al. 2002; Liu and Cao 2007; Markle and Shackelford 2011; Romero et al. 2009; Álvarez et al. 2011; Huang et al. 2013; Delgado et al. 2014; Fernández and Martínez 2014; Martínez et al. 2015; Dyreng et al. 2017; Salaudeen and Eze 2018; Fonseca et al. 2019; Fernández et al. 2019).

To know the impact that bailouts and financial assistance have had on the effective taxation, three variables have been defined. On the one hand, the *bailout* variable will take the value 1 for a country that has been rescued within the analysis period (regardless of the year) and 0 if it has never been rescued. Thus, Greece, Ireland, Portugal, Spain and Cyprus will always take value 1, and the rest of the countries always value 0. This variable allow us to examine whether the rescued countries show significant differences in the effective tax rate compared to non-rescued, regardless of the date on which a country has received assistance.

Due to tax requirements posed by bailouts and that companies domiciled in these countries bear generally a nominal rates traditionally higher than the rest of its European partners (European Commission 2019), we expect a direct relationship. However, the extended period studied and tax diversity of the countries rescued, some of them as particular as Ireland and Cyprus (Buijink et al. 2002; Alvarez et al. 2011), raises some uncertainty about the final results.

*H1: There is a relationship between ETR and the bailout variable*

On the other hand, we define the variable *after\_bailout* that will take value 1 in year  $t$ ,  $t+1$ , ...  $t+n$  for a country rescued in year  $t-1$ , and will take value 0 in any other case. In this way, Greece, Ireland, Portugal, Spain and

Cyprus will take value 1 on the date after their rescue and value 0 before, always being 0 for the non-rescued countries. In addition, as an alternative to this second variable, a third *bailout\_year&post* variable has been defined that will take value 1 for a rescued country but only in the year of rescue and the subsequent one, being 0 in any other case.

However, it should be clarified that, as the third rescue of Greece (08/2015) and Ireland (11/2010) occur in the second half of the year, it is understood that the measures and adjustments made are not recorded in that year but in the subsequent one. Therefore, this study assumes that rescues take place the following year, considering the previous year as the year of actual approval of assistance.

It has been decided to formulate hypotheses H2 and H3 establishing the existence of a significant relationship, a priori, between these two variables and the ETR. In both cases, because financial assistance is linked to macroeconomic conditionality and implies to undertake necessary reforms in the budgetary, economic, structural and supervisory fields (European Union 2010; Krajewska 2014). This relationship would indicate that both, the short and medium term, financial bailouts have had an impact on the effective corporate tax on companies domiciled in these countries.

*H2: There is a relationship between ETR and after\_bailout.*

*H3: There is a relationship between ETR and bailout\_year&post.*

Finally, to test the impact of financial bailouts on effective taxation in each of the rescued countries, hypotheses H4 to H8 have been defined.

*H4: Average ETR of Greece is the same before and after its bailouts.*

*H5: Average ETR of Portugal is the same before and after its rescue.*

*H6: Average ETR of Ireland is the same before and after its rescue.*

*H7: Average ETR of Spain is the same before and after its rescue.*

*H8: Average ETR of Cyprus is the same before and after its rescue.*

Despite these assumptions, as already noted, the amplitude of the analyzed period, the high number of compared countries and the differences between their level of economic development, its budgetary situation and its tax proposals introduce a high degree of uncertainty in the forecasts.

## Sample

Financial data of private, active and listed companies in any secondary market during the period 2005-2016 have been downloaded from the Orbis business database (Bureau Van Dijk). The initial sample includes the listed companies of the countries that were part of the Eurozone in the analyzed period.

We removed observations with missing data on any of the variables of the models and businesses framed in the sector “financial and insurance activities” of the NCEA (Richardson and Lanis 2007; Wu et al. 2007; Hsieh 2013; Delgado et al. 2014; Fernández and Martínez 2014; Salaudeen and Akano 2018; Salaudeen and Eze 2018; Fernández et al. 2019; Fonseca et al. 2019; Poli 2019).

In addition, the observations corresponding to firms with negative equity were eliminated (Table 1), as well as companies with negative or zero profit before tax or EBITDA (Janssen 2005; Liu and Cao 2007; Wu et al. 2007; Hsieh 2013; Fernández and Martínez 2014; Salaudeen and Eze 2018; Fonseca et al. 2019) and with ETR outside the range [0,1] (Feeny et al. 2006; Wu et al. 2007; Markle and Shackelford 2011; Huang et al. 2013; Fernández and Martínez 2014; Fonseca et al. 2019; Poli 2019).

**Table 1. Sample selection procedure**

Non-financial observations with data available in 2005-2016	29,890
Negative own funds (O.F. < 0)	(933)
Profit before tax or EBITDA $\leq 0$	(8,397)
ETR out of range [0,1]	(2,433)
Eurozone final sample	18,087
Eurozone (rescued countries) final sample	3,200

The final sample is an unbalanced panel with a total of 18,087 observations and 2,844 companies of which 3,200 and 569 correspond to the rescued countries, respectively. The greater size and economic development of the founding countries of the Eurozone is reflected in the final figures. In particular, France and Germany, group about 50% of the total observations. On the other hand, countries with lowest number of data are some of those that have joined the Eurozone more recently, such as Malta, Estonia, Latvia or Lithuania.

## **Panel Data Models and Endogeneity**

Panel data have been commonly used in the previous literature (Feeny et al. 2006; Liu and Cao 2007; Noor et al. 2010; Fernández and Martínez 2011; Hsieh 2013; Huang et al. 2013; Moreno et al. 2017; Fernández and Martínez 2014; Salaudeen and Akano 2018; Salaudeen and Eze 2018; Fernández et al. 2019; Fonseca et al. 2019; Greef 2019). Panel data has some advantages, such as the simultaneous conditioning of observed and unobserved business characteristics (Wooldridge 2010) that affect variations in the ETR (Feeny et al. 2006). Examples of the unobserved characteristics of companies are management strategy or the corporate culture (Noor et al. 2010).

However, static panel data models do not adequately deal with the endogeneity problem. Generalized Moments Method (GMM) develop dynamic models for the purpose of incorporating the causality relationships generated inside the model, and for avoiding endogeneity problems (Fernández and Martínez 2014; Boateng et al. 2017).

Therefore, we use the estimation of the system of equations (GMM-SYS) implemented by Blundell and Bond (1998), controlling the possible endogenous variables using as instruments their differences and levels. In addition, we include the first delay of the ETR, as an explanatory variable (Arellano and Bover 1995).

Theoretically, the model notation would be:



$$Y_{it} = \alpha Y_{it-1} + \beta X'_{it} + \varepsilon_{it}$$

where,  $\varepsilon_{it} = \mu_i + \vartheta_{it}$

$$E(u_i) = E(\vartheta_{it}) = E(\mu_i \vartheta_{it}) = 0$$

Different regressions are performed with a robust estimation and a two-step option in order to improve efficiency, to avoid any estimation bias. This is also useful to overcome possible heteroscedasticity problems, as initially confirmed by Breusch-Pagan's Test (Fernández et al. 2019; Fonseca et al. 2019). With the Arellano-Bond test, we check the autocorrelation of first and second orders to guarantee no autocorrelation problems in the model. If the aforementioned tests provide adequate results, we can assume that endogeneity has been removed from the model.

Therefore, to estimate the impact of bailouts on the ETR, the following two models have been specified econometrically:

$$ETR_{it} = \beta_0 + \beta_1 ETR_{it-1} + \beta_2 \text{bailout} + \beta_3 \text{after\_bailout} + \varepsilon_{it}$$

$$ETR_{it} = \beta_0 + \beta_1 ETR_{it-1} + \beta_2 \text{bailout} + \beta_3 \text{bailout\_year\&post} + \varepsilon_{it}$$

where,  $\varepsilon_{it} = \mu_i + \vartheta_{it}$ , is the random error term for company  $i$  in moment  $t$ , and is composed by two orthogonal components:  $\mu_i$  (the combined effect, varies between companies and periods of time) and  $\vartheta_{it}$  (individual effect, characteristic of the company). All the analyses are performed with the Stata 12 software.

The dependent variable is the mean tax burden measured by the *ETR*. The first of the explanatory variables  $ETR_{t-1}$  (the first lag of the dependent variable) is included in the model to identify potential temporary adjustments of ETRs. A significant coefficient for this variable would indicate that adjustments' effective tax rates are relevant. In addition, the *bailout* and *after\_bailout* variables will be included as explanatory variables in the first model. Instead, in the second model we will replace *after\_bailout* by *bailout\_year&post*.

Subsequently, and after comparing the normality of the sample of each period and country rescued, we apply the Mann-Whitney U test for independent samples. So ETR distributions will be compared before and after the financial assistance in each of the rescued countries.

## **RESULTS**

### **Comparative Analysis: Eurozone ETR**

First, we will conduct a comparative study of the effective tax rates bore in each of the member states during the 2005-2016 period. This descriptive analysis provides an overview of the taxation of business results of companies listed in the Eurozone that allows contextualizing the subsequent analysis.

Table 2 shows all the necessary values, shading those ETR that are higher than the annual mean ETR in the Eurozone.

As can be seen, the general evolution of the effective tax rates is quite erratic. However, the lowest rates appear in the second half of the analysed period. The average of the set of countries does reach its maximum in 2010 to start a downward trend. In addition, an individual strategy to reduce tax burden aimed at encouraging activity to fight the economic crisis is not revealed. Probably, we can find the reason that the euro crisis (unleashed that year 2010 by the Greek situation) had its origin in the budgetary imbalances of some countries. This, at least for part of the Eurogroup, questioned the desirability of reducing tax revenues despite the path of austerity required.

Italy, Greece, Germany and France are the ones who exercise greater tax burden on their listed companies, with ETR above the Eurozone average every year, except Germany and France in 2010. On the opposite, we find Estonia, Slovenia, Lithuania, and Ireland and Cyprus, which are two of the rescued countries.

**Table 2. Average ETR in Eurozone countries per year**

MS <sup>1</sup>	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AUS	21,45	22,37	21,96	23,81	21,93	23,16	21,71	25,26	22,78	25,13	24,11	22,68
BEL	26,10	25,90	22,94	23,59	23,92	19,25	22,32	20,01	22,12	25,58	19,31	20,23
CYP	-	-	-	22,36	16,75	17,14	15,21	18,69	20,49	13,56	19,24	20,36
EST	-	-	-	-	-	-	14,61	12,23	14,80	13,30	21,16	12,65
FIN	25,93	25,66	25,36	25,66	29,57	27,98	25,40	25,24	24,18	25,23	24,88	22,09
FRA	28,61	28,81	27,94	28,39	29,53	26,80	28,65	29,56	29,06	27,01	26,25	24,36
GER	31,34	29,20	30,17	29,10	29,51	25,91	26,79	27,85	28,34	29,75	28,30	26,85
GRE	34,73	33,61	29,40	30,63	36,82	45,70	29,91	28,06	37,94	31,03	31,86	34,38
IRE	18,70	19,02	19,62	20,79	21,98	18,08	22,57	20,07	17,88	17,88	17,02	16,58
ITA	39,35	43,18	38,52	38,10	40,11	41,19	40,76	39,92	44,29	39,91	36,85	35,32
LAT	-	-	-	-	-	-	-	-	-	22,00	30,64	23,96
LIT	-	-	-	-	-	-	-	-	-	-	16,25	13,28
LUX	23,18	20,80	22,22	19,40	28,29	23,78	25,76	27,30	26,66	27,03	26,36	28,54
MAL				35,67	25,67	37,73	29,91	28,54	24,05	31,13	22,72	22,52
NET	25,63	24,25	21,87	24,68	22,69	22,66	22,04	26,65	25,55	24,31	24,42	23,24
POR	23,46	25,38	24,17	28,39	28,85	28,05	32,65	30,98	27,08	23,72	24,92	24,88
SPA	27,49	25,62	23,75	26,36	25,59	27,97	26,70	24,70	27,12	22,66	23,97	20,72
SVK	-	-	-	-	34,53	37,20	32,48	23,04	22,34	22,61	27,19	36,26
SVN	-	-	19,66	20,12	19,21	26,25	23,23	14,47	14,69	18,21	12,46	11,54
EURO	27,16	26,98	25,20	26,47	27,18	28,05	25,92	24,86	25,26	24,45	24,10	23,18

<sup>1</sup>The abbreviations of the Eurozone Member States (MS) correspond to: Austria (AUS), Belgium (BEL), Cyprus (CYP), Estonia (EST), Finland (FIN), France (FRA), Germany (GER), Greece (GRE), Ireland (IRE), Italy (ITA), Latvia (LAT), Lithuania (LIT), Luxembourg (LUX), Malta (MAL), Netherlands (NET), Portugal (POR), Spain (SPA), Slovakia (SVK), Slovenia (SVN) and Eurozone (EURO).

Source: Own elaboration.

If we focus on the latter, only Greece during the entire period, and Portugal the year of its rescue and the next, are clearly above the average ETR in the Eurozone. In addition, Spain is around the Eurozone average for most of the period analysed, although the last year is below, with a decrease of more than three points in its ETR.

Thus, answering to the main research question of this chapter, in the cases of Greece, Portugal and Spain, it could not be argued that they grant more favourable tax treatment to companies to question the legitimacy of the bailout. Instead, the situation in Ireland and Cyprus in this regard is much more debatable. However, we need to discuss in more detail how each country arrived to the rescue.

In chronological order, Greece receives its first bailout in May 2010 after an upward trend in tax burden. On the contrary, the second assistance, approved in February 2012, comes after a period of marked decrease. While the third rescue is granted after a stabilization of the ETR in 2015<sup>2</sup>. In the case of Ireland, the approval of the rescue at the end of November 2010, occurs in a year in which the effective tax rate shows a significant decrease of almost four percentage points.

The rescue of Portugal takes place in the first half of 2011, after a three-year rate stability of around 28%. As for Spain, beyond the controversy over whether it was a rescue itself or only financial assistance for the banking system, European aid approved in mid-2012, arrives without a definite trend in the effective types of the previous exercises. Finally, Cyprus is approved for its rescue in March 2013, an exercise in which the upward trend of its types that began in 2012 continues.

Thus, Ireland and Cyprus would be the countries whose aid could be more controversial because of their tax lukewarm that gives them an advantageous position in attracting new investments. Although, in the case of Cyprus, at least prior to the rescue the country has also demanded a greater effort from its listed companies. However, Ireland requests the help of its partners in an exercise in which it presents a reduction of almost three points in its ETR. This is more relevant, if possible, considering that the same year the average of the Eurozone experiences an increase close to the percentage point.

Although also the bailouts of Spain, Portugal and the second of Greece occur in a context of lowering the fiscal pressure, the truth is that there are clear differences with Ireland. Since the year in which they are approved, the last two countries are notably above the average and Spain practically equals it.

Once known the situation prior to the bailouts, we try to assess what was the subsequent reaction of each of the countries after it.

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<sup>2</sup> Both the third rescue of Greece and Ireland, occurred in the second half of the year, so we understand that the measures that could have been taken after them have not had an impact on the taxation of that year. Therefore, for the purposes of this investigation, we assume that the bailouts take place the following year.

## GMM Models for Rescued Countries

Table 3 shows the results of the GMM-System for the two estimated regressions. Note that in both cases, the results of the robustness tests confirm that the autocorrelation of residuals (Arellano-Bond test) and avoiding endogeneity are guaranteed. In addition, in all estimated regressions the number of instruments is less than the number of companies.

Note also that the first delay of the ETR is positively significant in both models, which evidences that the companies domiciled in the Euro Area bear a tax burden that is directly related with the ETR of the previous year (ETR.L1). This justifies including the variable in the study.

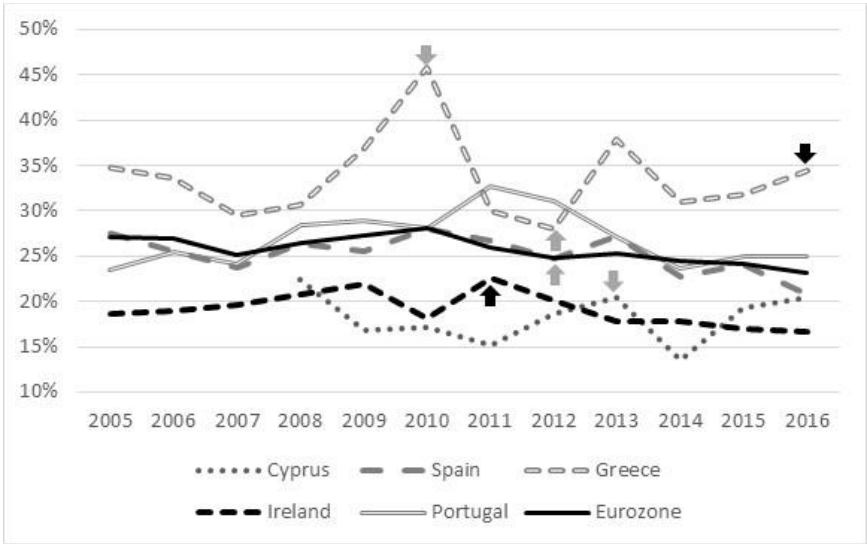
The results of model 1 (Table 3) indicate that, jointly, the rescued countries show a statistically significant increase in their effective tax rates after the rescue is approved, as indicated in the definition of the *after\_bailout* variable. In addition, if we only consider the year associated with the rescue and the subsequent one, model 2 reinforces these results since it shows a positive and significant coefficient for the variable *bailout\_year&post*.

**Table 3. Empirical results of the dynamic panel data models:  
GMM-System**

	Model 1	Model 2
Dependent variable:	ETR	ETR
Estimation period:	2005-2016	2005-2016
Observations:	13.218	13.218
Companies:	2351	2351
Explanatory variables	C (P>z)	C (P>z)
ETR_L1	8,23 (0,000)***	8,34 (0,000)***
bailout	-0,85 (-0,398)	-0,94 (-0,349)
after_bailout	3,94 (0,000)***	-
bailout_year&post	-	4,43 (0,000)***
constant	17,39 (0,000)***	29,22 (0,000)***
Hausman Test (chi2)	47,88 (0,0000)	1,37 (0,5051)
Wald Test (chi2)	86,21*** (0,0000)	89,14*** (0,0000)
Arellano-Bond Test (z)	-1,2470 (0,2124)	-1,2491 (0,2116)

Notes: Robust standard errors in parenthesis. \*, \*\*, \*\*\* For 10, 5 and 1% significance level respectively.

Source: Own elaboration.



Source: Own elaboration.

Figure 1. ETR evolution in rescued countries and Eurozone.

Therefore, both models would show that, as one would expect, rescued countries have had to make their own effort to increase public revenues in addition to receiving financial help from their partners (European Union 2010; Krajewska 2014). It should be noted that this has been done by increasing their tax burden on the results of their large listed companies, among other strategies. However, the behaviour of the *bailout* variable is not statistically significant in either model, confirming the initial doubts we had about its impact.

However, the individualized analysis reveals a reality that differs from the results obtained in the joint models. Figure 1 shows the evolution of the effective tax rates in rescued countries compared to the Eurozone average. The arrows indicate the year of each rescue, the darkest ones indicate the years in which the approval of financial assistance took place the previous year.

Greece in the first and third rescue, Ireland, Portugal and Cyprus have a significant increase in their ETR the year associated with the granting of the aid. Instead, Spain and Greece in their second rescue, receive financial support from their partners in a context of reductions in corporate tax burden.

**Table 4. Average ETR in rescue year, the previous and the subsequent**

Country	Rescue Year	ETR		
		Previous year (t-2)	Rescue year (t-1)	Next year (t)
Greece 1	2010	36,82%	45,70%	29,91%
Greece 2	2012	29,91%	28,06%	37,94%
Greece 3	2016	31,86%	34,38%	-
Ireland	2011	18,08%	22,57%	20,07%
Portugal	2011	28,05%	32,65%	30,98%
Spain	2012	26,70%	24,70%	27,12%
Cyprus	2013	18,69%	20,49%	13,56%

Source: Own elaboration.

However, the year after the aid occurs the contrary to that indicated in the previous paragraph. Note that we exclude the third Greek rescue because it exceeds the temporal scope of this work. That is, Greece, first bailout, Ireland, Portugal and Cyprus show significant decreases in their effective tax rates, particularly high in the cases of Greece and Cyprus. On the other hand, Spain and Greece, in the second aid, show a substantially higher ETR.

For a better understanding, Table 4 presents the effective tax rates of the rescued countries in the year of the rescue, the previous and the next one.

### **ETR Analysis: Rescued Countries Before and After Rescue**

To conclude the study, we will analyse whether the differences between the average effective tax rates before and after the rescue in the different countries are statistically significant.

As a preliminary step to the analysis, the Kolmogorov-Smirnov test was performed to test the normality of the samples. As in most cases this hypothesis has been rejected, we have chosen to apply the Mann-Whitney U test for independent samples in order to contrast the equality of the distributions of the ETR before and after the rescue.

The observations of each rescued country have been divided into two groups: one group comprises from the first year available until the year before the rescue; and the second group from the year of the rescue until the

end of the period under study. Given the design of the test, in the case of Greece the first rescue has been considered as a cut-off point.

Table 5 shows the results for the five countries under study.

As reported in Table 5, we only reject the null hypothesis in the case of Spain, confirming the significant differences between the effective average rates before and after the 2012 rescue.

In the rest of the rescued countries, ETR varies throughout the analysed period in relevant amount. However, they lack statistical significance and therefore cannot be attributed to the effect of European aid.

**Table 5. Average ETR in rescue year, the previous and the subsequent, in selected countries**

U test	Greece	Ireland	Portugal	Spain	Cyprus
Observations	1151	410	382	1006	353
Mann-Whitney U	164421,500	19431,000	18253,500	108407,000	12290,000
Wilcoxon W	277947,500	43521,000	36398,500	206310,000	16295,000
Test statistic	164421,500	19431,000	18253,500	108407,000	12290,000
Standard error	5553,806	1196,919	1079,036	4573,679	832,539
Standardized test statistic	0,679	-1,239	0,013	-3,55	0,651
Asymptotic sign. (bilateral test)	0,497	0,215	0,990	,000	0,515

Source: Own elaboration.

CONCLUSION

This chapter deals with the controversy generated about the justice of bailouts within the Eurozone. Fundamentally, in countries with greater budgetary balance, which normally are also those that exert the greatest tax burden on their residents. More specifically, it is questioned whether such aid responds to the necessary solidarity between the partners of the single currency. On the contrary, they can be considered unfair if the receiving states use corporate taxation as a tool of unfair competition to remove new investments from other member countries.



Our results evidence that Greece and Portugal listed companies bear a fiscal pressure higher than the Eurozone average. Spain moves quite tight to that average value. Thus, in these three cases, a lower tax requirement for companies could not be argued to justify a position contrary to the bailouts.

Meanwhile, Ireland and Cyprus evidence an ETR substantially below the Eurozone average, both before and after obtaining financial assistance. Therefore, it is more difficult to justify that the rest of the countries must come to their aid when those affected are applying a laxer taxation that gives them a certain competitive advantage. Above all, if the rescue does not involve a requirement to correct those particular differences.

In this sense, the models formulated appreciate that, as a whole, the rescued countries increase their rates both the year of the rescue and the subsequent one. In contrast, the individualized analysis of the evolution of the rates does not show the same results, reflecting disparate behaviours between countries.

In any case, only Spain has statistically significant differences between the distribution of the effective tax rates before and after the rescue. Therefore, in the rest of the rescued countries, the variations in the ETR cannot be related to the rescue received.

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## *Chapter 11*

# **MAIN DRIVERS OF MANAGEMENT BEHAVIOUR: EVIDENCE FROM ITALY**

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## **ABSTRACT**

Given the increasing demand for using analytical tools and advances in accounting or other disciplines to improve decision-making (e.g., Kaplan, 2011) and unravelling firms' management behaviour, especially in the Italian context, we propose a novel method with more normalized, objective, independent and positive indicators to do so. From a panel data of 156 Italian listed firms spanning 2007 to 2016, the results evidence shows that firms must adopt an operating behaviour to survive or grow in a region, but some other factors prevail to location, such as human capital, leverage, fairer competitiveness and economic stability. Additional analysis demonstrates that good performance triggers positive stock market development; otherwise, firms go unnoticed.

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**Keywords:** management behaviour, Kinds of Management, optimal management, performance, stock market development

## INTRODUCTION

Economic policy has as a foremost goal to ensure cohesion, understood as similar social and economic conditions across territories of the same political entity. However, ensuring cohesion is also subject to asymmetric effects, and then spillover effects. In fact, inner concentrations of industrial activities within the core regions of a country often raise concerns among economists and policy makers that peripheral or borderline areas turn impoverished and more defenceless to macroeconomic shocks (Acceturo and De Blasio, 2012). But what is undeniable is the fact that firms must adopt a certain kind of management either to grow or just to survive within the region where are located. Accordingly, accounting is the economic and financial portrait of business activity (Collier, 2015) and the direction taken by strategic activities determine firms' performance (Mariadoss et al., 2014).

So, this study aims to shed light on Italian companies' management behaviour. In this sense, the purpose of this work is threefold. First, determining the Kind of Management (KM) adopted by firms, which is the own answer of companies to changes in the economic and financial environment (Pérez-Benedito et al., 2017a; 2017b; 2018), by using the Accounting Methodology of Radar Charts (AMRC). Secondly, creating a simple but meaningful model in which we define and analyse the key drivers that influence the decision of adopting a specific KM. And finally, presenting those conditions that guarantee the meeting of the optimal management, which means that firms will be properly using their financial resources.

Our analysis is clearly linked with the magna theory of behavioural economics. On the one hand, urban (region) economics establishes that economies of agglomeration are cost savings. Firms are frequently located near to each other so that their production costs may decline and/or the cluster may attract more (and better) suppliers and customers than a single

enterprise might do alone (Andini et al., 2013). In addition, apart from these potential advantages, belonging to an agglomerate also suppose adaptation, which means that if a firm may not adapt within the cluster, this firm must settle for leaving the group because its activity is not able to adjust to their ways of doing.

On the other hand, following the behaviour theory, evaluating companies' management depends on accounting numbers and how rational agents are. The analysis of the microeconomic scenario lies on the contrasting perception of rationality, which is the appreciation of human behaviour that underpins all economic matter (Simon, 1978). Academics and economists challenged the assumption of rational behaviour (Williamson, 1979) because although society is becoming more convoluted, managers' information is not complete and insufficient (Mandysová, 2018). As behavioural theorists state, that influences decision-making process of stakeholders.

In line with the Prospect Theory, behavioural financial highlights market inefficiencies such as reactions to information (Rajan, 1994; Guttentag and Herring, 1997). The attempt to explain observed and unobserved market performance and firms' management is at least conflicting with rational expectations and efficient market theory. Therefore, stakeholders usually follow simple heuristic indicators to choose the acceptable decision instead of the optimal one (Burgstahler and Dichev, 1997; Shrefin, 2002; Bingham and Halebian, 2012), and this is what in essence our AMRC methodology does. Basically, managers can engage in impression management – e.g., measurement distortion and monetary measurement –, willing to show an encouraging but not warranted image of the firm (Collier, 2015), probably triggered by selectivity. In this respect, our indicators and classification of KM are not tied to these drawbacks than can lead to misleading conclusions.

We focus our analysis in Italy for various reasons. Italy is widely perceived as representative of contrasting models of European culture, economic and regulatory regimes (Nobes and Parker, 2010), and featured to have code-law tradition, less developed stock market, concentrated ownership, low level and investors rights and weak legal enforcement (Elshandidy and Neri, 2015), which might exacerbate agency problems. In

addition, Italy is the fifth economy in Europe in terms of Gross Domestic Product, comprises the highest number of active firms, with high wage inequalities, and is markedly conditioned by bank credit (Ciani et al., 2019). Therefore, its inquiry is more than necessary so as to ease Italian firms' behaviour so that it may reduce the notable agency problems that "mask" this economy.

We use a panel data consisting of 156 Italian listed firms spanning 2007 to 2016, collected from ORBIS database and others to complete our dataset. Quantitative analyses shed light on interesting issues. Regardless firms must necessarily incur in an adaptable operating strategy to survive, factors such as human capital, leverage, fairer competitiveness (less market concentration) and less economic instability (less income inequality) contribute to a properly use of available resources and financing. Finally, additional analysis confirms that firms' management behaviour supports stock market development, but not inversely.

Our paper makes the following contributions to the existing research on behavioural economics. First, we contribute to the stream of detecting the existence of space-time clustering of firms (Arbia et al., 2010). Our methodology is not only able to determine and label firms' management behaviour, but also represents a useful and meaningful tool that provides a proper and precise manner to analyse factors that describe location and adaptation processes. We argue that our indicators may help the economic inquiry on this field of study so as to mitigate systematic differences in judgements. Having a broad perspective and being able to identify individual characteristics enhances decision-making process - comprehensive thinking ability – (Butler and Ghosh, 2015).

Second, with respect to firm-level studies, our methodology presents two main advantages. Firstly, our highlights do not suffer from selectivity procedures because we may consider all firms and the only limitation is subject to economic and accounting data availability. And secondly, our measures may exploit either aggregate analysis or individual heterogeneity which, as mentioned before, facilitates making decisions. Finally, the third contribution lies on the relation between firms' operating activities and market reaction. We argue that firms' behaviour builds firms' performance

and then the market can judge by rewarding or penalising them through prices, but not conversely. Thus, the operating activity is the basis for firms' survival regardless market opinion.

The reminder of this paper is structure as followed. In section two the empirical framework is developed, in which we will explore the need to study the Italian context. The third section will explore those potential determinants that may drive certain business practices and will also contain the modeling of regressions for the treatment of causal relationships. The major results appear in section four whereas section five concludes the main highlights and potential implications for future research.

## SAMPLE

The Italian model of management is widely seen as “*representative of contrasting models of European culture, economic and regulatory regimes*” (Nobes and Parker, 2010). In general, Italy legal origin is characterised to have civil-law tradition, less developed stock market, concentrated ownership, low level of investors rights and weak legal enforcement, as pointed, for instance, by La Porta et al., (1998) or Elshandidy and Neri (2015). Italian enterprises still show weaknesses such as low legal protection for investors and poor legal enforcement in spite of the continuous effort of the Code of Self. Regulation in emphasizing the importance of board of directors' structure and independence (Elshandidy and Neri, 2015). Therefore, type II agency conflicts, which arise from the plausible advantage that controlling shareholders can show against non-controlling shareholders, may be the main issue (Bianco and Casavola, 1999). So that, it is pertinent to evaluate and orchestrate Italian firms' behaviour to facilitate their comprehension, interpretation and thus investors' decision making.

Moreover, several macro and microeconomic indicators are also supportive to go through Italian market. Italy is the European economy with more active enterprises (almost 4 millions) and top 4 in births of enterprises (close to 300 thousand), as well as being the country with one of the most sustained (but not excessive) unemployment rate of about 10.15% during the

last crisis period and spotting top 5 when one looks at the Gross Domestic Product. Even though these positive economic signals, others are discouraging but suggestive of a deeper analysis that could explain what is behind. As pointed by Ciani et al., (2019), Italy is a country with “*lasting labour-market disparities in the context of rigid local wages and limited housing supply elasticity*.” For instance, Italy has one of the highest Gini indexes in Europe (33.1 in 2016), which denotes higher inequality. Another example of this would be the large increase of 6.2% in nominal unit labour costs, which supposedly hides a potential rising pressure over labour costs with the consequent productivity and competitiveness impairment. This fact denotes precarious hiring of human capital exists, which means an increase of part-time contracts to the detriment of full-time ones. Though this hiring policy could be interpreted as bad, perhaps this action could have protected firms facing economic shocks and hence guaranteeing their survival.

Therefore, these features, together with the fact that Italy is heavily dependent on bank credit, make its study a highly relevant issue from the policy, economic and behavioural perspectives. Assessing how Italian firms react to changes in the economy and how they behave in order to adapt where they are located are not only attractive but also important questions to go deeper.

Then, we concentrate the analyses on Italian firms but only on those that are o have once listed spanning 2007 to 2016 because they are frequently known to be the flagships in economies. We gather the data from ORBIS database, obtaining 1,558 firm-year observations. Table 1 presents the search strategy:

**Table 1. Search strategy**

Search steps	# firms
Companies that are active	172,048,793
Country: Italy	4,326,718
Listed companies or companies that were once listed on stock market	388
Companies whose data is available	156

## METHODOLOGY

We build our study on the framework of companies' behaviour, more exactly on firms' management behaviour according to several characteristic: (i) firms' financial statements and stock market, (ii) firms' performance, as well as external factors, such as (iii) macroeconomic indicators (GDP per capita, unemployment and M2), (iv) the market concentration (Herfindahl-Hirschman index) and the income inequality (Gini index). These four features have been selected in order to cover as much as possible both internal and external factors that could affect firms' management behaviour.

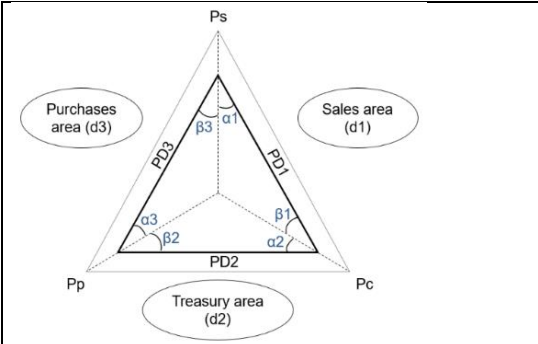
To run the analyses and contrast our expectations, next we are briefly explaining the AMRC methodology to determine the Kinds of Management (KM), those factors that could logically affect firms' management behaviour, and finally the two regression models used in this study (logistic and multinomial logistic regressions).

### The Accounting Methodology of Radar Charts (AMRC)

The Accounting Methodology of Radar Charts (AMRC) addresses the assessment of companies' behaviour by making use of accounting information from financial statements and applying mathematical assumption relative to trigonometry and geometry, in particular, the cosine and sine theorems. That allows us to calculate the average periods of maturation, per firm and year, which are represented on axes of a radar chart that conforms three basic areas that identify firms' operating activity: sales area, treasury area and purchases area. According to the procedure made by Pérez-Benedito et al., (2017a; 2017b; 2018), we obtain the six Kinds of Management (KMs) which every firm is classified into (see Table 2). In a nutshell, we may say that KMs are "*the own answers of companies to changes in the economic and financial environment.*" So, none of the KMs is damaging by itself but is chosen according to the demands of their activity

and other both internal and external factors (culture, economy, etc.). Those firms that are codified as A, B or C are called “Positive KMs” because are more dynamic in terms of collect policy than purchase policy. Inversely, “Negative KMs” is the name for those that adopt D, E or F.

**Table 2. Kinds of Management (KM) according to the compliance of Perimeter Distances’ relative positions**

		Positives KMs	
		A	PD2 > PD3 > PD1
		B	PD3 > PD2 > PD1
		C	PD3 > PD1 > PD2
		Negatives KMs	
		D	PD1 > PD3 > PD2
		E	PD1 > PD2 > PD3
		F	PD2 > PD1 > PD3

PD1 = Perimeter Distance for sales area; PD2 = Perimeter Distance for treasury area; PD3 = Perimeter Distance for purchases area.

***Compliance of the Optimal Management (OM)***

Nevertheless, this does mean that companies are labelled to have good or bad management but is the compliance of the optimal management (OM) which denotes a proper performing of the available resources and the financing. In order to meet the OM, firms must accomplish two conditions at the same time: (i) Financial Sufficiency (FS) which means financial resources are properly employed, and (ii) Liquidity on Transactions (LT) which means to what extent the employment of the available resources in a specific area is worthy. Table 3 summarizes all the required and already explained conditions.



**Table 3. Necessary, financial sufficiency and liquidity on transactions conditions by Kinds of Management (KM) and areas (d)**

Panel A: Necessary conditions						
	Positives KM (+)			Negatives KM (-)		
Angular Coefficients	A	B	C	D	E	F
	PD2 > PD3 > PD1	PD3 > PD2 > PD1	PD3 > PD1 > PD2	PD1 > PD3 > PD2	PD1 > PD2 > PD3	PD2 > PD1 > PD3
$\alpha_1$	$\alpha_1 > 30$	$\alpha_1 < 30$	$\alpha_1 < 30$	$\alpha_1 < 30$	$\alpha_1 > 30$	$\alpha_1 > 30$
$\beta_1$	$\beta_1 < 30$	$\beta_1 > 30$	$\beta_1 > 30$	$\beta_1 > 30$	$\beta_1 < 30$	$\beta_1 < 30$
$\alpha_2$	$\alpha_2 > 30$	$\alpha_2 > 30$	$\alpha_2 > 30$	$\alpha_2 < 30$	$\alpha_2 < 30$	$\alpha_2 < 30$
$\beta_2$	$\beta_2 < 30$	$\beta_2 < 30$	$\beta_2 < 30$	$\beta_2 > 30$	$\beta_2 > 30$	$\beta_2 > 30$
$\alpha_3$	$\alpha_3 < 30$	$\alpha_3 < 30$	$\alpha_3 > 30$	$\alpha_3 > 30$	$\alpha_3 > 30$	$\alpha_3 < 30$
$\beta_3$	$\beta_3 > 30$	$\beta_3 > 30$	$\beta_3 < 30$	$\beta_3 < 30$	$\beta_3 < 30$	$\beta_3 > 30$
Panel B: Financial Sufficiency conditions (FS)						
Sales area (d1)	$\frac{\alpha_2}{\beta_3} < 1$	$\frac{\alpha_2}{\beta_3} > 1$	$\frac{\alpha_2}{\beta_3} > 1$	$\frac{\alpha_2}{\beta_3} > 1$	$\frac{\alpha_2}{\beta_3} < 1$	$\frac{\alpha_2}{\beta_3} < 1$
Treasury area (d2)	$\frac{\beta_1}{\alpha_3} > 1$	$\frac{\beta_1}{\alpha_3} > 1$	$\frac{\beta_1}{\alpha_3} > 1$	$\frac{\beta_1}{\alpha_3} < 1$	$\frac{\beta_1}{\alpha_3} < 1$	$\frac{\beta_1}{\alpha_3} < 1$
Purchases area (d3)	$\frac{\alpha_1}{\beta_2} > 1$	$\frac{\alpha_1}{\beta_2} > 1$	$\frac{\alpha_1}{\beta_2} < 1$	$\frac{\alpha_1}{\beta_2} < 1$	$\frac{\alpha_1}{\beta_2} < 1$	$\frac{\alpha_1}{\beta_2} > 1$
Panel C: Liquidity on Transactions conditions (LT)						
Sales area (d1)	$\frac{\beta_2}{\alpha_3} < \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$	$\frac{\beta_2}{\alpha_3} > \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$	$\frac{\beta_2}{\alpha_3} > \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$	$\frac{\beta_2}{\alpha_3} > \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$	$\frac{\beta_2}{\alpha_3} < \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$	$\frac{\beta_2}{\alpha_3} < \left(\frac{Rec}{Inv}\right) \cdot \left(\frac{CS}{S}\right)$
Treasury area (d2)	$\frac{\alpha_1}{\beta_3} > \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$	$\frac{\alpha_1}{\beta_3} > \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$	$\frac{\alpha_1}{\beta_3} > \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$	$\frac{\alpha_1}{\beta_3} < \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$	$\frac{\alpha_1}{\beta_3} < \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$	$\frac{\alpha_1}{\beta_3} < \left(\frac{Rec}{Sup}\right) \cdot \left(\frac{P}{S}\right)$
Payment area (d3)	$\frac{\beta_1}{\alpha_2} > \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$	$\frac{\beta_1}{\alpha_2} > \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$	$\frac{\beta_1}{\alpha_2} < \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$	$\frac{\beta_1}{\alpha_2} < \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$	$\frac{\beta_1}{\alpha_2} < \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$	$\frac{\beta_1}{\alpha_2} > \left(\frac{Inv}{Sup}\right) \cdot \left(\frac{P}{CS}\right)$

PD1 = Perimeter Distance of sales area; PD2 = Perimeter Distance of treasury area; PD3 = Perimeter Distance of purchases area.

Ps = Sales Average Period of Maturation; Pt = Treasury Average Period of Maturation; Pp = Purchases Average Period of Maturation.

Rec = Average Receivables; Inv = Average Inventory; Sup = Average Suppliers.

S = Sales; CS = Cost of Sales; P = Purchases.

As claimed by both professionals, academics and institutions, all the above indicators meet four essential characteristics. First, they are normalized, that is, they can always be used. Second, they are independent because the data is not previously treated, so subjectivity does not exist. Third, they are objective due to the fact that a researcher does not make any influence on these indicators. Finally, they are always positive, which means there are no compensation effects between negative and positive values.

## **Determinants of Business' Practices**

In agreement with behavioural economics, monitoring business environment deserves attention because new opportunities and threats can arise. This point has become imperative nowadays since the recent financial crisis has uncovered the remarkable herding behaviour that firms experience together, which sometimes becomes transcendental if some of them are the flagship of the economy. Traditional literature has demonstrated that both internal and external factors are supposed to affect firms' behaviour (Krugman, 1991; La Porta et al., 1998), which is usual since companies locate their activity on a scenario that is characterized by a representative regional culture. Then, we will list some main determinants in the literature.

Firms' size is often associated with political and agency costs (Key, 1997; Watts and Zimmerman, 1986). For instance, larger firms might also report timelier losses rather than small ones due to potential agency costs or greater litigation risk (Ball and Shivakumar, 2005).

The level of debt could also be an instrument to monitor firms' activity and the structure of ownership (Mande et al., 2012) because financing policies may attenuate costs related to over- and under-investments (Stulz, 1990, p. 3) and agency costs in favour of shareholders (Hovakimian, 2006). For example, Fama and French (2002) point out a negative relation between enterprises' growth opportunities and leverage ratio.

Earnings quality is a common indicator used as a proxy for accounting quality. Dechow et al., (2010, p. 344) define earnings of higher quality when they provide more information about financial performance, which are

important for a decision maker in order to make a specific decision (Dichev et al., 2013). Even though the multidimensional nature of earnings quality, earnings management, in particular discretionary accruals, is one of the most frequent indicators to measure earnings quality. The opportunistic practice of financial information is widely evidenced by previous research, and it appears to mislead agents who are interested in economic and financial performance of firms from their real firms' performance (Walker, 2013; Wang et al., 2016).

In economy field, elasticity denotes the sensitivity to which a variable changes compared to another. Firms' transactions entail monetary and non-monetary operations (ESA, 2010). It is supposed that there will be monetary flow when a transaction entails effective exchange, and otherwise, if there is no cash implied in a transaction it obviously reflects an economic/financial flow but non-monetary. Similarly, though incomes and expenses not necessarily entail monetary flow, it is crucial to maintain certain level of cash. Researchers are also divided on the issue of the performance implications of cash. While some studies show that cash enhances firms' performance, (Kim and Bettis, 2014), others argue a negative relationship (Harford et al., 2012). This mixed evidence might suggest that context may shape performance consequences of cash (Deb et al., 2017). Analogously to income elasticity of demand (Havranek and Kokes, 2015), we use income elasticity of treasury account so as to consider how cash and cash equivalents change as businesses get benefits.

Stock prices may contain some information that managers do not actually have but that it is likely they use it to make decisions, such as corporate investments (Chen et al., 2006). Since markets have a notable ability to produce information that generates accurate forecasts about real economy and that guide managers in making corporate decisions, financial markets (stock price) must not be set aside from business' activity.

Businesses' transactions and how a firm performs are based on momentum strategies which may push companies' activity to obtain benefits from it (Antoniou et al., 2007). According to investment opportunities, rational investors may take advantage from their irrational counterparts at certain risk level and in large number of stocks (Ghosh et al., 2011).

Therefore, operating strategies are determined by (derived from) prior (actual) profitability and market value achieved.

Undeniably, business cycle depends on economic cycle, and vice versa. For that reason, it is needed to control for economic conditions that necessarily affect firms' behaviour, because if companies are optimistic, they will probably incur in riskier strategies and will assume more risk in transactions. Gross Domestic Product per capita is used not only for signalling economy growth but also to reflect changes in productivity, and (un)employment rate to control for the social component of the economy as well as the cyclicalities. Market concentration and income inequality also influence firms' behaviour. With respect to the former, it may affect positively the return of projects when this pushes up competition in the equity market (Santandrea et al., 2017), because competition is widely seen as a good external disciplinary mechanism that reduces consumption of private information (Haw et al., 2004), attenuates agency costs (Aledo et al., 2014), and thus lowers information asymmetries. In turn, income inequality is one of the most recurrent topic to analyse the economy within a country or even a region (Checchi and Peragine, 2010, p. 430), because it allows somehow to study the labour market, consumption and portfolio transitions, which is particularly relevant in Italy due to this country ranks very high in terms of income inequality (Jappelli and Pistaferri, 2010).

### ***Logistic Regressions***

Having said the above, we build our study on the framework of companies' behaviour, more exactly on firms' management behaviour according to several characteristics: (i) firms' financial statements and stock market, (ii) firms' performance, as well as external factors, such as (iii) macroeconomic indicators (GDP per capita, unemployment and M2), (iv) the market concentration (Herfindahl-Hirschman index) and the income inequality (Gini index).

We approach the probability of adopting a positive (A, B or C) or negative (D, E or F) Kinds of Management depending on the considered factors. Then, we estimate the probability of choosing "A," "B" or "C" instead of "D," "E" or "F" by running the following logit model (1):

$$Pr(KM(+) = 1) = f(FI, P, MACRO, CULTURE) \quad (1)$$

where the likelihood of adopting a positive or negative KM is a function of financial information from firms' financial statements and stock market (FI), firms' performance (P), macroeconomic indicators (MACRO), and culture factors (CULTURE). Thus, the logit model takes the following form (2):

$$\begin{aligned} Pr(KM(+) = 1) = & \alpha + \beta_1 LNTA_{it} + \beta_2 LNEMPLOYEES_{it} + \\ & \beta_3 LEVERAGE_{it} + \beta_4 FINAN\_AUTO_{it} + \beta_5 DA_{it} + \beta_6 TRES\_ELAST_{it} + \\ & \beta_7 MC\_SHARE_{it} + \beta_8 ROE_{it} + \beta_9 ROA_{it} + \beta_{10} QRATIO_{it} + \\ & \beta_{11} GDPpc\_GROWTH_{jt} + \beta_{12} M2\_GROWTH_{jt} + \\ & \beta_{13} UNEMP\_GROWTH_{jt} + \beta_{14} HHI_{it} + \beta_{15} GINI_{jt} + \beta_{16} \sum Year_t + \\ & \beta_{17} \sum Industry_i + \varepsilon_{it} \end{aligned} \quad (2)$$

where  $KM(+)$  is a dummy variable that takes value 1 if a firm adopts positive KMs (A, B, or C), and 0 for negative KMs (D, E, and F).  $LNTA$  is the natural logarithm of total assets. Empirical literature has criticized the use of total assets to be a noisy and confusing variable that is affected by the accounting numbers reported in financial statements and that, in fact, leads to disperse results (Watts and Zimmerman, 1990). Because of that, we also use the natural logarithm of the number of employees ( $LNEMPLOYEES$ ) as a proxy for firms' size. The rest of variables are defined in Appendix (Table A1).

Finally, we also introduce year and industry dummies to control for unobserved effects from the period and industry that do not vary over time and that have not been incorporated in the model.

### ***Multinomial Logistic Regressions***

Despite this reasoning, every KM shows some particularities that must be considered. So, we estimate another model based on multinomial logistic regression. In this sense, multinomial model allows to estimate the probability of adopting a specific KM regardless whether it is positive or negative. We also assume the KM "A" as the base outcome of the multinomial logistic regression, because it represents the most adopted KM

across the sample and controls in a stricter way for the change of KM. Then, the multinomial logistic regression looks like this (3):

$$\begin{aligned} \Pr(KM = 1, 2, 3, 4, 5, 6) = & \alpha + \beta_1 KM\_premeans + \\ & \beta_2 LNTA_{it} + \beta_3 LNEMPLOYEES_{it} + \beta_4 LEVERAGE_{it} + \\ & \beta_5 FINAN\_AUTO_{it} + \beta_6 DA_{it} + \beta_7 TRES\_ELAST_{it} + \beta_8 MC\_SHARE_{it} + \\ & \beta_9 ROE_{it} + \beta_{10} ROA_{it} + \beta_{11} QRATIO_{it} + \beta_{12} GDPpc\_GROWTH_{jt} + \\ & \beta_{13} M2\_GROWTH_{jt} + \beta_{14} UNEMP\_GROWTH_{jt} + \beta_{15} HHI_{it} + \\ & \beta_{16} GINI_{jt} + \beta_{17} \sum Year_t + \varepsilon_{it} \end{aligned} \quad (3)$$

where KM ranges 1 to 6 denoting A to F, respectively. It is noticeable to point out that for multinomial logistic regression we have included the variable *KM\_premeans*, which is a pre-sample mean estimator that replaces the fixed effects by the pre-sample mean of the dependent variable (Blundell et al., 2002). In this case, we take the mean of the three first years of the sample. Additionally, standard errors are cluster-robust by year.

## RESULTS

### Descriptive Statistics

Table 4 shows the descriptive statistics for the whole sample (Panel A), as well as the results from differences in means and medians for positive and negative Kinds of Management (KM) breakdown (Panel B) and for the achievement of Optimal Management (OM) decomposition (Panel C). Accordingly, companies with positive KMs are larger (more assets and employees) and more indebted. This is consistent with their credit policy: using more frequently external financing rather than internal implies being less dependent from shareholders' financial resources (Equity) and creating value for the firm at the same time (e.g., Cheng and Tzeng, 2011). In line with this, they have less financial autonomy, higher market capitalization and are located on areas with a more intensive market concentration and

income inequality. In addition, though those companies that meet the OM conditions appear to be larger in assets and employees and have lower market concentration, we cannot initially make conclusive findings because of the lack of significant differences between both groups.

**Table 4. Descriptive statistics**

Panel A. Descriptive statistics of overall sample						
	Obs.	Mean	Median	St. Dev.	Min.	Max.
LNTA	1,558	19.843	19.641	1.966	11.057	25.871
LNEMPLOYEES	1,403	6.842	6.876	1.972	0.000	11.341
LEVERAGE	1,558	0.646	0.655	0.222	0.019	3.025
FINAN_AUTO	1,558	0.901	0.526	2.287	-0.669	50.402
DA	1,546	-0.006	-0.015	0.149	-0.878	2.543
TRES_ELAST	1,551	-0.760	0.027	56.918	-1,739.452	724.031
MC_SHARE	1,240	7.463	2.448	22.006	0.023	369.046
ROE	1,558	0.075	0.131	1.037	-22.228	8.099
ROA	1,558	0.087	0.073	4.506	-154.798	74.903
QRATIO	1,245	1.183	1.032	0.642	0.296	11.560
GDPpc_GROWTH	1,558	0.002	0.008	0.020	-0.043	0.019
M2_GROWTH	1,558	0.042	0.039	0.029	-0.007	0.091
UNEMP_GROWTH	1,558	0.073	0.079	0.101	-0.062	0.275
HHI	1,558	0.024	0.020	0.023	0.007	0.274
GINI	1,558	0.305	0.304	0.023	0.261	0.353

Panel B. Descriptive statistics regarding positive and negative KM										
	KM (+)			KM (-)						
	Obs.	Mean	Median	Obs.	Mean	Median	Diff. Mean		Diff. Median	
LNTA	1,264	20.018	19.777	294	19.093	18.960	0.925	***	0.817	***
LNEMPLOYEES	1,143	7.024	7.274	260	6.038	6.026	0.987	***	1.249	***
LEVERAGE	1,264	0.665	0.672	294	0.561	0.567	0.105	***	0.104	***
FINAN_AUTO	1,264	0.821	0.489	294	1.244	0.763	-0.423	***	-0.273	***
DA	1,256	-0.011	-0.020	290	0.014	0.002	-0.025	***	-0.022	***
TRES_ELAST	1,260	-1.090	0.033	291	0.669	0.001	-1.759		0.032	
MC_SHARE	1,017	7.879	2.454	223	5.569	2.431	2.309	***	0.023	
ROE	1,264	0.105	0.140	294	-0.053	0.090	0.157		0.050	***
ROA	1,264	0.097	0.077	294	0.044	0.052	0.052		0.025	***
QRATIO	1,022	1.199	1.040	223	1.107	0.992	0.092		0.049	***
HHI	1,264	0.025	0.020	294	0.022	0.011	0.003	**	0.008	***
GINI	1,264	0.306	0.304	294	0.300	0.304	0.005	***	0.000	***

**Table 4. (Continued)**

Panel C. Descriptive statistics regarding the achievement of Optimal Management (OM)									
	OM			Non-OM					
	Obs.	Mean	Median	Obs.	Mean	Median	Diff. Mean	Diff. Median	
LNTA	1,128	19.895	19.680	430	19.707	19.436	0.188	**	0.244 **
LNEMPLOYEES	1,023	6.947	7.038	380	6.558	6.622	0.389	***	0.416 ***
LEVERAGE	1,128	0.647	0.656	430	0.642	0.654	0.005		0.001
FINAN_AUTO	1,128	0.930	0.526	430	0.826	0.529	0.104		-0.003
DA	1,119	-0.005	-0.016	427	-0.010	-0.014	0.005		-0.002
TRES_ELAST	1,123	0.450	0.037	428	-3.936	0.004	4.386		0.033
MC_SHARE	894	7.461	2.403	346	7.469	2.735	-0.008		-0.332
ROE	1,128	0.084	0.136	430	0.053	0.113	0.031		0.024 **
ROA	1,128	0.057	0.075	430	0.166	0.067	-0.109		0.008 **
QRATIO	896	1.198	1.030	349	1.143	1.037	0.055		-0.007
HHI	1,128	0.023	0.011	430	0.027	0.020	-0.004	***	-0.008 **
GINI	1,128	0.305	0.304	430	0.305	0.304	-0.001		0.000

This Table reports the descriptive statistics of variables. The definition of all variables is provided in

Table A1. The statistical significance of the difference of means (medians) is based on the parametric t-test (the non-parametric Wilcoxon/Mann-Whitney test). \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels.

## Logistic and Multinomial Logistic Regressions

Table 5 displays the results from the logistic regression considering the dependent variable that defines whether companies adopt a positive or negative KM. The different sets of variables defined in the Eq. (1) are included progressively model by model. Thus, in all cases the results are consistent and suggest that larger firms that have more employees tend to adopt positive KMs. Those firms that have higher LEVERAGE are more likely to perform a positive KMs. However, firms that show lower levels of earnings management (DA), as well as those that demonstrate better performance (ROE, ROA, QRATIO) seem to be more likely to adopt positive KMs. As expected, there is no causality on macroeconomic and cultural factors, which firmly evidences that firms' management must be carried out by managers, and consequently they must necessarily adopt a KM regardless the region. While the first model has a prediction power of 84.18%, the addition of the rest of variables improve the R2 of the models but also the prediction capacity up to 85.41%.



**Table 5. Logistic regression on positive and negative Kinds of Management**

	(1)		(2)		(3)		(4)	
VARIABLES	KM (+)		KM (+)		KM (+)		KM (+)	
Constant	-6.312	**	-7.703	**	-10.152	***	-11.770	***
	(-2.070)		(-2.410)		(-2.660)		(-3.000)	
LNTA	0.036	**	0.041	**	0.041	**	0.036	**
	(2.014)		(2.270)		(2.270)		(2.075)	
LNEMPLOYEES	0.039	***	0.036	***	0.036	***	0.039	***
	(2.944)		(2.767)		(2.767)		(2.944)	
LEVERAGE	0.328	***	0.329	***	0.329	***	0.284	***
	(3.171)		(2.678)		(2.678)		(2.128)	
FINAN_AUTO	-0.015		-0.019		-0.019		-0.025	
	(-1.019)		(-1.039)		(-1.039)		(-1.278)	
DA	-0.216	**	-0.235	**	-0.235	**	-0.237	**
	(-2.563)		(-2.319)		(-2.319)		(-2.295)	
TRES_ELAST	-0.000		-0.000		-0.000		-0.000	
	(-1.052)		(-1.015)		(-1.015)		(-1.029)	
MC_SHARE	0.000		-0.000		-0.000		-0.001	
	(0.037)		(-0.612)		(-0.612)		(-0.665)	
ROE			0.025	**	0.025	**	0.026	**
			(2.095)		(2.095)		(2.137)	
ROA			0.029	**	0.029	**	0.030	**
			(2.548)		(2.548)		(2.545)	
QRATIO			0.057	*	0.057	*	0.057	*
			(1.901)		(1.901)		(1.846)	
GDPpc_GROWTH					13.305		13.550	
					(0.591)		(0.600)	
M2_GROWTH					1.507		1.629	
					(0.157)		(0.171)	
UNEMP_GROWTH					1.478		1.520	
					(0.582)		(0.597)	
HHI							0.502	
							(0.863)	
GINI							0.789	
							(1.394)	
Year Dummies	Yes		Yes		Yes		Yes	
Industry Dummies	Yes		Yes		Yes		Yes	
Observations	891		891		891		891	
R2	0.3067		0.3234		0.3234		0.3259	
Prediction Power	84.18%		85.07%		85.07%		85.41%	

This Table reports the results of logistic regression on the dependent variable KM(+) that takes value 1 for positive Kinds of Management and 0 for negative Kinds of Management. The definition of all variables is provided in Table A1. Both year and industry dummies have been included in the models. Standard errors are corrected for heteroscedasticity. t-values are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels.

Once the KM is analysed, the next step is to identify if companies are performing their activity according to the achievement of the OM. So, Table 6 shows the relationship of indicators with the OM. In the same vein that logistic regression for KM (+), we add model by model the different set of indicators defined in Eq. (1). However, model 5 includes an additional variable of interest that identifies the KM adopted by firms in year  $t$ . Focusing on the last model, and with a prediction power of about 74%, we can affirm that human capital is a significant factor to meet the OM, as well as the level of debt and Financial Autonomy. This highlight confirms the importance of firms' financial structure and manifest the relevance of the human capital as a critical and strategic resource on business valuation (Wernerfelt, 1984; Alama et al., 2006; García Zambrano et al., 2012; Vomberg et al., 2015; Houdek and Koblovsky, 2017). Furthermore, companies are more likely to meet the OM if they perform better (positive and significant QRATIO coefficient) and are located on areas with less market concentration and income inequality, which demonstrates a fairer competitiveness and less economic instability. Finally, adopting positive KMs facilitates to meet the OM (coef.: -0.019;  $t$ :-1.774).

Besides the prior results, we find no evidence about whether the market (current or potential investors) rewards or penalises firms' operating behaviour. Despite this, the outcome is quite understandable: firms must necessarily incur in an operating strategy (defining customers' and suppliers' policy, sales, minimum stocks, etc.) regardless market's opinion. However, the opposed causal effect (how operating management affect firm value on the market) should be significant because of good or bad behaviour. This point will be seen in more detail in additional analyses section.

Nevertheless, all these findings must be explained in more detail, so Table 7 shows the results from the multinomial logistic regression performed to identify the main factors that affect the adoption of each KM, and defines the firms' management behaviour. In this sense, the models from 1 to 6 represents the estimated coefficients for each specific KM (from A to F, respectively).

**Table 6. Logistic regression on optimal management**

	(1)	(2)	(3)	(4)	(5)
VARIABLES	OM	OM	OM	OM	OM
Constant	-0.256 (-0.160)	-0.876 (-0.520)	1.745 (0.910)	3.804 (1.810)	4.514 (2.130)
LNTA	-0.013 (-0.796)	-0.009 (-0.543)	-0.009 (-0.543)	-0.001 (-0.066)	-0.001 (-0.052)
LNEMPLOYEES	0.05 (3.015)	0.047 (2.863)	0.047 (2.863)	0.042 (2.565)	0.039 (2.407)
LEVERAGE	0.202 (2.092)	0.178 (1.807)	0.178 (1.807)	0.264 (2.529)	0.253 (2.463)
FINAN_AUTO	0.037 (1.715)	0.035 (1.713)	0.035 (1.713)	0.047 (2.146)	0.048 (2.249)
DA	-0.016 (-0.172)	-0.027 (-0.293)	-0.027 (-0.293)	-0.003 (-0.030)	0.019 (0.202)
TRES_ELAST	0.000 (1.400)	0.000 (1.399)	0.000 (1.399)	0.000 (1.213)	0.000 (1.193)
MC_SHARE	-0.000 (-0.077)	-0.000 (-0.470)	-0.000 (-0.470)	-0.000 (-0.712)	-0.001 (-0.778)
ROE		0.008 (0.864)	0.008 (0.864)	0.007 (0.750)	0.006 (0.611)
ROA		-0.002 (-0.619)	-0.002 (-0.619)	-0.001 (-0.459)	-0.001 (-0.482)
QRATIO		0.057 (1.724)	0.057 (1.724)	0.057 (1.756)	0.055 (1.701)
GDPpc_GROWTH			-2.141 (-0.088)	-3.349 (-0.139)	-3.056 (-0.128)
M2_GROWTH			-9.895 (-1.097)	-9.070 (-1.017)	-9.466 (-1.066)
UNEMP_GROWTH			-1.665 (-0.592)	-1.763 (-0.636)	-1.723 (-0.626)
HHI				-2.373 (-3.392)	-2.437 (-3.470)
GINI				-1.231 (-1.749)	-1.358 (-1.895)
KM					-0.019 (-1.774)
Year Dummies	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,082	1,082	1,082	1,082	1,082
R2	0.1008	0.1039	0.1039	0.1173	0.1196
Prediction Power	73.75%	73.75%	73.75%	74.12%	73.75%

This Table reports the results of logistic regression on the dependent variable OM that takes value 1 if company achieve the Optimal Management for it KM and 0 otherwise. The definition of all variables is provided in Table A1. Both year and industry dummies have been included in the models. Standard errors are corrected for heteroscedasticity. t-values are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels.

Therefore, KM “A” is positively affected by firm size, level of indebtedness, the elasticity of treasury, market share capitalization, macroeconomic indicators (GDPpc, M2 and Unemployment) and the concentration of wealth distribution. At the same time, it is negatively affected by the number of employees, the level of earnings management through discretionary accruals and the market concentration in the region where firm is located. Thus, those firms that adopt the KM “A” seem to be large and consolidated companies that are performing their activity in sectors with a low employees’ requirement, as well, they maintain a high level of leverage and low earnings management. Additionally, they seem to be located on regions with less market concentration and higher income inequality.

KM “B” is adopted by companies that suffer a decrease in their market share prices. However, we observe that ROA affects positively. Additionally, they are located on places with higher market concentration and low income inequality.

KM “C” is adopted by smaller firms that develop activities with high employees’ requirement. As well, they present higher levels of earnings management and market share price, so they seem to be companies that are growing (higher treasury elasticity) located in places with higher market concentration and lower income inequality.

On the other hand, firms that adopt negative KMs tend to show a different credit policy, so, in particular those firms that adopt the KM “D” are negatively affected by all financial factors with the exception of discretionary accruals. Thus, they seem to be small companies that do not need many employees to perform their activity and are less indebted, as well as showing higher values of earnings management and lower performance.

When companies adopt the negative KM “E,” they present less discretionary accruals, higher market share price and good profitability (ROE) for shareholders, but a worse performance. They used to be located on places that show a higher value of market concentration.

**Table 7. Multinomial logistic regression on Kinds of Management**

	(1)		(2)		(3)		(4)		(5)		(6)	
VARIABLES	KM (A)		KM (B)		KM (C)		KM (D)		KM (E)		KM (F)	
KM_pmeans	-0.172	***	0.012	*	0.078	***	0.039	***	0.008	**	0.035	***
	(-18.438)		(1.764)		(10.122)		(9.529)		(2.257)		(8.296)	
LNTA	0.036	*	0.017		-0.046	***	-0.015	***	-0.009		0.016	**
	(1.914)		(1.410)		(-2.966)		(-2.430)		(-1.589)		(2.356)	
LNEMPLOYEES	-0.075	***	0.030		0.065	**	-0.015	*	0.002		-0.007	
	(-3.991)		(1.554)		(2.537)		(-1.660)		(0.368)		(-1.267)	
LEVERAGE	0.230	**	-0.017		-0.044		-0.278	**	0.022		0.087	***
	(2.565)		(-0.236)		(-0.253)		(-2.207)		(1.110)		(3.747)	
FINAN_AUTO	0.034		-0.048		-0.024		0.019		0.006		0.013	**
	(0.879)		(-1.533)		(-0.558)		(0.934)		(1.069)		(2.299)	
DA	-0.704	***	-0.119		0.652	***	0.340	***	-0.200	***	0.030	
	(-3.818)		(-0.753)		(3.971)		(4.913)		(-6.832)		(0.800)	
TRES_ELAST	0.001	*	-0.000		-0.001	***	0.000		0.000		0.000	***
	(1.833)		(-0.317)		(-3.010)		(0.352)		(0.859)		(2.714)	
MC_SHARE	0.002	*	-0.002	***	0.002	***	-0.002	**	0.001	***	-0.001	
	(1.779)		(-3.279)		(3.632)		(-2.333)		(4.404)		(-1.267)	
ROE	0.010		-0.004		0.001		-0.015		0.005		0.003	
	(1.173)		(-0.359)		(0.099)		(-0.906)		(1.461)		(1.342)	
ROA	-0.000		0.009	***	0.005		-0.009		-0.003		-0.002	
	(-0.143)		(3.051)		(0.672)		(-1.119)		(-1.557)		(-0.251)	
QRATIO	-0.012		0.035		0.007		-0.019	**	-0.050	***	0.040	
	(-0.326)		(1.068)		(0.441)		(-2.069)		(-3.924)		(1.593)	
GDPpc_	8.728	***	7.653	***	6.957	***	16.449	***	-34.372	***	-5.416	***
GROWTH												
	(4.048)		(6.644)		(3.559)		(9.353)		(-9.798)		(-4.939)	
M2_GROWTH	3.060	***	2.397	***	2.549	***	3.327	***	-9.443	***	-1.891	***
	(5.017)		(7.293)		(4.545)		(6.210)		(-9.940)		(-5.570)	
UNEMP_	0.521	*	1.169	***	1.016	***	1.822	***	-3.949	***	-0.580	***
GROWTH												
	(1.911)		(8.923)		(4.397)		(7.513)		(-9.836)		(-4.615)	
HHI	-1.693	***	0.800	*	1.077	***	-0.232		0.419	***	-0.371	
	(-4.227)		(1.805)		(6.949)		(-0.527)		(2.653)		(-1.253)	
	(1)		(2)		(3)		(4)		(5)		(6)	
VARIABLES	KM (A)		KM (B)		KM (C)		KM (D)		KM (E)		KM (F)	
GINI	2.639	***	-1.758	***	-1.519	**	-0.216		0.008		0.846	*
	(5.134)		(-5.027)		(-2.556)		(-0.503)		(0.063)		(1.848)	
Year Dummies	Yes											
Observations	780											
R2	0.3346											
Prediction Power	.											

This Table reports the results of multinomial logistic regression on the dependent variable KM that takes value 1, 2, 3, 4, 5 and 6 for Kinds of Management A, B, C, D, E and F, respectively. The definition of all variables is provided in Table A1. Year dummies have been included in the models. Standard errors are corrected for heteroscedasticity. t-values are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels.

KM “F” is adopted by firms that are characterized by being larger companies with a high level of leverage, however they present higher financial autonomy, which implies that they also depend on the shareholders’ resources. They are usually located on places with higher income inequality.

Additionally, those firms that decide to follow the KMs “A,” “B,” “C” or “D” are positively affected by macroeconomic indicators. Conversely, companies that adopt the KMs “E” or “F” are negatively affected by the evolution of macroeconomic indicators. That means that firms react to the evolution of economy, monetary and unemployment policies, shifting from one KM to other depending on the economic situation, due to firms can develop better their activities adopting one KMs or other. That could be the case of large and consolidated companies that maintain higher level of leverage and are located on regions that show higher income inequality. They could change from “A” to “F” or vice versa if the economic situation of Italy changes and so they have to adapt their activity.

### **Additional Analysis**

In this section, we try to further investigate the relationship between firm value and firms’ management behaviour.

As observed in previous Table 5, there is no significant causality between the operating behaviour of firms (measured by KMs) and the market reaction (measured by price per share). The notion of that market does not impact on the firms’ operating behaviour seems to be logic. As described, the operating activity of companies depends on the credit that a firm obtain from suppliers, the bargaining power over customers, stocks’ levels and the time to put the product (good or service) on the market. So that, investors do not make any influence over firms’ operating activities since these activities are necessary for companies’ survival. Nevertheless, the inverse causal relationship might occur, that is, firms’ behaviour might affect market opinion.

Among other duties, corporate managers are supposed to put more effort on those resources that might maximise its utility at the benefit of their shareholders (e.g., Aktas et al., 2015). Managing efficiently a firm would imply to carry out more profitable investment opportunities, and these two signals would enhance firm performance and thus market rewarding through prices. Otherwise, bad management behaviour or simply low level of working capital might considerably threaten stock-outs, sales or other corporate policy implications, thus affecting adversely firms' performance, which is directly penalised by the market.

Inspired in the model used in Yartey (2010), we run the following regression (4):

$$SMD_{it} = \alpha + \beta_1 LNTA_{it} + \beta_2 CF\_TA_{it} + \beta_3 GDPpc\_growth_{it} + \beta_4 ST\_DEBT_{it} + \beta_5 LT\_DEBT_{it} + \beta_6 KM_{it} \text{ (or } OM_{it}) + \beta_7 \sum Year_t + \varepsilon_{it} \quad (4)$$

where  $SMD_{it}$  means the Stock Market Development using market capitalisation (equals to the value of listed shares) as a percentage of GDP. We focus on this measure to be less discretionary (but correlated) than other market indicators (Demirguc-Kunt and Levine, 1996). As explanatory variables, we include  $LNTA$  as natural logarithm of total assets,  $CF\_TA$  as firm' cash flow to total assets, change in GDP per capital ( $GDPpc\_growth$ ), short- and long-term debt and our main variables that define firms' behaviour ( $KM$  and  $OM$ ). We expect firms' size, cash flow and increase of GDP per capita to contribute positively to stock market development: (i) larger firms are supposed to be heavily monitored, reduces information asymmetries and agency costs because of conveying more information, and generate powerful and relevant signals to an economy, therefore stimulating market confidence; (ii) higher levels of cash flows might be a signal of better firms' performance, which are expected to inspire investors' confidence and thereby triggering stock market development; and (iii) economic stability or upturns clearly favour credit supply and better contracting conditions, which in turn improves firms' performance and thus affecting market rewarding through prices.

Initially, we do not make any prediction for the relationship between debt and stock market development. On the one hand, one classical stream of research emphasises the signalling role of debt in conveying inside information to the market (Leland and Pyle, 1977), thus reducing information asymmetries and increasing firm value (Stulz, 1990; Cheng and Tzeng, 2011). Yet, debt may create value because of the tax benefit. Oppositely, other traditional argument relates to the negative effect of debt financing on growth opportunities and probability of default (Harris and Raviv, 1991). The reasoning behind is that if firms need credit, then it means either equity is not enough or shareholders are not able to fully cover firms' activity, which implies transferring risk from insiders to outsiders. In this case, market confidence might be threatened. Furthermore, financial leverage increments may also boost earnings volatility and thus in stock price.

Finally, we expect firms' management behaviour to affect stock market development. As mentioned earlier, if corporate managers (firms in essence) behave correctly, then it allows to improve firms' performance which in turn would trigger a positive market reaction.

As expected, we find positive and significant coefficients in firm size, cash flow and change in GDP per capita in all models (Table 8). In relation with debt, overall results do not present any significant relationship between short-term debt and stock market development. A plausible explanation might lie on the quality and composition of short-term creditors, which is sometimes complex to unravel. This confusing fact might difficult immediate stock price adjustment. However, this association is negative and heavily significant for companies performing with negative KMs. In essence, it means that having excessive short-term debt is penalised by the market, which is predictable for these firms. Obviously, if they already present difficulties in paying suppliers and charging from customers, agents will see short-term debt overhang as a threaten for their investments, thus disciplining them downwards through prices. Long-term debt also obstructs Italian stock market development, especially for negative KMs. Therefore, financing debt appears to jeopardise Italian agents' confidence, probably due



to the indebtedness difficulties that the Italian economy drags on for a long time.

**Table 8. Determinants of stock market development**

	Whole sample		KM(+)	KM(-)
Variables	(1)	(2)	(3)	(4)
Constant	-8.510*** (-3.372)	-8.576*** (-3.371)	-9.812*** (-3.363)	-5.015** (-2.396)
LNTA	0.458*** (3.410)	0.462*** (3.351)	0.533*** (3.333)	0.320** (2.365)
CF_TA	0.673* (1.725)	0.681* (1.705)	0.740* (1.834)	0.857** (2.303)
GDPpc_growth	20.777** (2.490)	19.856** (2.362)	26.919** (2.575)	-1.018 (-0.312)
ST_DEBT	-0.121 (-0.613)	-0.128 (-0.648)	-0.047 (-0.216)	-0.736*** (-2.606)
LT_DEBT	-0.407* (-1.757)	-0.425* (-1.815)	-0.440* (-1.818)	-0.670** (-2.422)
KM	0.012 (0.378)		-0.146* (-1.805)	-0.002 (-0.229)
OM		0.043* (1.724)		
Year dummies	Yes	Yes	Yes	Yes
Random-effects	Yes	Yes	Yes	Yes
Observations	1,245	1,245	1,022	223
R2	0.2354	0.2364	0.2615	0.2747

This Table reports the results of the regression on the dependent variable of Stock Market Development.

The definition of all variables is provided in Table A1. Year dummies have been included in the models. Standard errors are corrected for heteroscedasticity. t-values are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels.

Surprisingly, the variable that classifies firms' management behaviour (KM) is not associated with stock market development (model 1). In this respect, we decide to breakdown the sample: positive vs negative KM (models 3 and 4), since their behaviour is different. Doing this, the results now meet our expectations, companies that adopt positive KM contribute and push up stock market development, which means market rewards firms that performs better. Conversely, companies with negative KM go

unnoticed, that is, market ignores them. Therefore, the kind of management adopted by firms represents a signal to the market.

Lastly, companies that meet the optimal management of the available resources and financing ( $OM = 1$ ), in other words, firms that are properly performing their operating activity, are partly responsible of the stock market development in a country.

## CONCLUSION

The purpose of this study is to inquire into the Italian firms' management behaviour, by determining their own answer to changes in the economic and financial environment, which is called as Kinds of Management (KM) throughout using the Accounting Methodology of Radar Charts (AMRC). As well, we create a simple but meaningful model in which we define and analyse the key drivers that affect the decision of adopting a specific KM.

From a panel data based on 156 Italian firms spanning 2007 to 2016 and based on quantitative analyses (logistic and multinomial logistic regression models) the empirical results show that even though firms must necessarily adopt an operating strategy/behaviour (kind of management), just to survive or grow, some other factors prevail to location. In particular, human capital appears to be a critical and strategic resource on business valuation, together with leverage, fairer competitiveness and economic stability. These drivers contribute to meet firms' optimal management, which would provide additional funds that could be engaged in more profitable investments and thus affecting positively firm value.

Additional analysis presents an important issue. Corporate managers (firms at last) define firms' behaviour which determines firms' performance. When companies show a good performance, it triggers a positive market reaction (increase of stock market development). Otherwise, they go unnoticed and represent no signal to the market.

This work has several implications from different perspective. Firstly, we contribute to the existing need of improving decision-making (Kaplan, 2011). Our indicators stem from mathematical assumption relative to

trigonometry and geometry, so that it provides a possible solution for the claim of more normalized, objective, independent and positive indicators. Secondly, an important corporate policy implication arises from our additional analysis. Our finding hints that when corporate managers target a good performance of their firms or target the optimal management, that efficiency would provide additional funds for more profitable investments (Aktas et al., 2015) because the market rewards this behavior (increase of stock market development).

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## APPENDIX

**Table A1. Definition of variables**

KM	=	Kind of Management adopted by firms according to the Accounting Methodology of Radar Charts (AMRC). It takes 1, 2, 3, 4, 5, and 6 for each Kind of Management A, B, C, D, E, and F, respectively.
KM(+)	=	Dummy variable that takes 1 if firm adopts positive KM (A, B, or C), and 0 for negative KM (D, E, and F)
KM_premeans	=	Pre-sample mean estimator that replaces the fixed effect by the pre-sample mean of the dependent variable (Blundell et al., 2002). In this case, we take the mean of the three first years of the sample.
LNTA	=	Natural logarithm of total assets
LNEMPLOYEES	=	Natural logarithm of number of employees
LEVERAGE	=	Total debt deflated by total assets
FINAN_AUTO	=	Financial autonomy ratio. It is defined as equity deflated by total liabilities.
DA	=	Discretionary accruals value, which is the value of residuals from the cross-sectional version (Dechow et al., 1995) of the modified Jones (1991) model, as well as considering the additional constant suggested by Kothari et al., (2005).
TRES_ELAST	=	It defines treasury elasticity and is calculated as the change in cash and cash equivalents deflated by change in income.
MC_SHARE	=	Price per share at the end of period t.
ROE	=	Return on Equity as earnings before interests and taxes deflated equity
ROA	=	Return on Assets as earnings before interests and taxes deflated by non-financial assets.
QRATIO	=	Proxy of firm's performance (Tobin's Q). It is defined as book value of total assets minus the book value of common equity plus the market value of common equity deflated by the book value of total assets (Laeven and Levine, 2009). It ranges from 0 to 1, with higher values indicate better performance.
GDPpc_GROWTH	=	Change in annual Gross Domestic Product per capital. Data from OECD database.
M2_GROWTH	=	Change in annual M2, which is defined as "broad money" that include M1 (cash and checking deposits) plus "near money" (savings deposits, money market securities, mutual funds and other time deposits). Data from Bank of Italy.
UNEMP_GROWTH	=	Change in annual unemployment rate. Data from OECD database.
HHI	=	Herfindahl-Hirschman index that measures market concentration. It is calculated by taking the market share (based on revenues) of each firm in a region, squaring them, and then summing the result. It ranges from 0 to 1, with higher values indicate lower competition.
GINI	=	Gini index by region which determines income inequality within a region. It ranges from 0 to 1, with higher values indicate more income inequality.
OM	=	Dummy variable that takes value 1 when firm meets the Optimal Management in its activity and 0 otherwise. That is, the compliance of Financial Sufficiency and Liquidity on Transactions conditions.



*Chapter 12*

**MEASURING THE MARKET POWER  
IN THE CONTEXT OF THE BEHAVIOURAL  
ECONOMICS AND INDUSTRIAL  
ORGANIZATION**

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**ABSTRACT**

This chapter investigates economic implications of the increased market power in the context of the behavioural economics and industrial

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organization. Finding an adequate measure of market power is one of the many challenges that researchers face. In addition, rising market power calls for reforms that keep future market competition strong. The main purpose of this chapter is to contribute to the creation of a holistic picture of measuring the market power by examining the connections between market structure and firm behaviour. As the present study focused on the quantitative and qualitative analysis, contemporary critical approach to different approaches is emphasized. The study draws on conceptual analysis of behavioural economics in order to describe behaviour with a focus on the stylized facts. The study pioneers by providing an in-depth analysis of the measuring the market power, and gives theoretical and empirical ground for future researches. This chapter deals with the decision-making process of economic agents which have different goals and interests in the context of the new empirical industrial organization. In addition, chapter is intended to provide an introduction to the approach of behavioural economics, and to some major findings and promising new directions. It also seeks to fill some unavoidable gaps in the literature coverage of topic. It challenges the reader by the providing insight into the trendy issues and providing answers to economic dilemmas. Comparative review of two approaches of analyzing market power (Structure-Behaviour-Performance Paradigm and New Empirical Industrial Organization) shows that the debate will continue because there is no unanimous agreement on which of these two methods should be used to analyze the market power.

**Keywords:** market power, behavioural economics, structure-behaviour-performance paradigm, New Empirical Industrial Organization

## INTRODUCTION

Understanding theoretical models is of great importance for understanding firm behaviour. Since the choice of a business model is a *condition sine qua non*, parameters such as: conditions of competition, market power and profitability are becoming strategic variables for business entities. Undoubtedly, understanding theoretical concepts is the basis for his experimental verification. In this connection, the role of behavioural economics in this part of the chapter is certainly worthy of attention.

Some authors define scientific models as constructs that represent a phenomenon, covering all relatively stable and general features of the world

that are interesting from a scientific point of view (Frigg and Hartmann 2012). Therefore models simplify complex reality in order to make it understandable, and empirically validated models can be referred to as theories. The latest study elaborated the picture of information behaviour by identifying three main approaches by which researchers have conceptualized the interplay of information seeking and sharing. The findings suggest that the most sophisticated conceptualizations of such connections draw on the interactive approach (Savolainen 2019).

Considering the historical context of behavioural economics, it can be noted that most of the ideas in behavioural economics are not new; indeed, they return to the roots of neoclassical economics. This conviction imply a adoption of the neoclassical approach to economics based on utility maximization, equilibrium, and efficiency. This approach provides a theoretical framework that can be applied to almost any form of economic behaviour. The methods used in behavioural economics are the same as those in other areas of economics. At the beginning, behavioural economics relied heavily on evidence generated by experiments. More recently, behavioural economists have embraced the full range of methods employed by economists.

The term “market power” refers to the ability of a firm (or a group of firms, acting jointly) to raise price above the competitive level without losing sales so rapidly that the price increase is unprofitable and must be rescinded. Besides, a simple economic meaning of the market power is the ability to set price above marginal cost. In addition, market power is a key concept in competition law (Landes and Posner 1981). Public debate on growing market power is increasing, and increased interest is developing amid rising market concentration, profitability, and due to macroeconomic developments in advanced economies. Research on market power is important for both policy makers and academics. It provides evidence that policy makers can use to improve competition law, and it also allows academics to test theoretical models that were accepted.

Unlike the empirical literature on Structure-Behaviour-Performance Paradigm (SCP), which was primarily based on cross-section studies, the New Empirical Industrial Organization (NEIO) focuses on econometric

testing of particular aspects of behaviour in single industries in order to detect market power or changes in the collusive-competition behaviour of firms.

The objective of this chapter is to expound the economic implications of rising market power observed through the prism of behavioural economics and industrial organization. This chapter is structured into five sections as follows. After Introduction, Section 2 provides the role of behavioural economics in the analysis of the firm behaviour. Section 3 provides a critical review of structure-behaviour-performance paradigm. Section 4 focuses on estimating the economic implications of rising market power. Finally, conclusion is provided in Section 5.

## **THE ROLE OF BEHAVIOURAL ECONOMICS IN THE ANALYSIS OF THE FIRM BEHAVIOUR**

In this part we describe behavioural concepts, discuss theory and evidence from behavioural economics that are most relevant to the study of industrial organization. Behavioural economics increases the explanatory power of economics by providing it with more realistic psychological foundations.

At the core of behavioural economics is the conviction that increasing the realism of the psychological underpinnings of economic analysis will improve economics - generating theoretical insights, making better predictions, and suggesting better policy. This conviction does not imply a rejection of the neoclassical approach to economics based on utility maximization, equilibrium, and efficiency. The neoclassical approach is useful due to it provides a theoretical framework that can be applied to almost any form of economic behaviour. Theories in behavioural economics also strive for generality. Particular parameter values often reduce the behavioural model to the standard one, and the behavioural model can be pitted against the standard model by estimating parameter values (Camerer and Loewenstein 2003).

Behavioural economics is studying how economic actors (consumers, households, business entities, state) make the choice in reality. It uses concepts and evidence from psychology to enhance understanding of economic decision making. A new field of neuroeconomics complements the behavioural economics, and helps to understand the link between neural and psychological variables, on the one hand, and economic choice, on the other hand.

Game theory has rapidly become an important foundation for many areas of economic theory, such as bargaining in decentralized markets, contracting and organizational structure, as well as political economy. “Behavioural game theory” uses experimental evidence and psychological intuition to generalize the standard assumptions of game theory (Camerer and Loewenstein 2003). While game theory tries to predict what interaction between rational players should be, “behavioural game theory” explores interaction between real actors.

The rational behaviour of business entities indicates an intention to achieve the goals while respecting a number of constraints. In particular, a rational economic entity produces quantities that maximize profits based on the demand, technological conditions and behaviour of competitors. However, in many cases, actual behaviour is different from that predicted by the rational behaviour model. This statement is important when determining a model that predicts behaviour or a policy. It should be noted that the market rewards rational behaviour, and punishes the irrational. Limited rationality is the idea that people behave rationally within the limits of limited information and mental capacity. In this connection, it is worth mentioning the area of behavioural economics, which is an integral part of complex economic analyzes (Kostić 2019).

It is difficult to make decisions when information is imperfect. Bounded rationality is the concept that people are bounded by the limits of their capacity to obtain complete information and to deal with complex issues. In economic decision-making, salient features of various options will give them excessive weight. Many of the anomalies or mistakes are result from excessive salience of a particular option. Decision-making becomes even more difficult when consequences of choices are unknown or uncertain. In

these situations, economic actors often make choices relative to a “reference point” which is often set at the *status quo*. Preferences are reference-dependent when a change in reference point gives rise to different choices. A phenomenon known as the endowment effect refers to the situation when economic agents tend to place greater value on what they already own. A measure of the endowment effect is the difference between the price an economic actor is willing to accept for an item and the price he is willing to pay. The Akerlof–Kranton model shows that economic actors become identified with a social group. When this happens, they gain utility from behaving according to the “rules” of the group (Tremblay and Tremblay 2012, 101–119). In this connection, we emphasize the stylized facts<sup>1</sup> that are characteristic in this field:

- the effect of anchoring (refers to the fact that the choices made by people can be influenced by completely suspect information);
- the effect of grouping (refers to the fact that people can hardly predict what they will choose in different circumstances. Decisions differ in situations when longer-term choices need to be made than those made in short-term observation period);
- wide choice (the theory predicts that more choices are better. However, this claim neglects the costs of making choices and this can make it difficult to make a decision);
- constructed preferences (behavioural economists point out that preferences are not a guide to the selection process, but that they partially reveal through the experience of choice. So, people develop preferences through choice. When preferences are detected, they are installed in the choices, which tend to grow into the decision. On the other hand, traditional economic theory treats preferences as

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<sup>1</sup> The term stylized facts uses all non-trivial statistical evidence, for the empirical regularities observed in a sufficient number of cases. They are more moderate term than the law, but also more comprehensive due to it refers to broader systemic phenomena. The term derives from Nicholas Kaldor who used the term in economic growth theory. This term is used in economics in different contexts (See: Arroyo and Khalifa 2015, 143–156 and Cristelli 2014, 19–25).



something that exists in advance, so that preferences explain behaviour);

- the law of small numbers (people are usually overly influenced by small samples, especially if they have experienced them. It is also related to the fact that it is difficult for people to recognize coincidence. This is very important in game theory when people need to make their strategy choice as uncertain as possible, so that they appear to be randomly selected. However, people are not very adept at spotting random behaviour);
- loss aversion (people have a loss aversion rather than a risk aversion, so that they give a seemingly overweight status quo, in relation to what condition they will find themselves in)<sup>2</sup>.

## **A CRITICAL REVIEW OF STRUCTURE-BEHAVIOUR- PERFORMANCE PARADIGM**

Market structure behaviour and performance framework was derived from the neoclassical analysis of markets. The SCP paradigm was designed by Harvard school. It is popularized during 1940-60s with empirical research involving the identification of correlations between industry structure and performance. It was followed by the Chicago school of thought from 1960-80s. During 1980-90s game theory took center stage with emphasis on strategic decision making and Nash equilibrium concept. After 1990s empirical industrial organization with the use of economic theory and econometrics lead to complex empirical modeling of technological changes, merger analysis, and identification of market power. There are two competing hypotheses in the SCP paradigm: the traditional “structure performance hypothesis” and “efficient structure hypothesis”. The structure performance hypothesis states that the degree of market concentration is inversely related to the degree of competition. Specifically, this hypothesis will be supported if positive relationship between market concentration

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<sup>2</sup> See: Varian 2014; Tremblay and Tremblay 2012; Camerer, Loewenstein and Rabin 2011.

(measured by concentration ratio) and performance (measured by profits) exist, regardless of efficiency of the firm (measured by market share which can indicate market power). On the other hand, the efficiency structure hypothesis states that performance of the firm is positively related to its efficiency (Edwards, Allen and Shaik 2006). Kostić, Stojanović and Radukić (2016) point out the key determinants of the analysed approaches which recognise the importance of the ability of firms to take advantage of economies of scale and product differentiation. However, they differ in their view of the relationship between market structure and performance.

Stigler (1968) defined industrial organization (IO) as ‘the application of microeconomic theory to the analysis of firms, markets and industries’. Industrial organization (IO) is concerned with the structure of industries in the economy and the behaviour of firms and individuals in these industries. Schmalensee (1989) considers that in the modern era, IO economist have played an important role in industry studies in support of broad assertions regarding market behaviour and performance.

One of the central fields in the area of Industrial organization is market structure. Some industries are dominated by a handful of firms and this outcome is kind of an inevitable consequence of the functioning of competitive markets. Some authors provides a new perspective on the link between market concentration and the profitability of firms (Sutton 2001).

Studies frequently indicate that the Structure-Behaviour-Performance Paradigm basically attempts to look at the market structure of industries and determine their behaviour and performance. However, in recent period, a reverse approach to look at the structure and performance of a given industry by observing the behaviour of firms has emerged. The new wave of research goes to New Empirical Industrial Organization (NEIO) which tried to understand the institutional details of particular industries and use this knowledge to test specific hypotheses about specific firm behaviour. Nevertheless, NEIO appears to be the alternate paradigm for imperfect market analysis (Lelissa and Kuhil 2018). Unlike the empirical literature on SCP, which was primarily based on cross-section studies, the NEIO focuses on econometric testing of particular aspects of behaviour in single industries

with the objective of detecting market power or changes in the collusive-competition behaviour of firms (Weiss 1971).

The existing literature on market power shows that there is no unanimous agreement on which of these two approaches (SCP or NIO) should be used to analyze the market power. For instance, much of the literature on developing countries' experiences continues to be based on the SCP paradigm and even in developed countries the number of NEIO studies is far less than the number of SCP based studies that have been carried out. Most importantly, literature has not yet resolved a critical question of what determines industry competitiveness, considering both firm strategies and market structure. This is still remained one of the important center area of industrial organization. Therefore, NEIO appears to be the alternate paradigm for SCP approach. Comparative analysis of these two methods of analyzing market power shows that the debate over the use of the SCP versus the use of the NEIO approaches to analyze market power will continue (Lelissa and Kuhil 2018).

## **ESTIMATING THE ECONOMIC IMPLICATIONS OF RISING MARKET POWER**

Considering the fact that measuring market power is challenging, this part considers two main alternatives. The first is the ability of firms to charge prices that exceed their marginal cost of production. Under this definition, a firm's market power can be measured through its markup, defined as the ratio of price to marginal cost. The second definition is the ability of firms to obtain extraordinary profits. A frequently used indicator is an (operational) profitability measure, such as the ratio of operating earnings to sales. This is an empirical measure of the Lerner index, which is also related closely to a firm's markup.

A markup can be defined as the ratio of the price ( $P$ ) to the marginal cost ( $MC$ ). Empirically, it is challenging to estimate for many reasons, one of which being that most firm-level databases do not include information on

firm-level prices. De Loecker and Warzynski (2012) derive the following expression for the markup ( $\mu_{it}$ ) from the firm's cost-minimization problem:

$$\mu_{it} = \frac{P_{it}}{MC_{it}} = \frac{\partial F_{it}(\cdot)}{\partial V_{it}} \frac{V_{it}}{F_{it}(\cdot)} / \frac{P_{it}^{V_{it}} V_{it}}{P_{it} Q_{it}} = \frac{\beta_{it}^v}{\alpha_{it}^v} \quad (1)$$

where  $i$  and  $t$  are the subindexes for the firm and year considered, respectively.  $(\cdot)$  is the firm's production function and  $V_{it}$  refers to any given flexible input. The firm's markup is thus estimated as the ratio of the output elasticity of the variable input considered ( $\beta_{it}^v$ ) to the expenditure share of that input ( $\alpha_{it}^v$ ). Output elasticities can be obtained from the estimation of an industry-specific Cobb-Douglas production function, following the method proposed by Akerberg, Caves and Frazer (2015). See Díez, Fan, and Villegas-Sánchez (2019) for further details on the estimation.

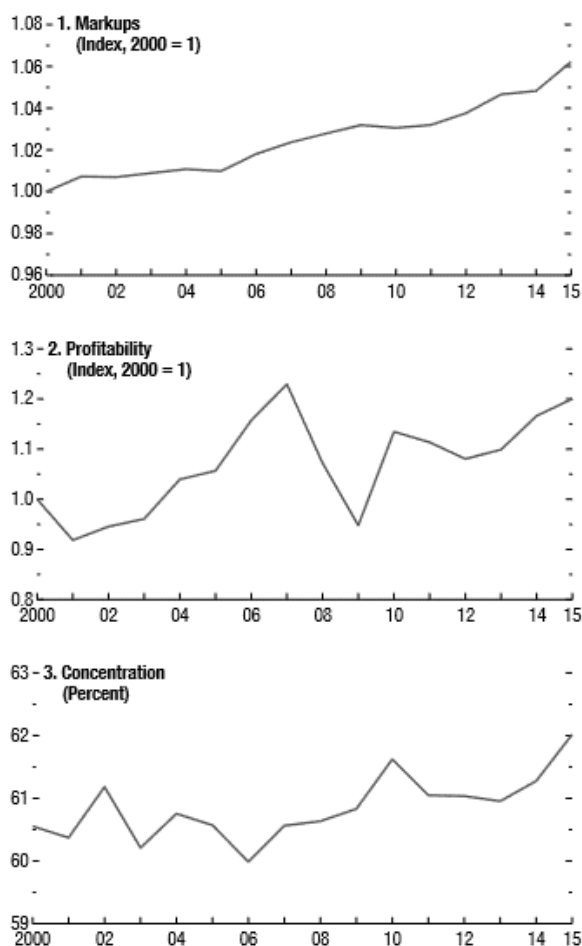
On the one hand, the firm-level Lerner index, or price-cost margin, can be calculated as:

$$l_{it} = \frac{EBIT_{it}}{OPER_{it}} \quad (2)$$

where  $EBIT_{it}$  refers to earnings before interest and tax and  $OPER_{it}$  refers to operating revenue. On the one hand, country-industry-level markup is the simple average of firm level markups in the country and industry considered.

The latest research in this area shows that the firm markups have risen about twice as much in digitally-intensive industries than in the average industry since 2000. In particular, an industry is considered to make intensive use of digital technologies if it ranks in the upper half of the cross-industry distribution in at least three of the following categories: software investment, ICT tangible investment, intermediate ICT goods, intermediate ICT services, and robot use (Calligaris, Chiara and Marcolin 2018).

Aggregate market power trends (Figure 1) show that all measures point toward a moderate increase in market power over time: higher markups, higher profitability, and, to a lesser extent, higher concentration.



Source: International Monetary Fund staff calculations (International Monetary Fund, 2019, 59)

Figure 1. Aggregate market power trends.

Markup calculations are based on the approach of De Loecker and Warzynski (2012), used measure of profitability is the Lerner index, computed as the weighted average of firms' ratio of earnings before taxes to revenue. Concentration is computed as the ratio of sales of top four to top twenty firms within country. To aggregate, simple averages are taken across

sectors within a country, and then the median across countries to obtain results.

## CONCLUSION

Defining and measuring the market power is challenging for researchers. Firstly, market power shows the ability of firms to charge prices that exceed their marginal cost of production. Under this definition, a firm's market power can be measured through its markup (ratio of price to marginal cost). Secondly, market power is the ability of firms to obtain extraordinary profits. A frequently used indicator is a profitability measure (ratio of operating earnings to sales) which is an empirical measure of the Lerner index, which is related closely to a firm's markup. We have compared two alternatives of analyzing market power and concluded that the debate over the use of the SCP approach versus the use of the NEIO approach to analyze market power will continue.

The chapter considered the historical context of behavioural economics. It can be concluded that most of the ideas in behavioural economics are not new; indeed, they return to the roots of neoclassical economics. In addition, behavioural economics is studying how economic actors make the choice in reality. Therefore, this approach provides a theoretical framework that can be applied to almost any form of economic behaviour. Finally, we emphasised the importance of behavioural economics in the analysis of the firm behaviour in order to to maximize market power.

This is a significant topic for further research due to it opens the possible directions of thought and points to the importance of the theoretical concepts for decision making in a real environment. Further analysis should seek answers to question such as: what are the effects of increased market power on competition policy measures. Comparative studies would be particularly welcome because they may result in a more holistic picture of measuring the market power by examining the connections between market structure and firm behaviour.

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*Chapter 13*

## **FIRM FINANCIAL REPORTING BEHAVIOR: ANALYSIS OF GOODWILL IMPAIRMENT**

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### **ABSTRACT**

Goodwill is one of the most controversial issues in financial reporting. This topic is relevant and timely, since IASB is investigating possible improvements to the accounting for goodwill acquired in a business combination, since do not always produce useful financial information. In this study we present the evolution and current accounting treatment of goodwill. The empirical work focuses on a sample of the 100 biggest Spanish listed firms and covers a ten-year period (2008–2017). The results show that, although there are important differences between firms and industries, on average, the ratio of goodwill over total assets is 13%. Moreover, only 29.7% of companies recognize an impairment loss, and 95.8% of this loss is concentrated in top ten companies. Furthermore, we construct an index and hand-collect the information disclosed in the notes

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to the financial statements with the aim of providing evidence on the compliance with IAS 36 disclosure requirements on the goodwill impairment test. The study confirms that certain firm characteristics (the magnitude of goodwill and the goodwill impairment intensity) have an impact on compliance levels. In addition, the compliance level seems to have increased over time, thus indicating learning. These results contribute to the literature by increasing the knowledge about the reporting behavior of Spanish listed firms on goodwill impairment and financial information disclosed in this area.

**Keywords:** goodwill impairment, compliance level, disclosure, financial reporting, accounting standards, Spain

## INTRODUCTION

The accounting treatment of goodwill has been subject of a great controversy. The accounting standards dealing with goodwill have undergone significant changes over the years, trying to meet the needs of the users of financial information, studies have been done, feedback have been received, but there is still an ongoing debate.

On the one hand, as stated in some reports by the Institute of Chartered Accountants in England and Wales (ICAEW, 2007), the European Securities Market Authority (ESMA, 2013, 2014) and the European Financial Reporting Advisory Group (EFRAG, 2016), among others, the views on the usefulness of goodwill impairment and its disclosure are not very positive. Since, although the minimum information is disclosed, this information is too generic, repetitive and non-specific to the entity, especially in the sensitivity analysis. Some investors argue that companies provide insufficient information about goodwill and impairment, and that impairment of goodwill is not always recognized in a timely way. Other investors state that existing disclosure does not provide enough information to enable them to understand whether an acquisition has been a sound investment decision, and whether the acquired business really performs as expected at the time of the acquisition, and it is also perceived the late

recognition of impairment losses and the overstatement of goodwill. On the other hand, the view of companies about the current way of examining goodwill impairment is not very favorable either. Thus, some companies state that the impairment test of goodwill under International Accounting Standard (IAS) 36 is overly complex, time-consuming and expensive. According to a PriceWaterhouseCoopers (PwC)' study on compliance with disclosure requirements on goodwill and goodwill impairment, disclosure of information required by International Financial Reporting Standards (IFRS) 3 and IAS 36 is not always useful to users and is often scarce and vague (PwC, 2011).

Prior academic literature that looks at the level of compliance with the accounting standards on goodwill impairment is based on Anglo-American countries, such as Australia (Carlin and Finch, 2010a, 2010b, 2011; Guthrie and Pang, 2012, 2013; Bepari et al., 2014), New Zealand (Carlin and Finch, 2010b), the United States (US) (Sevin et al., 2007), and the United Kingdom (UK) (Camodeca et al., 2013). Furthermore, some of these authors have also considered other contexts, such as Singapore (Carlin et al., 2010), Malaysia (Carlin et al., 2009), or Hong Kong (Carlin et al., 2014). However, there are also some other papers whose focus of attention is mainly Continental European countries, such as Italy (Izzo et al., 2013; Devalle et al., 2016; Quaranta et al., 2019), Greece (Baboukardos and Rimmel, 2014), Italy and the UK (D'Alauro, 2013), the Netherlands and Sweden (Hartwig, 2015), Germany (Lazar and Velte, 2018), and even a wider European context (Glaum et al., 2013). However, only a few of them make an analysis of the factors that explain disclosure.

The main objective of the work is to present the accounting treatment of goodwill and to analyze the financial reporting behavior on this issue of a sample of Spanish listed companies. In particular, in this chapter we summarize the evolution of the goodwill accounting treatment, both at international and national level, presenting the main aspects of current regulation. In the empirical work, first, we carry out a descriptive analysis of the evolution of goodwill and goodwill impairment in a ten-year period using a sample of Spanish listed companies. Second, based on the manually collected information that listed firms provide in their notes to the

consolidated financial statements on goodwill impairment, we conduct an analysis of the level of disclosure on this area. To this end, we construct an index to measure the level of disclosure; hence, of compliance with the international accounting standards on goodwill impairment. Moreover, through a multivariate analysis we investigate the aspects that explain this level of disclosure, and we focus on some firm characteristics that have been frequently used in the literature such as the magnitude of goodwill, the impairment of goodwill, the company size, and some other control variables. The results reveal that firms, which have a higher goodwill and intensity of goodwill impairment, see the greatest improvement in this index. The compliance level seems to have increased over time, thus indicating learning.

This study might be useful for the accounting standard setters, including the International Accounting Standards Board (IASB), since it contributes to the literature by providing information about the recognition of goodwill impairment and the level of disclosure in a country, that has not been considered very often. Likewise, this new evidence reveals an improvement in disclosure on goodwill impairment testing over time, although there is room for improvement, especially in the area of sensitivity analysis.

## **THEORETICAL BACKGROUND: ACCOUNTING REGULATION**

Goodwill is a complex concept that includes certain items that give value to a company and are not recognized independently by the accounting system. Specifically, goodwill recognized in a business combination represents the expected future economic benefits of assets acquired in the combination that are not recognized separately because they are not individually identifiable. These include: investment opportunities, expected synergies of the combination, staff characteristics, advantages derived from market imperfections, such as the ability to obtain monopolistic benefits or

the existence of barriers to entry. The accounting standards dealing with goodwill have undergone significant changes over the years.

Internally generated goodwill is treated differently from that acquired, since only the later is recognized as an asset, because it derives from a market transaction, so its initial measurement is more objective. In particular, initially it should be measured at its cost, being the excess of the cost of the business combination over the acquirer's interest in the net fair value of the identifiable assets and liabilities. However, after its initial recognition, the subsequent treatment may be subject to immediate write-off, systematic amortization or impairment. The three alternatives have been in force in different countries and periods, and the last one, which is currently in force in the international standards, is the one that gives to the companies the opportunity to decide when and how much loss to recognize, which, in turn, may result in lack of transparency and allow for earnings management and opportunistic behaviors.

In the US, the systematic amortization of goodwill was introduced in 1970, in a period not exceeding 40 years in Opinion No. 17 (APB, 1970). However, in 2001 the Financial Accounting Standards Board (FASB) replaced the amortization by the impairment test (SFAS 142, FASB, 2001). However, in 2014, the FASB allowed private companies to amortize goodwill on a straight-line basis over ten years or less, as set out in the ASC 350, "Intangibles — Goodwill and Other Intangibles" (FASB, 2014), and in 2019 has extended this option to not-for-profit entities.

Concerning the international standards, the IAS 22 (IASB, 1983) "Business combinations" allowed the amortization of goodwill during its useful life (in a maximum period of 20 years), but also allowed to be written off to equity on the date of acquisition. In 1993, IAS 22 was revised and the option of goodwill been written off to equity was eliminated. In consequence, only the amortization of goodwill within a maximum amortable period of 20 years was required. In 2004, the IASB superseded IAS 22 and issued IFRS 3 "Business Combinations" (IASB, 2004a) and revised IAS 36 "Impairment of Assets" (IASB, 2004b), which introduced a similar procedure to the US GAAP with respect to the accounting treatment of

goodwill. Therefore, the amortization of goodwill was prohibited and an impairment test was established, at least annually.

Nevertheless, the IFRS for Small and Medium-sized Entities (SMEs) issued by the IASB require that goodwill should be measure at cost less accumulated amortization and accumulated impairment losses. In addition, if the useful life of goodwill cannot be established reliably, the life shall be determined based on management's best estimate but shall not exceed ten years.

Following the Post-Implementation Review of IFRS 3 (IFRS 3 PIR), and after the feedback received, the IASB undertook a research project on goodwill and impairment with the aim to improve IFRS 3 and IAS 36 (IASB, 2015). The project covers whether changes should be made to the existing impairment test for goodwill and other non-current non-financial assets, being the separation with the internally generated goodwill the most worrying aspect. Although the IASB has not made any tentative decision, it is expected to continue discussions and publish a discussion paper in 2020. In this same line, the FASB also has active projects on its agenda regarding accounting for identifiable intangible assets in a business combination, goodwill and goodwill impairment.

With regard to the Spanish regulation, the 1990 General Accounting Plan (GAP) established that goodwill should be amortized systematically in a maximum period of ten years. In 1998, the maximum amortization period was extended to 20 years. Following the international standard guidelines, the 2007 GAP set that goodwill should not to be amortized and only subject to an impairment test. Nevertheless, in 2015, as a result of the introduction of Directive 2013/34/EU into the local regulation, the GAP changed, and since 2016 companies have to amortize goodwill over its useful economic life, in a maximum period of ten years in their standalone financial statements. However, European listed firms are required to prepare their consolidated financial statements in accordance with IFRS. Therefore,



currently Spanish listed firms have to amortize goodwill in their standalone financial statements, and test it for impairment in their consolidated financial statements.

In summary, current international accounting standards require to recognize goodwill acquired in a business combination as an asset. After initial recognition, the acquirer shall measure goodwill acquired in a business combination at cost less any accumulated impairment losses, since goodwill shall not be amortized. Instead, the acquirer shall test it for impairment annually, or more frequently if events or changes in circumstances indicate that it might be impaired, in accordance with IAS 36.

Since goodwill recognized in a business combination is an asset that does not generate cash flows independently of other assets or groups of assets, for the purpose of impairment testing, goodwill shall, from the acquisition date, be allocated to each of the acquirer's cash-generating units (CGUs), or groups of CGUs, that is expected to benefit from the synergies of the combination. Then, a CGU to which goodwill has been allocated shall be tested for impairment annually by comparing the carrying amount of the CGU, including the goodwill, with its recoverable amount. The recoverable amount of the CGU is the higher of the CGU's fair value less costs of disposal and its value in use.

If the recoverable amount of the CGU exceeds its carrying amount, the CGU and the goodwill allocated to that CGU shall be regarded as not impaired. On the contrary, the entity shall recognize the impairment loss, first, reducing the carrying amount of any goodwill allocated to the CGU; and then, to the other assets of the CGU pro rata on the basis of the carrying amount of each asset in the CGU. The information about this goodwill impairment test should be disclosed in the notes to the financial statement. In the empirical study we analyze this information in a sample of Spanish listed firms.

## MATERIALS AND METHOD

### The Sample

In order to perform the empirical analysis, the 100 largest Spanish listed companies at the end of 2017 have been selected, after excluding financial, insurance and REIT entities. These firms have been excluded due to their special characteristics and specific regulation. We focus on firms that disclosed information about goodwill impairment test in their notes to the consolidated financial statements. The analysis has been done for the ten-year period between 2008 and 2017, both inclusive. Since 2005 listed companies must to prepare their consolidated financial statements applying IFRS, hence, all companies in the sample have to test goodwill for impairment after the initial recognition, instead of amortization. The consolidated financial statements have been obtained from the *Comisión Nacional del Mercado de Valores* (CNMV). The information has been gathered manually from the notes, while the additional financial data are from the *Sistema de Análisis de Balances Ibéricos* (SABI) database.

This part of study presents a quantitative analysis of this sample with the aim of providing evidence on how goodwill and goodwill impairment have evolved over time, doing an industry analysis as well. The main objective of this work is to provide an overview of accounting practices in relation to the application of IAS 36 requirements in a sample of financial statements prepared in accordance with the IFRS. Additionally, we investigate the disclosure practices and the factors associated with firms' compliance with IAS 36 for goodwill impairment testing.

### Goodwill

Table 1 displays the descriptive statistics of the total sample. The average value of goodwill is about €685 million, this is 9.6% of total assets. As it can be observed there is a high dispersion. For example, the percentage of goodwill on total assets ranges from 0% to 70.5%, although the median

is around 4%. It also happens with the impairment of goodwill, that on average, impairment losses represented 4,1% of the opening balance of goodwill, but the median is 0, and it ranges from 0% to 100%.

**Table 1. Descriptive statistics of the total sample**

	Mean	Median	St. dev.	Min.	Max.
Goodwill*	684,945	33,717	2,791,993	0	29,582,000
Goodwill/Total assets	9.6%	3.9%	12.3%	0.0%	70.5%
Goodwill impairment*	10,015	0	79,045	0	1,855,720
Goodwill impairment/ Prior year goodwill	4.1%	0.0%	14.2%	0.0%	100.0%

\* Figures are in thousands of euros.

N = 913.

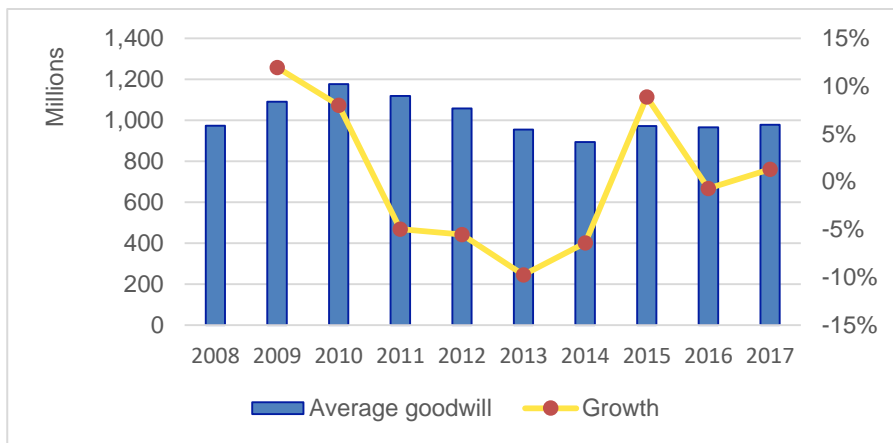


Figure 1. Evolution of the average goodwill per company (companies with goodwill).

If we focus on goodwill evolution of companies reporting goodwill in the sample, Figure 1 shows the evolution of the mean goodwill per company. The growth line shows in percentage the annual change in goodwill. As we can see, from 2008 to 2010 the goodwill increased by 21%. Since then it decreased slightly until 2014, in which it reached the minimum (€893 million). The decrease in this period was 24%, since 2015 the trend has changed, and there has been a slight increase until 2017. During the first

years of the crisis (from 2008 to 2010) the goodwill increased, and it began to decrease when the financial crisis peaked in 2011.

Figure 2 shows the mean goodwill ratio over total assets for companies with goodwill, and this ratio is relatively stable over the whole period, with an average around 13%. From 2009 to 2014 the trend is decreasing, however, from 2014 it increased until 2017.

As Table 2 shows below, although the total number of companies recognizing goodwill has been increasing (with the only exception of 2013), the percentage of companies with goodwill increased until 2012, and dropped in 2013, and since then it has been increasing again until 2017.

Over the whole period, goodwill remained highly concentrated in a small number of companies. The five companies with the highest amount of goodwill (top 5) account for, on average, 69% of the total goodwill (column 5). The same companies represent 35%, on average, of the equity (net assets) in the sample (column 7). Besides, companies accounting for 50% of total goodwill are 3 in half of the years, and 2 from 2012 to 2016 (column 6).

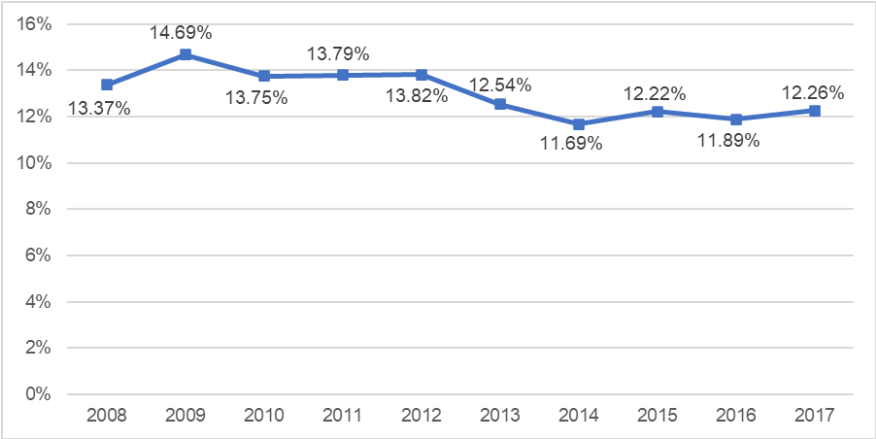


Figure 2. Goodwill over total assets (companies with goodwill).

**Table 2. Level of concentration of goodwill**

	Companies in the sample	Companies reporting goodwill	In %	Concentration in top 5 companies	Companies accounting for 50% of total goodwill	% of net assets represented by these companies
2008	86	60	70%	67%	3	31%
2009	86	61	71%	68%	3	41%
2010	87	65	75%	70%	3	38%
2011	89	69	78%	68%	3	36%
2012	89	69	78%	68%	2	30%
2013	92	67	73%	67%	2	31%
2014	95	70	74%	72%	2	33%
2015	97	71	73%	70%	2	32%
2016	100	74	74%	69%	2	32%
2017	100	76	76%	66%	3	38%
Mean	92.8	69.1	74%	69%	2.4	35%

## Goodwill Impairment Losses

In principle, goodwill impairment losses should be greater when financial markets are experiencing difficulties (usually in times of recession), and lower in periods of economic boom. However, Figure 3 shows that the mean recognized impairment losses in the sample of companies with goodwill were, contrary to expectations, very low at the beginning of the financial crisis, in 2008 and 2009. Since then, the impairment losses have been increasing until 2013, with a maximum (around of €40 million). In 2015 there is an outstanding decrease compared to the previous year, followed by an increase in 2016 and 2017, although figures are much lower than in 2013.

As we have mentioned in Figure 3, impairment losses reached their highest values between 2011 and 2014, when market capitalization was lowest. Table 3 refers to the impairment ratio recognized in each year with respect to the goodwill at the beginning of the year. On average, the companies in the sample recognized an annual impairment of 4.2% over goodwill at the beginning of the year (column 6). Until 2013, the trend is

growing, and in 2014 the percentage is reduced approximately in two thirds, being 3% in 2017.

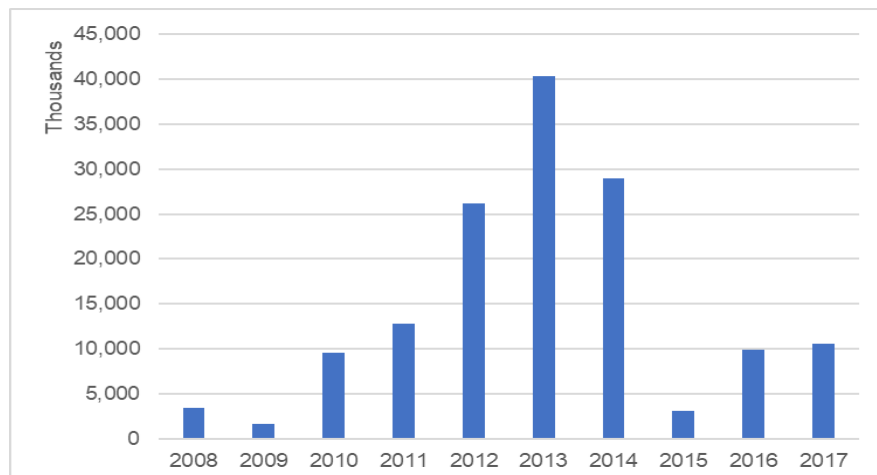


Figure 3. Evolution of the average goodwill impairment per company (companies with goodwill).

**Table 3. Level of concentration of impairments**

	Firms with goodwill	Firms with goodwill impairments	% of firms with goodwill impairment	% of goodwill impairment by top 10	Goodwill impairment/Goodwill prior year
2008	60	14	23%	98.0%	
2009	61	16	26%	95.1%	0.9%
2010	65	22	34%	94.3%	4.2%
2011	69	24	35%	90.3%	7.1%
2012	69	29	42%	93.2%	7.2%
2013	67	23	34%	96.8%	7.9%
2014	70	14	20%	99.8%	2.5%
2015	71	17	24%	96.5%	1.3%
2016	74	20	27%	98.2%	3.3%
2017	76	19	25%	98.0%	3.0%
Mean	69.1	20.4	29.7%	95.8%	4.2%

Table 3 shows the number of companies that recognize impairment losses each year and the level of concentration of impairment losses. With

regard to the number of companies that recognize goodwill impairment (column 3), they increase until 2012. In 2014 and 2015 they are reduced by half, and then increase until 2017.

Additionally, goodwill impairment losses are mainly concentrated in a few companies. In particular, the percentage of impairment recognized by the ten companies with more impairment (top 10) ranges between 90.3% and 98% (column 5), while the mean percentage of companies that have recognized impairment over the period analyzed is 29.7% (column 4). In consequence, the majority of companies that report goodwill in their financial statements did not recognize any impairment loss, as can be seen in Table 3. In particular, non-tabulated results evidence that 49 companies did not recognize any goodwill impairment in the whole period, while 11 companies have recognized impairment of goodwill for at least six of the ten years analyzed.

## **Industry Analysis**

Next, we break down the sample at the industry level. Table 4 describes the industry classification following the criteria of the Madrid Stock Exchange in the sample of the companies with goodwill. It can be observed that the highest number of companies belongs to the Basic materials, manufacturing and construction industry, followed by Consumer goods and Consumer services, while the rest of the sectors have fewer companies.

Figure 4 shows the evolution of the total goodwill per company by industry (in million €). The industry which the greatest goodwill per company is Technology and media, with values significantly higher than the rest of the sectors, especially from 2010 to 2012. The Oil and energy industry has also much bigger amount of goodwill than the other industries, although in 2009 this amount was similar to the Technology and media sector.

**Table 4. Industry classification**

Industry	Firm-year obs. with goodwill	Percentage
1. Oil and energy	54	8.0%
2. Basic materials, manufacturing and construction	244	35.9%
3. Consumer goods	146	21.5%
4. Consumer services	145	21.4%
5. Financial services	14	2.1%
6. Technology and media	66	9.7%
7. Real estate services	10	1.5%
TOTAL	679	100.0%

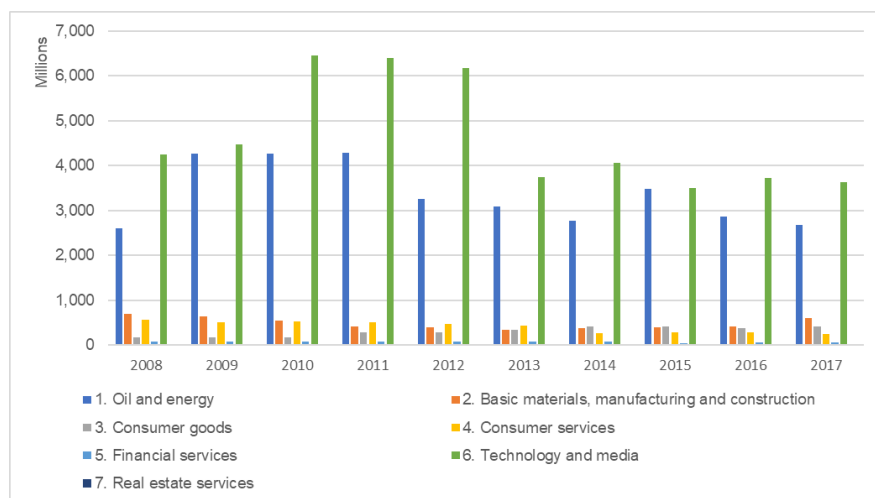


Figure 4. Evolution of total goodwill per company by industry (in million €).

Regarding the ratio goodwill over total asset, Figure 5 confirms that this ratio is higher in the Technology and media industry. Although we can see that, in the period 2008-2011, the percentage of goodwill on total assets in this industry is very similar to the one in the Consumer services. From 2012 these ratios begin to separate, and it is especially from 2014 when the Technology and media industry has a much higher goodwill ratio than the rest of the sectors.

Concerning goodwill impairment, Figure 6 displays that the highest goodwill impairment over goodwill of prior year is recognized from 2010 to



2013. With regard to the analysis by industry, this percentage is relatively similar in the sectors analyzed, except in the Real estate services industry in 2013 and 2017, in which is much higher. It should be noted that companies with goodwill in the Financial services industry hardly recognize goodwill impairment, although it should be taken into account that there are few companies in this industry.

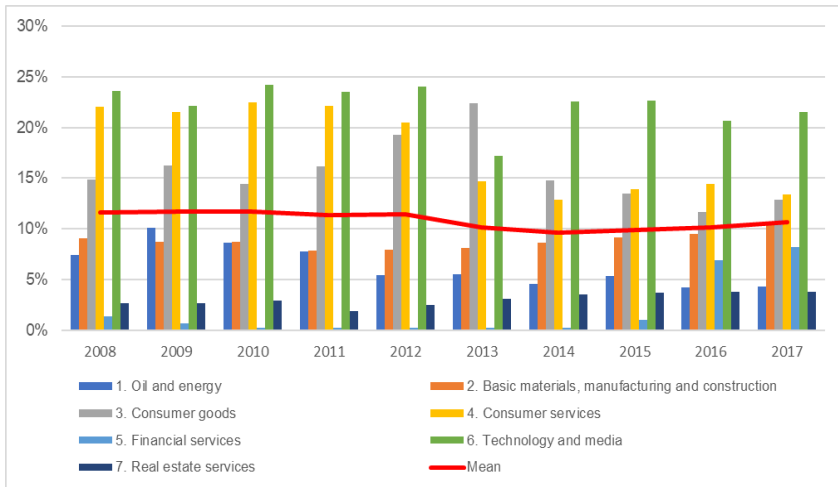


Figure 5. Goodwill over total assets by industry (companies with goodwill).

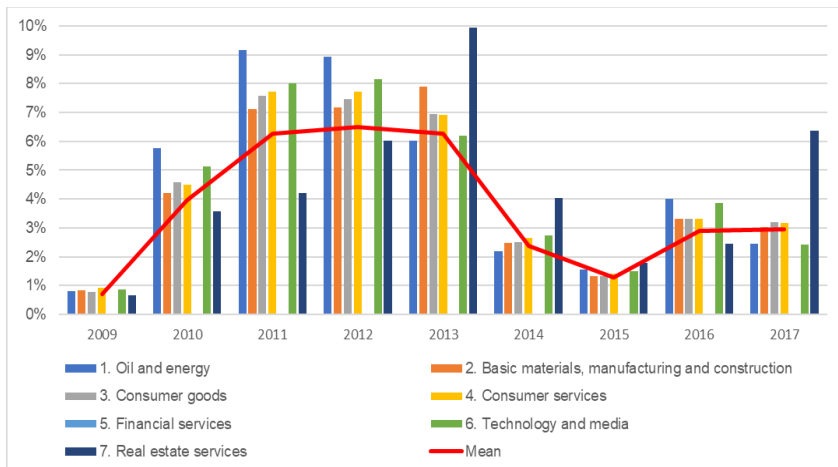


Figure 6. Goodwill impairment over goodwill of prior year by industry.

## RESULTS

### **Compliance with the Disclosure Requirements of IAS 36 for Goodwill Impairment Testing**

In order to analyze the level of disclosure, we perform an analysis of the companies of the previous section. A study with similar characteristics was carried out by Guthrie and Pang (2013) in which they investigate whether the information disclosed by Australian listed companies complies with the Australian standard on impairment of assets (AASB 136). In New Zealand, a similar study was conducted by Carlin and Finch (2010b) after the adoption of IFRS (e.g., information disclosed, number of CGUs, basis for calculating the recoverable amount...). Glaum et al. (2013) also analyzed compliance for a large sample of European companies mandatorily applying IFRS in the first year of adoption (2005).

Moreover, Mazzi et al. (2017) analyze the relationship between the level of disclosure in the notes regarding IFRS 3 and IAS 36 and the cost of capital in a sample of European companies. Their results confirm significant differences in compliance levels across firms and time, and they find that the higher level of disclosure and quality of the information disclosed, the lower the cost of capital for the company is, since increased levels of these disclosures mitigate estimation risk.

As mentioned previously, companies that present their financial statements following IFRS must disclose a comprehensive list of items on goodwill, and its potential impairment in the notes to the financial statements (IAS 36, paragraph 134). We construct a disclosure index based on the disclosure requirements in IAS 36 (see the Appendix), similar to that used by Guthrie and Pang (2012). This disclosure index is calculated by dividing the number of checklist disclosures provided in the notes by the number of applicable items (11, in our case). Thus, the score takes the value of 1, 0.5 or 0 for each item, according to the level of disclosure.

$$INDEX_{ij} = \frac{\sum_{i=1}^n x_i}{n} \quad (1)$$

where:

$x_i = 1$  (0.5) if  $i$  item is disclosed (partially disclosed) by company  $j$ , 0 otherwise,  $n$  = total number of potential disclosure items.

The first part refers to the basic information, which includes whether the company discloses the carrying amount of the goodwill attributed to each CGU (item 1) and the basis on which the recoverable amount has been determined (i.e., value in use or fair value less costs of disposal) (item 2). Subsequently, depending on the basis used as a recoverable amount, items 3.1 to 3.5 (value in use) or items 4.1 to 4.5 (fair value less costs of disposal) have been scored. This information includes if the key assumptions are shown (3.1/4.1), if the values assigned to them are explained (3.2/4.2), the period on which the forecasts are based (3.3/4.3), the growth rate (3.4/4.4), the discount rate (3.5/4.5). Finally, the last part refers to the sensitivity analysis, in order to see if the company performs it (5), how much the recoverable amount exceeds the book value (5.1), the values assigned to the key assumptions (5.2), and the amount by which the value assigned to the key assumption must change in order for the recoverable amount to be equal to its carrying amount (5.3). Thus, the sensitivity analysis shows how changes in the key assumptions would affect the recoverable amount, and what changes would cause that the recoverable amount remains higher than the book value. Therefore, each item is scored, being the maximum score of 11 items, in the case that all the required information is disclosed, 0 in the opposite case.

This analysis has been done for the years 2012 and 2017, in order to check whether companies improve over time. Table 5 shows the results, and we can see that in 2012 for 69 companies the mean index is 0.669. However, five years later, in 2017 for 76 companies, the mean index is 0.724. In addition, we test the statistical significance of this difference between both years using a Wilcoxon signed-rank test, and it turns out to be significant at 5%. Hence, the compliance level increased between 2012 and 2017, which indicates learning.

Table 5 also presents the analysis of the information disclosed regarding the impairment test of goodwill by industry. The industry with a highest

index in both years is Technology and media, although the index is lower in 2017 than in 2012. On the contrary, the industry with the lowest index in 2012 is Basic materials, manufacturing and construction (0.605), this industry has the highest number of companies in the sample (26 companies), whereas in 2017, the industry with the lowest index is Financial services (0.5). Hence, in general, there has been an improvement in the information disclosed by companies, although there are some differences by industry. In particular, the industries Oil and energy, Basic materials, manufacturing and construction, Consumer services and Real Estate services improve compared to 2012, while Consumer goods, Financial services and Technology and media sectors have a lower score compared to 2012.

**Table 5. Disclosure index per industry and year**

Industry	2012	2017	Difference
1. Oil and energy	0.621	0.674	0.053
2. Basic materials, manufacturing and construction	0.605	0.761	0.156
3. Consumer goods	0.698	0.652	-0.046
4. Consumer services	0.688	0.762	0.075
5. Financial services	0.636	0.500	-0.136
6. Technology and media	0.918	0.793	-0.125
7. Real estate services	0.682	0.773	0.091
Mean	0.669	0.724	0.055**
Companies with goodwill	69	76	

**Table 6. Disaggregation of disclosure index per year**

Panel A. Score by main components	2012	2017
Basic information	0.65	0.71
Recoverable amount as value in use	0.52	0.62
Recoverable amount as fair value	-	0.63
Sensitivity analysis	0.28	0.37
Panel B. % firms that comply	2012	2017
Item 5	81%	87%
Item 5.1	16%	18%
Item 5.2	59%	65%
Item 5.3	16%	15%

Table 6 Panel A reports the average results of three main components of the index: basic information, information about the estimation of the recoverable amount (value in use or fair value), and the sensitivity analysis. The three sub-indexes have been re-computed to make them comparable, dividing the score in the group by the number of items (1 the maximum, and 0 the minimum).

As it can be seen, the highest result refers to the basic information, in both years (0.71 in 2017 and 0.65 in 2012), while the lowest score is obtained in the sensitivity analysis (0.37 in 2017 and 0.28 in 2012).

In Table 6 Panel B we can observe that most companies (87% in 2017 and 81% in 2012) indicate that they do a sensitivity analysis, of those 65% stay that the assigned values to each key hypothesis to perform the test (item 5.2) in 2017 (59% in 2012). However, only 18% (16% in 2012) indicate how much the recoverable amount exceeds the book value (item 5.1), and only 15% (16% in 2012) (item 5.3) of which indicate that the performance of the sensitivity analysis shows how much values of the key assumptions should change to equal the two values. In general, as shown in Table 6, the results obtained in 2017 are considerably better than those in 2012.

Regarding the recoverable amount, most companies use the value in use since it is usually very difficult to determine fair value. In our sample, 91% of the companies with goodwill use the value in use to determine the recoverable amount, only 5% use fair value in 2017, and 3% do not provide information about it in the notes. However, in 2012 none of the companies of the sample use fair value as recoverable amount (non-tabulated results).

### **Effect of Firm Characteristics on the Level of Compliance**

Based on the explanations that the prior literature has provided on the level of disclosure, we look at some factors that could explain it. As in Glaum et al. (2013), we argue that accounting for business combinations and goodwill impairment testing under IFRS are complex; hence, companies will devote more resources and put more emphasis to these areas of

accounting when they have highly material goodwill positions. Consequently, the magnitude of goodwill could have a positive impact on the disclosure about the impairment test of goodwill, as Bepari et al. (2014) and Glaum et al. (2013) find.

The information on impairment required by IAS 36 is considerably high regardless of whether firms have recognized an impairment of goodwill or not. As explained before, a lot of information on the assumptions used to determine the fair value or the value in use of the CGU has to be included in the notes, which can be seen as a mechanism to counterweight the subjectivity inherent in the impairment test. As D'Alauro (2013) sustains, it is likely a lower level of disclosure when there is no impairment. Thus, the larger the impairment of goodwill, the greater the disclosure about the impairment test of goodwill could be.

Larger firms are expected to have a higher level of disclosure than smaller firms, since larger firms have more need of external funds, therefore there are more potential agency conflicts, they are also subject to more political costs, and both can be reduced via disclosure. Indeed, size has been found to have an impact on compliance levels (Bepari et al., 2014). Hence, the larger the firm is, the greater the disclosure about the impairment test of goodwill we could expect.

For the three explanatory variables (goodwill intensity, goodwill impairment losses and size) we expect a positive relationship with the level of disclosure. In addition, we introduce the profitability of the firm into the model (expression 2) as Bepari et al. (2014) and Lazar and Velte (2018), and the number of CGU, since it has been incorporated in this type of analysis, but we do not have any specific expectation regarding its sign. We control for the year and the industry, introducing dummy variables.

The model used is:

$$INDEX = \alpha_0 + \alpha_1 GW + \alpha_2 GWIMP + \alpha_3 SIZE + \alpha_4 ROA + \alpha_5 CGU + \alpha_6 YEAR + \varepsilon \quad (2)$$

where: *INDEX* is the compliance index score obtained after reading the financial statements. The independent variables are: *GW* is goodwill deflated by total assets; *GWIMP* is reported goodwill impairment loss (expressed as a positive number) over the opening balance of goodwill; *SIZE* is measured as the logarithm of total assets; *ROA* is return on assets; *CGU* is the number of CGU reported; *YEAR* is an indicator variable taking the value of 1 for 2017, 0 otherwise.

We estimate standard errors clustered by firm. Additionally, the Pearson correlation coefficients for the variables used in the multivariate analysis were calculated; the non-tabulated results indicate that the correlations between the independent variables are not high. We have also calculated the variance inflation factor (VIF) of each variable and the results do not suggest multicollinearity problems.

Table 7 shows the results of the multivariate regression model. Given that the variables *GW* and *GWIMP* are significant at 1%, it is confirmed the influence of goodwill and impairment losses' intensity in the level of disclosure with the signs expected. These results are in line with Glaum et al. (2013) and Bepari et al. (2014) in the case of the magnitude of goodwill; and with D'Alauro (2013) and Lazar and Velte (2018) in the case of the goodwill impairment intensity variable, who find that the goodwill impairment affects disclosure level. However, firm size (*SIZE*) has not been found to have any statistically significant effect on their disclosure and compliance levels, as in Bepari et al. (2014), and it could be explained because companies in the sample are the biggest listed firms. Regarding the control variables, *ROA* and *CGU*, we cannot affirm that the profitability of the firm or number of CGU reported have an influence on the compliance level. The variable *YEAR* is positive and significant at 1%, which reveals that the compliance level increased between 2012 and 2017, indicating learning. This finding is in line with Hartwig (2015)'s results, and consistent with the significant difference found in the univariate analysis (Wilcoxon test) of the disclosure index between both years.

**Table 7. Multivariate regression analysis**

	Expected sign	Coefficient [t statistic]
Intercept	?	0.510** [2.276]
GW	(+)	0.586*** [3.228]
GWIMP	(+)	0.368*** [3.203]
SIZE	(+)	0.008 [0.616]
ROA	(+/-)	0.050 [1.263]
CGU	(+/-)	-0.006 [-1.361]
YEAR	(+/-)	0.073*** [2.812]
Industry dummies		Yes
N		140
Adjusted $R^2$		0.127

Note: \*\*\* = 1% significance; \*\* = 5%; \* = 10%.

Dependent variable: Index: the compliance index score obtained after reading the financial statements.

Independent variables: GW: goodwill deflated by total assets; GWIMP: reported goodwill impairment loss (expressed as a positive number) over the opening balance of goodwill; SIZE: measured as the logarithm of total assets; ROA: return on assets; CGU: number of CGU reported; YEAR: an indicator variable taking the value of 1 for 2017, 0 for 2012.

As a robustness analysis, we have replicated the regression using other proxies for the independent variables. In particular, *ROE* instead of *ROA* to control for the profitability of the firm. We have used different deflator for *GWIMP* (reported goodwill at the end of the year, or reported goodwill at the end of the year before impairments). We have also replicated the study eliminating outliers; and the results obtained are basically consistent with those reported.



## CONCLUSION

Goodwill is a complex and controversial topic, and its accounting treatment, more specifically its subsequent measurement, has been subject of discussion for decades. Currently, the IASB has an active research project on goodwill and impairment whose objectives are to enhance the application and effectiveness of the impairment test, which should mitigate concerns that recognition of impairment losses may not be timely, and to reduce complexity and achieve a better balance between costs and benefits.

The impairment test has been strongly criticized. In particular, the main criticism of the impairment only approach is that it can result in write downs of goodwill which some consider to be ‘too little, too late’. Hence, reintroducing annual amortization of goodwill is being considered. Some investors support the amortization of goodwill, because they think that goodwill acquired in a business combination is consumed and replaced with internally generated goodwill over time. Other investors support the current requirements, because they think that the non-amortization of goodwill and the absence of impairment charges help them to verify whether an acquisition is working as expected.

In the empirical study, the data on goodwill impairment, in a period that includes a financial crisis, could help to understand if the impairment test model is working as intended. On the one hand, the empirical study shows that most of the goodwill is recognized by a few companies, indeed, the top five companies with the highest goodwill represent 69% of the total goodwill. On the other hand, only 29.7% of the companies in the sample with goodwill recognized impairment losses. In addition, these losses peaked in 2013, five years after the last international financial crisis began, what might suggest that the flexibility of the impairment test involves that many companies do not recognize any losses, or recognize them too late.

Regarding the information disclosed in the notes to the financial statements, we observe that the vast majority of the companies in the sample provide the information regarding the estimates of the recoverable amount for their CGUs required by IAS 36. However, a considerable number of companies do not provide all the items required by that standard, even some

company does not provide any of the required items. In addition, the most of companies use the value in use as a basis to calculate the recoverable amount of the CGU, specifically, only 5% use fair value less costs of disposal in 2017, and none in 2012.

We examine the impact of different firm characteristics such as firm goodwill intensity, goodwill impairment, size, profitability and the number of CGU on firms' compliance with IFRS for goodwill impairment testing. We find that firms provide more disclosures when firms have large amounts of goodwill and goodwill impairment. Moreover, the compliance level increased between 2012 and 2017, which indicates learning.

With this work we try to contribute to the current debate on goodwill, especially its subsequent measurement. The empirical analysis aims to provide evidence on the financial reporting behavior of a sample of Spanish listed companies, investigating the importance of goodwill, goodwill impairment, and the level of compliance with to the disclosure requirements of international financial reporting standards.

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## Appendix. Disclosure items in IAS 36 for construction of compliance index

Items	Disclosure Items	Paragraph
	Basic Information	
1	The carrying amount of goodwill allocated to the CGU (group of units)	134 (a)
2	The basis on which the CGU's (group of units') recoverable amount has been determined (i.e., value in use or fair value less costs of disposal)	134 (c)
	If the CGU's (group of units') recoverable amount is based on value in use:	
3.1	Each key assumption on which management has based its cash flow projections for the period covered by the most recent budgets/forecasts.	134 (d) (i)
3.2	A description of management's approach to determining the value(s) assigned to each key assumption, whether those value(s) reflect past experience or, if appropriate, are consistent with external sources of information, and, if not, how and why they differ from past experience or external sources of information.	134 (d) (ii)
3.3	The period over which management has projected cash flows based on financial budgets/forecasts approved by management and, when a period greater than five years is used for a CGU (group of units), an explanation of why that longer period is justified.	134 (d) (iii)
3.4	The growth rate used to extrapolate cash flow projections beyond the period covered by the most recent budgets/forecasts, and the justification for using any growth rate that exceeds the long-term average growth rate for the products, industries, or country or countries in which the entity operates, or for the market to which the CGU (group of units) is dedicated.	134 (d) (iv)
3.5	The discount rate(s) applied to the cash flow projections	134 (d) (v)
	If the CGU's (group of units') recoverable amount is based on fair value less costs of disposal:	
4.1	Each key assumption on which management has based its determination of fair value less costs of disposal.	134 (e) (i)
4.2	A description of management's approach to determining the value (or values) assigned to each key assumption, whether those values reflect past experience or, if appropriate, are consistent with external sources of information, and, if not, how and why they differ from past experience or external sources of information.	134 (e) (ii)

Items	Disclosure Items	Paragraph
	Basic Information	
4.3	The period over which management has projected cash flows.	134 (e) (iii)
4.4	The growth rate used to extrapolate cash flow projections.	134 (e) (iv)
4.5	The discount rate(s) applied to the cash flow projections.	134 (e) (v)
	Sensitivity Analysis	
5	If a reasonably possible change in a key assumption on which management has based its determination of the CGU's (group of units') recoverable amount would cause the CGU's (group of units') carrying amount to exceed its recoverable amount:	134 (f)
5.1	The amount by which the CGU's (group of units') recoverable amount exceeds its carrying amount.	134 (f) (i)
5.2	The value assigned to the key assumption.	134 (f) (ii)
5.3	The amount by which the value assigned to the key assumption must change, after incorporating any consequential effects of that change on the other variables used to measure recoverable amount, in order for the unit's (group of units') recoverable amount to be equal to its carrying amount.	134 (f) (iii)





*Chapter 14*

# **IMPACT ANALYSIS OF OFF-BALANCE SHEET ACTIVITIES ON THE BASEL III LEVERAGE REQUIREMENT**

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## **ABSTRACT**

New agreements on the Basel III leverage ratio have been reached in 2017. This work performs Monte Carlo simulations to determine the impact of off-balance sheet activities (OBS) and credit conversion factors on leverage requirements. The results reveal that the minimum requirement of 3% allows the prevention of 4.3% of the banks in the European industry being leveraged banks. In addition, between 5.2% and 25.4% of the global systemically important banks (G-SIBs) are estimated to not meet the minimum leverage requirement by 2022, when the buffer to the leverage ratio will come into force.

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**Keywords:** off-balance sheet activities, banking industry, leverage, Basel III, Monte Carlo simulation

## INTRODUCTION

There is considerable and widespread interest in the solvency and liquidity of banks, but also in all the other variables related with the predictability of systemic risk measurement and bank failure prediction (Keffala and Peretti 2013; Bongini et al. 2018; Su 2018).

Leverage is a key financial indicator of risk (Keffala and Peretti 2013; Cihak and Schaeck 2010; Lorenzoni 2008; Stein 2010) since financial leverage is the main driver of credit growth (Brunnermeier and Sannikov 2014; Shleifer and Vishny 2011; Stein 2010), and credit growth is considered to have predictive power for financial stress in most countries (Schoenmaker 2013).

Basel Accords are a set of recommendations for banking industry regulations. The Basel III initiatives, promoted by the Financial Stability Board (FSB) since December 2010, incorporate a leverage ratio as a novelty. The leverage ratio is defined as Tier-1 capital divided by a measure of non-risk weighted on- and off-balance sheet exposures. The combination of a capital and leverage requirement in banks helps to prevent system failures (ECB 2015; Lengwiler and Maringer 2015).

The literature offers many examples that have shown the importance of financial leverage in systemic risk (Adrian and Shin 2010, 2008; Danielsson, et al. 2016, 2013; Ramadan 2012; Thurner 2011). Bergevin et al. (2013) analyze the elasticity of leverage measures to date, with Basel III leverage resembling the requirements in Canada, and propose new measures capable of seeing more short-term elasticity. Kuzubaş et al. (2016) analyze systemic risk in heterogeneous leverages using a networks tool, who find that when leverage heterogeneity increases, the system become less resilient to shocks.

Basel III attributes the recent crisis to the build-up of excessive leverage (Karim et al. 2013), especially off-balance-sheet leverage as OBS revenues tend to be more volatile than on-balance-sheet revenues (Calmès and Liu

2009; Calmès and Théoret 2011, 2010). Boyd and Gertler (1994) state that on-balance sheet assets may no longer be a reliable indicator of the bank's role in financial intermediation. Since 1985, OBS activities have significantly increased (Fernandez de Guevara 2001; Kabir Hassan 1994) and the emergence of OBS activities poses challenges for regulators (Bergevin et al. 2013). Karim et al. (2013) indicate that further research in this area is needed to adjust banks' liquidity and leverage ratios to the size of OBS exposures.

Despite the proven relationship between OBS activities and bank leverage (Beccalli et al. 2014; Calmès and Théoret 2013; Karim et al. 2013), very few studies focus on the European case (EBA 2016). Beccalli et al. (2014) find that formal leverage underestimates effective leverage and its pro-cyclical behavior, compared to a leverage exposure measure that incorporates off-balance-sheet items (particularly securitization) for the USA. The European Banking Authority (2016) concludes that off-balance-sheet items are exposures that give rise to the more pro-cyclical behavior of the Basel III exposure measure, which falls in line with the findings of Beccalli et al. (2014).

The Basel III leverage ratio is new for the international framework, and may still have an unknown impact on trade finance and lending. Some countries, like the USA, have a leverage requirement that is assessed as a minimum ratio of Tier-1 capital to the total average adjusted assets, which does not include off-balance-sheet exposures (EBA 2016).

In Europe, the lessons learned from the crisis justified amending the Basel Agreement (European Commission 2013), and the introduction of a new regulatory framework (CRR and CRD IV). The requirements proposed in Basel III have been adapted to EU regulations. An introductory implementation of the leverage ratio requirement began on 1 January 2013 and migrated to a Pillar 1 treatment on 1 January 2018, based on the appropriate review and calibration performed in 2017.

Since the Basel III leverage requirement has suffered calibration (BCBS 2017), an impact study of OBS activities on the ratio is necessary. This impact analysis is also valuable as the EU has to study the requirement to other jurisdictions to faithfully apply Basel III, whereas the European Central

Bank (ECB) has to consider the impact of the possibility of some banks reporting in accordance with their national accounting standards.

The main purpose of this paper is to study the effect of OBS activities on the Basel III leverage requirement in the European banking industry. In order to highlight the potential of the Basel III leverage requirement, an impact analysis that compares the leverage ratio, including and excluding OBS exposures, is performed by the Monte Carlo simulation method (Valencia et al. 2013).

Simulation methods are not common in accounting research (Labro 2015), despite them being most useful in research questions for which no data are available (Kuzubaş et al. 2016; Smerlak et al. 2015; Valencia et al. 2013), and they also allow better decision making under uncertainty as the impact of risk can be assessed.

The remainder of this article is organized as follows: Section 2 deals with the definition of the leverage ratio in Basel III and IV. Section 3 formulates the main research question to be addressed. Section 4 provides an analytical discussion about the relationship between OBS exposures and leverage. Section 5 describes the sample and performed analyses. Section 6 presents the results of the numerical simulations. Finally, section 7 addresses the main conclusions.

## INSTITUTIONAL REGULATORY BACKGROUND

The Basel III initiatives, promoted by the Financial Stability Board (FSB) since December 2010, have revised and strengthened the three pillars established by Basel II by extending it in several areas (BCBS 2014). For the first time, a leverage ratio is included. A minimum requirement of 3% for the Basel III leverage ratio has been tested from 1 January 2013 to 1 January 2017 in the EU. The leverage ratio in Basel III (BCBS 2014) is defined as:

$$Leverage = \frac{Capital\ measure}{Exposure\ measure}, \quad (1)$$

where the capital measure is the Tier-1 capital of the risk-based capital framework and the exposure measure is obtained as the sum of four kinds of exposures: i) on-balance sheet exposures; ii) derivative exposures; iii) securities financing transaction (SFT) exposures; iv) OBS items. The specific treatment of the four exposure types is defined in detail in Basel III.

Specifically, commitments (including liquidity facilities), whether or not they are unconditionally cancellable, direct credit substitutes, acceptances, standby letters of credit and trade letters of credit are considered to be OBS exposures. Note that the value of the OBS exposures are converted by the standardized approach into credit exposure equivalents by using credit conversion factors (CCFs), set from the start at 10% for retail unconditionally cancellable commitments (BCBS 2014).

Banks must separately report the leverage ratio, the Tier-1 capital and the exposure measure, as well as the amount of measures from i) to iv).

Previous publications by the Basel Committee and the European Banking Authority (EBA) agreed to recommend a minimum leverage requirement between 4% and 5%, and some countries are currently implementing these values for their requirements (EBA 2016). The minimum requirement of 3% set in Basel III was calibrated and reviewed in 2017, and will come into force in 2019.

After several years of work, the Basel Committee on Banking Supervision (BCBS) agreed the revisions to the leverage ratio framework in December 2017 on the pending issues of finalizing the Basel III framework, the so-called Basel IV (BCBS 2017). The modification of Basel III mainly aimed to increase simplicity, risk sensitivity and the comparability of capital ratios, among others. Within the Basel IV framework, a minimum leverage ratio requirement of 3% came into force in 2019. Basel IV includes some amendments to the leverage ratio.

As regards off-balance sheet exposures, a measure to update their treatment in order to make it consistent with the standardized approach to credit risk has been included. Thus a complete table of the CCFs to be applied, depending on the nature and characteristics of OBS exposures, is provided (BCBS 2017).

As from January 2022, those global systemically important banks (G-SIBs) will add a buffer to the leverage ratio. The G-SIB leverage ratio buffer has been set at 50% of the G-SIB's risk-weighted higher loss absorbency requirements.

These changes have generated debate between stakeholders and the European Commission (EC). The EC started consultation seeking for specific input from stakeholders about the impact of recent amendments to the Basel III framework (European Commission 2018). This exploratory consultation is not linked to a legislative proposal, and has received 56 responses. Some responders suggest that off-balance sheet exposures may increase.

## RESEARCH QUESTIONS

In light of the above previous regulatory background, we posit the following research questions (RQ) about the decisions and changes stated in the different drafts of the Basel III leverage requirement.

*Research question 1. What percentage of banks should adapt their leverage structure to meet the minimum leverage requirement of 3% in 2018?*

Since 2011, the Tier-1 leverage ratio of major internationally active banks has increased by over 65% (from 3.5% to 5.8%), which demonstrates that Basel III reforms have helped to strengthen the global banking system (Ingves 2018). Once the regulation comes into force, all banks must comply with the minimum leverage requirement, even if they did not comply with it before 2018; thus it seems interesting to quantify the real proportion of banks that have been prevented from being leveraged banks.

*Research question 2. How many banks would be affected in 2018 if a decision had been made to extend the minimum leverage requirement to 4% or 5%?*

The EBA agreed to recommend a minimum leverage requirement between 4% and 5% (EBA 2016) and some countries have implemented higher minimum ratios for their requirements. Thus scenarios with changes in minimum Basel III requirements were herein considered.

*Research question 3. As regards OBS exposures, what criterion allows those banks at a higher leverage risk to be determined?*

As the literature suggests, formal leverage underestimates effective leverage and its pro-cyclical behavior compared to a leverage exposure measure that incorporates off-balance-sheet items (Beccalli et al. 2014; EBA 2016). Therefore, it is interesting to identify a critical value that allows the identification of those banks with the highest leverage risk according to their OBS exposures.

*Research question 4a. As regards the inclusion of OBS exposures, what percentage of the banking industry was at risk (before 2018) and should be carefully monitored? What characteristics do these banks have?*

In the aftermath of banking crises, banks appear to concentrate more on their core traditional banking activities (Vithessonthi and Tongurai 2016). Moreover, as formal leverage underestimates effective leverage, further research is needed to adjust banks' liquidity and leverage ratios to the size of OBS exposures (Karim et al. 2013).

In-depth knowledge about the structure of OBS activities in banks at a higher risk of leverage allows the proposal of Basel III to be validated or new recommendations to be made.

*Research question 4b. What would the considerations for RQ4a be if a decision had been made to extend the minimum leverage requirement to 4% or 5%?*

*Research question 5. As regards the new buffer in the leverage ratio requirement, which comes into force in 2022, how many of the banks that comply with the BASEL III leverage requirement (3%) at risk of not accomplishing the BASEL IV leverage requirement?*

Bear in mind that, according to the European Banking Federation (EBF 2016), there are 5452 banks in the Eurozone of which only some 120-150 are historically considered G-SIBs (around 2.8% of the European banking industry), and G-SIBs are also those banks that most strongly influence the economy's stability.

In line with debate about the main Basel III modifications (BCBS 2017) having generated among stakeholders (European Commission 2018), it is necessary to approximate the impact that those amendments can have on the banking industry.

The European Banking Authority (EBA) presented a report which assessed the impact of the final revisions to credit and operational risks, as well as the leverage ratio framework, on EU banks for data as of December 2015 (EBA 2017). The impact of these amendments made to the Basel III leverage ratio requirement are estimated to have an average impact of 16.7% on the minimum required capital for all banks.

However, there is no specific estimate of both the percentage of banks affected and the suitability of these amendments. These issues will be addressed in this and the following research questions.

*Research question 6. Is the proposal of the CCFs in BASEL IV adequate?*

In an attempt to mitigate the impact of the leverage ratio on trade finance operations and lending, the EU Regulation applied lower credit conversion factors to trade related off-balance sheet items (10%) than those initially provided in the Commission's initial proposal, in accordance with European Banking Authority suggestions (EBA 2016).

CCFs were also calibrated in that first draft of Basel III (BCBS 2014) and they have been tightened up in the last draft (BCBS 2017).

Boyd and Gertler (1994) estimate that the Basel credit equivalents likely understate off-balance sheet activities in the USA. As far as we know, no literature exists that discusses appropriate medium CCFs for the European banking industry.



## ANALYTICAL DEVELOPMENT

Let OBS be the off-balance sheet exposures converted into credit equivalent amounts, the total Basel III leverage exposure by deducting OBS, and  $\alpha$  be the ratio of the previous two, as follows:

$$\alpha = \frac{OBS}{A}. \quad (2)$$

where  $L_1$  is the leverage ratio when OBS activities are not included and  $L_2$  is the leverage ratio when OBS activities are considered which, in the latter case, the exposure measure equals  $A + OBS = A + \alpha A = (1 + \alpha)A$ . Then if *Tier1* is the Tier-1 capital measure,  $L_2$  takes this form:

$$L_2 = \frac{\textit{Tier1}}{(1 + \alpha)A} = \frac{1}{(1 + \alpha)} L_1. \quad (3)$$

Thus  $\gamma$  can be defined as the relation between  $L_1$  and  $L_2$  as follows,

$$\gamma = \frac{L_2}{L_1} = \frac{1}{(1 + \alpha)}. \quad (4)$$

In this way, for a given increase in  $\alpha$ , the effect on  $\gamma$  decreases as  $\alpha$  increases (Figure 1). This implies that increases in OBS activities in banks with small  $\alpha$  imply a higher percentage of change in leverage ( $\gamma$ ).

Thus for each  $L_1$  value, there will be a critical  $\alpha$  value so that the banks with a proportion of OBS converted into credit equivalent amounts exceeding this value will not fulfill the minimum leverage requirement. If  $c$  is the minimum leverage requirement ( $c = 0.03$  in Basel III), then  $L_2 < c$  when:

$$\alpha > \frac{1}{c} L_1 - 1. \quad (5)$$

Banks in the industry with  $L_2 < c$  are called leveraged banks.

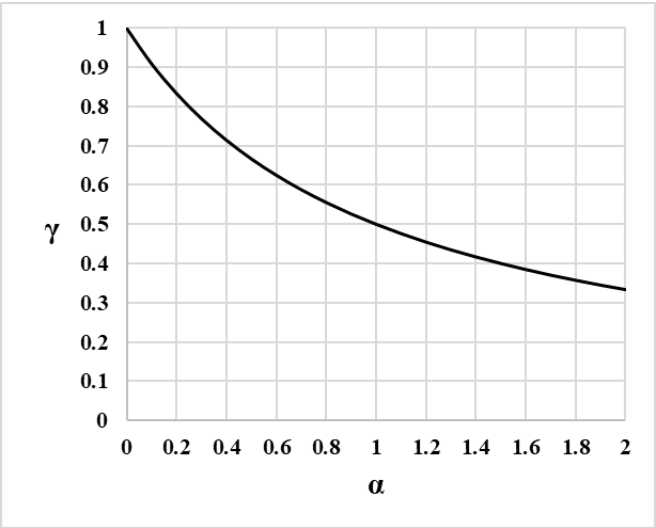


Figure 1. Function  $\gamma$ , for  $0 \leq \alpha \leq 2$ .

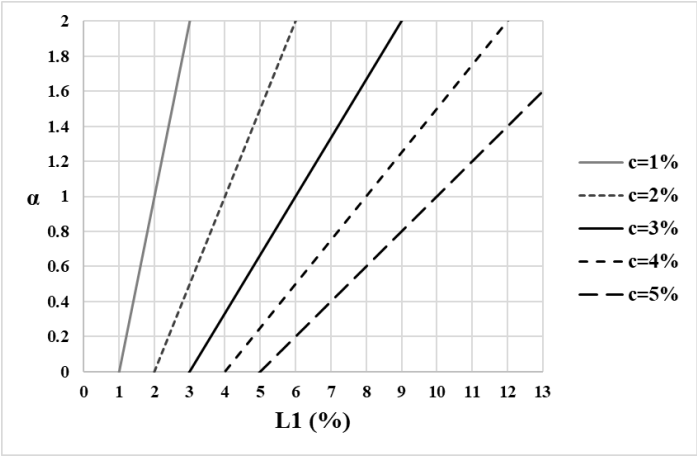


Figure 2. Critical  $\alpha$  value in the function of  $L_1$  for different minimum requirement  $c$  values.

From the analysis shown in Figure 2, it seems interesting to identify a neighborhood around  $L_1$  where a big concentration of leveraged banks can be found.

The larger the minimum requirement  $c$ , the smaller the  $\alpha$  needed to exceed this limit, even for cases where  $L_1$  is not included in a very small neighborhood of  $c$  (Figure 2). So it clearly comes over that the more restrictive the leverage regulations are (higher  $c$ ), the more effective the inclusion of OBS activities become as the neighborhood with a big concentration of leveraged banks increases.

The CCF value has also been studied and calibrated. Currently, the median coefficient of 33.3% is used in the European banking industry, and also in our sample. This coefficient is directly involved in the previous analytical discussion. By way of simplification, if we consider  $F$  the average CCFs, and if  $OBS_g$  are off-balance sheet exposures of the gross notional amount, then:

$$F = \frac{OBS}{OBS_g}. \quad (6)$$

If  $F = 0$ , OBS exposures are not included in the leverage ratio ( $\alpha = 0$ ). Let's define  $\alpha_g$  as  $\alpha$  when  $OBS_g$  are considered as so:

$$\alpha_g = \alpha F^{-1}. \quad (7)$$

In the next section the effectiveness of the Basel III leverage requirement, simplified and modeled as  $F = 0.333$ , is analyzed. A criterion to select an  $F$  value is also discussed.

## MATERIALS AND METHOD

### Sample Description

The banks of the 19 Eurozone countries are subject to the directives of the European Central Bank (ECB 2016). Since 2015, and in some cases since 2014, the data on the Basel III requirements are reported by banks in a prudential relevance report (risk report, Pillar 3).

In this paper, data are hand-collected from the prudential relevance report of each bank, where a table with the leverage ratio and all the concepts involved in the ratio, including OBS exposures, is provided.

The available data of the leverage Basel III ratio, Tier-1 capital, total leverage exposure, off-balance sheet exposures of the gross notional amount (*OBSg*) and conversion into credit equivalent amounts of off-balance sheet exposures (*OBS*) are hand-collected for the sample described in Table 1. Data recording was restricted to reports in English. Note that the 2014 data are excluded from the sample as the value of OBS exposures was not reported.

Available data are recorded for December 31, 2017, 2016 and 2015 for a total sample of  $N = 72$  observations (Table 1).

**Table 1. Sample description. Financial data in m€**

<i>PANEL A: Number of banks per country and year</i>							
	2017	2016	2015	Total	Total supervised banks (ECB, 2018)	Representation of total supervised banks (%)	Country representation of the total sample (%)
Spain	6	8	7	21	12	58.3	29.2
Germany	2	2	2	6	21	33.3	8.3
Ireland	4	4	4	12	5	140	16.7
Italy	2	3	3	8	12	58.3	11.1
France	3	3	3	9	12	58.3	12.5
Greece	1	1	0	2	4	175	2.8
Luxembourg	1	2	2	5	4	175	6.9
Estonia	1	1	1	3	3	233.3	4.2
Netherlands	1	1	1	3	6	116.7	4.2
Belgium	1	1	1	3	7	100	4.2
TOTAL	22	26	24	72	118	20.3	
<i>PANEL B: Descriptive statistics</i>							
Variable	Obs.	Mean	Median	Standard deviation	Max.	Min.	
Leverage	72	6.42	5.41	3.6	24	2.8	
Tier-1 capital	72	19596.66	7835.23	27545.3	142700	314.15	
Total exposures	72	385006.09	124209.9	552727.12	2557100	3338.08	
OBSg	60	94585.87	13617	162910.22	801700	371.95	
CCF	60	0.39	0.33	0.21	1	0.15	

As regards sample composition (Table 1, panel A), bank holdings are classified by country depending on the significant supervised entities (EBC 2018) or the headquarters' location otherwise; most of these banks have subsidiaries operating in other countries.

## **FITTING A DISTRIBUTION TO THE EMPIRICAL LEVERAGE AND A SEQUENCE**

Pearson Chi Square and Cramer Von Mises test the null hypothesis that the distribution of the sample data and the theoretical distribution proposed are coincident.

To perform the subsequent simulations, fitting a distribution function to the empirical leverage ( $L_1$ ) and  $\alpha$  sequence is necessary (Kuzubaş et al. 2016). All the stochastic variables are fitted to a probability distribution. Only the non-significant different distributions ( $p\text{-value} > 0.05$ ), according to Pearson Chi Square or Cramer Von Mises values, are selected. When more than one distribution is non-significantly different, that with the minimum Akaike Information Criterion (AIC) is selected.

After identifying the underlying data distributions, distribution parameters are estimated with random sampling with replacement (bootstrap) to ensure that estimations are robust and stable (Mitchell and Stafford 2000; Simar and Wilson 2000). The distributions fitted the stochastic variables of the model, and the main parameters of the fitting, and are presented in Table 2.

The data for 2017, 2016 and 2015 are fitted as a single data set since similar results are obtained if data are fitted both together and separately.

With leverage (Table 2, Figure 3 a), the idea that it comes from a LogNormal distribution cannot be ruled out ( $p\text{-value} > 0.05$ ). A LogNormal distribution (1.82297, 0.386243) is selected according to the histogram (Figure 3.a) and the consideration of rare events (as  $L = 24$ ), but also due to Cauchy and T-Student distributions attenuating in excess values above 5%.

**Table 2. Results of the Pearson  $\chi^2$  test and AIC criterion for the probability distributions fitted to leverage and the  $\alpha$  dataset**

Leverage ( $L_1$ )			$\alpha$		
Distribution	P-Value	AIC	Distribution	P-Value	AIC
Cauchy	0.233	-4.603	Weibull	0.742	3.774
T-Student	0.061	-4.609	Beta	0.415	3.776
LogNormal	0.058*	-4.677	Gamma	0.53	3.795

\*P-Value corresponds to the Cramer Von Mises fitting test.

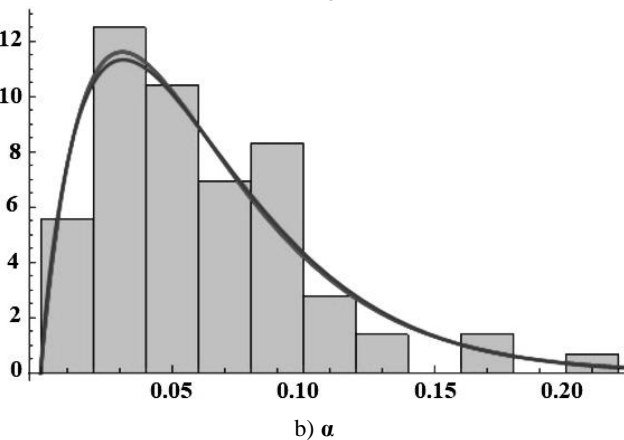
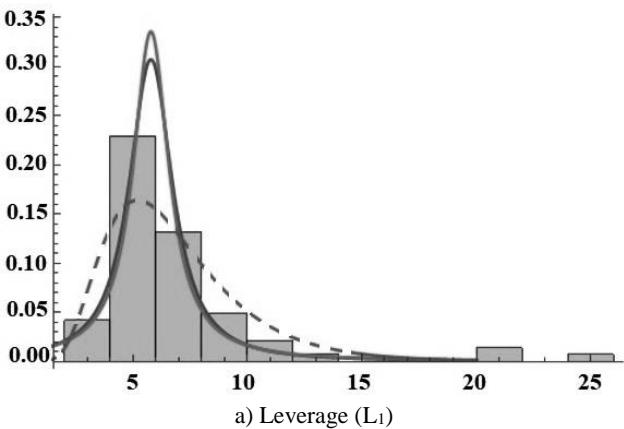


Figure 3. Histogram of the empirical sequence and fitted distributions. a) Leverage ( $L_1$ ) sequence, legend: T-Student (black line), Cauchy (gray) and LogNormal (dashed) distributions. b)  $\alpha$  sequence, legend: the Weibull, Gamma and Beta distributions overlap.

$\alpha$  is adequately and similarly fitted by the three considered distributions (Table 2, Figure 3b). A Weibull distribution (shape = 1.65899, scale = 0.06905) is selected in accordance with the AIC criterion. It is consistent with the European Bank Authority results, which evidence that the volatility in the utilization rates of these commitments is quite low (EBA 2016).

The simulations described in Section 6 are performed with the aforementioned distributions.

## NUMERICAL SIMULATIONS

### Monte Carlo Simulation

The Monte Carlo Method is a computational algorithm that relies on repeated random sampling to obtain numerical results (Valencia et al. 2013). Essentially, the Monte Carlo Method solves a problem by directly simulating the underlying process and then calculating the average result of the process. The Monte Carlo Method samples in a probability distribution for each variable, which produces thousands of possible scenarios and hardly any sampling in very low probability regions; i.e., rare events (Glasserman 2004).

Let  $a_m = \frac{1}{r} \sum_{i=1}^r x_i$  be the average result of the Monte Carlo simulation, where  $a_m$  is the average result of the Monte Carlo method for the variable of interest  $a$ ,  $x$  is the individual result of each simulated observation and  $r$  is the number of simulations (runs).

The Monte Carlo result is a consistent unbiased estimator that converges to the population average at a speed  $\frac{b_m}{\sqrt{r}}$ , where  $b_m$  is the estimated standard deviation and the estimated variance comes as:  $b_m^2 = \frac{\sum_{i=1}^r (x_i - a_m)^2}{r-1}$ .

To generate meaningful and reliable results, a sufficient number of runs needs to be selected. When the mean and measure of variance stagnate, the results are stochastically stable. An objective criterion for the number of runs

is estimated in a pre-experimental simulation run with an increasing number of runs (Hocke et al. 2015).

In this paper, 750000 runs are performed because any improvement in the result from this number of runs does not compensate the computational cost, according to the estimated standard deviation (standard deviation = 0.204, Figure 4). Simulations are performed for different  $c$  values ( $c = 0.03, 0.04, 0.05$ ).

The algorithm for the simulation is as follows. First,  $L_1$  and  $\alpha$  are simulated following a LogNormal distribution and a Weibull distribution, respectively. The condition that the minimum  $L_1$  value equals  $c$  is imposed as it is assumed that companies take the necessary actions to conform to the leverage requirement (Smith et al., 2017). Let  $L_1(c)$  be the value of  $L_1$  simulated for scenario  $c$ . As the empirical data for the distribution fitting is recorded in scenario  $c = 0.03$ ,  $L_1$  is simulated for the other scenarios considered to be  $L_1(c = 0.04) = L_1(c = 0.03) + 0.01$  and  $L_1(c = 0.05) = L_1(c = 0.03) + 0.02$ , respectively.

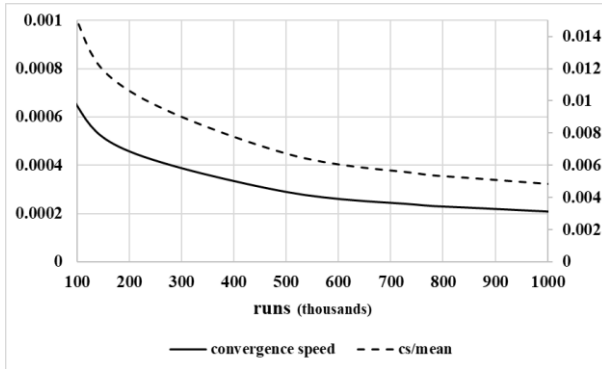


Figure 4. Convergence speed (left vertical axis) and ratio convergence speed/mean (right vertical axis) according to the number of runs in the simulation.

Next the critical  $\alpha$  corresponding to  $L_1$  is calculated for each bank. Thus  $\alpha$  is compared with critical  $\alpha$  and a value of 1 is assigned to the failure variable when  $\alpha$  is bigger than critical  $\alpha$  ( $L_2 < c$ ). Failure is defined as  $\alpha$  being higher than critical  $\alpha$ ; i.e., this is the equivalent to being a leveraged bank. Thus the failure rate at time  $t$  will be the percentage of banks that  $L_2 <$



$c$  - i.e., the percentage of banks if the OBS items considered in the leverage calculation (with  $F = 0.333$ ) do not meet the minimum requirement imposed by the standard ( $c$ ).

The average failure rate in that run is calculated as:

$$\frac{\sum_{i=1}^{750,000} failure_i}{750,000}. \quad (8)$$

The average failure rate of the banking industry will be the unweighted average of the failure rate for all the runs.

## DISCUSSION OF THE BASEL III FRAMEWORK

This section deals with the sensitivity analysis of the Basel III leverage ratio ( $L_2$ ) to potentially leveraged banks. Thus the scenario where  $F = 0$ ; i.e., OBS exposures are not included ( $L_1$ )-, is compared to the current Basel III leverage ratio with  $F = 0.333$  ( $L_2$ ). The median of  $F$  is considered instead of the average as the skewness coefficient equals 2.079 for that variable in our sample.

Different scenarios are simulated by increasing the percentage of banks, including OBS exposures in the ratio and by keeping  $F = 0.333$  constant.

The result of the simulations is that the mean failure rate with  $c = 0.03$  is 4.3%. This means that within the current framework, 4.3% of European banks were potentially leveraged banks when OBS exposures were included with  $F = 0.333$  (RQ1). Hence the introduction of Basel III into the EU forces these 4.3% of banks to ensure they have leverage ratio higher than 3% by modifying and adapting their leverage structure for that purpose.

The recalibration of the minimum requirement in 2017 was considered by moving the leverage requirement to  $c = 0.04$  or  $c = 0.05$ . So if the minimum requirement had been modified, the banks with  $0.03 < L_2 < 0.04$  and  $0.03 < L_2 < 0.05$  would have been leveraged banks. Thus that possible tightening up of the requirement would have affected 16.59% and 34.56% of the banks in the industry for  $c = 0.04$  and  $c = 0.05$ , respectively (RQ2).

Let  $n$  be a value defined as a neighborhood of  $c$ . The scenario where all the banks report the leverage calculation without considering OBS items ( $L_1$ ) is compared with the scenario in which a percentage of banks in a neighborhood of  $c$  ( $L_1 < c + n$ ) report the ratio, including OBS exposures ( $L_2$ ), for  $F = 0.333$ . Simulations are performed for different  $n$  values to study the neighborhood of  $c$  where a greater concentration of leveraged banks is found (RQ3).

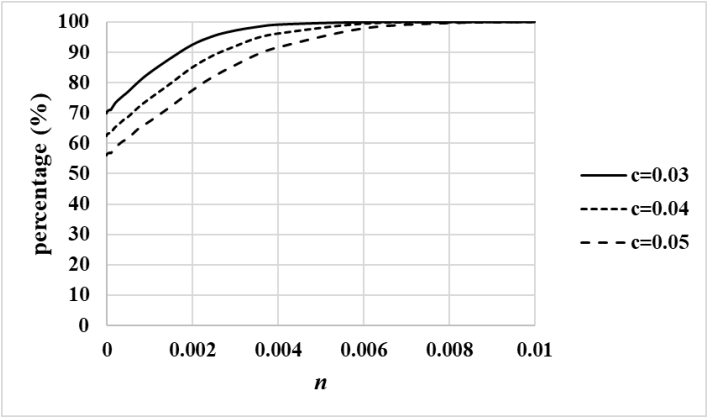


Figure 5. Percentage of the total leveraged banks with  $L_1$  in the neighborhood of  $c$  (for different  $c$  values).

Thus the detection of leveraged banks according to the neighborhood of  $c$  ( $n$ ) is discussed for both the current Basel III requirement ( $c = 0.03$ ) and for other possible  $c$  values (RQ4a and RQ4b). The  $n$  values are discussed according to the percentage of leveraged banks in the neighborhood of  $c$ .

The higher the  $c$  value, the bigger the neighborhood of  $c$  ( $n$ ), where a specific percentage of leveraged banks is found (Figure 5). As expected, if the standard is tightened up, a bigger proportion of banks will not potentially fulfill the leverage requirement.

About 90% of leveraged banks are in a small neighborhood  $n$  ( $n = 0.004$ ) for  $0.03 \leq c \leq 0.05$ . This highlights the effectiveness of the Basel III measure, according to which all banks report leverages including OBS exposures, as converted by  $F = 0.333$ , and independently of their  $L1$  ( $n = \infty$ ).

Regarding the current Basel III minimum requirement ( $c = 0.03$ ), it seems that 99% of the banks that are failing can be found by considering a neighborhood of  $n = 0.0045$ . This would be the equivalent to state that 99% of the leveraged banks have  $L_1 < 0.0345$ . With the simulated  $L_1$  distribution, approximately 6.5% of the banks in the European banking industry would potentially be leveraged banks (RQ4a) as they have  $L_1 < 0.0345$ .

In response to the Basel III requirement, potentially leveraged banks are expected to modify the course of their activities in order to comply with this requirement, and to thus achieve a more resilient system consistently with the results of Kuzubaş et al. (2016). This means that the migration of the Basel III leverage requirement to Pillar 1 will mainly affect 6.5% in 2018. Special attention should be paid by the authorities to that 6.5% of the bank industry.

As a result, according to these two possible scenarios, 99% of the leveraged banks have  $L_1$  below 4.6% or 5.8% for  $c = 0.04$  or  $c = 0.05$ , respectively. This is the equivalent to approximately 8% or 10.3% of the banks in the European banking industry possibly being potentially leveraged banks, respectively (RQ4b).

These results are consistent with a bank's failure probability according to  $L_1$  (Figure 6) because, for the suggested  $n$  values with  $L_1 < c + n$ , the failure probability falls below 1%.

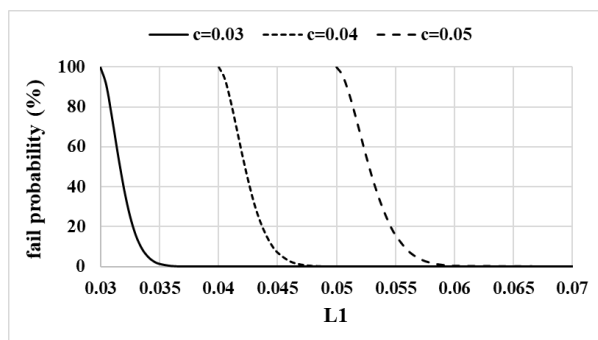


Figure 6. The failure probability (%) for a bank according to its leverage ratio, excluding OBS exposures ( $L_1$ ), when considering that OBS items ( $\alpha$ ) follow a Weibull distribution in the European banking industry.

## THE LEVERAGE RATIO BUFFER REQUIREMENT

Studying the two scenarios ( $c = 0.04$  and  $c = 0.05$ ) can be considered an approximation to the last agreements reached, which contemplate an increase in the leverage requirement for especially risky banks (BCBS 2017), which will come into force in 2022.

Reformulating the Basel III requirement in 2022 would modify the average requirement in the industry.

As the loss absorbance requirement ranges between 1% and 3.5%, we can approximate that the average impact of the buffer on the minimum leverage requirement will vary between 0.005 ( $0.01 \times \left(\frac{1}{2}\right)$ ) and 0.0175 ( $0.035 \times \left(\frac{1}{2}\right)$ ). That is the equivalent to setting a minimum average requirement for G-SIBs between  $c = 3.5\%$  and  $c = 4.75\%$ .

If we focus on those banks with  $0.03 < L_2 < 0.035$  and  $0.03 < L_2 < 0.0475$ , then 5.2% and 25.4% of G-SIBs meet the minimum leverage requirement of 3%, but would not meet  $c = 0.035$  and  $c = 0.0475$ , respectively (RQ5). It would seem that the buffer leverage requirement is a measure that could foreseeably affect many banks (between 6 and 35 banks, calculated as  $0.05 \times 120$  and  $0.25 \times 150$ ), in accordance with debate on the matter.

## DISCUSSION OF CREDIT CONVERSION FACTORS (CCFs)

It is interesting to discuss the influence of credit conversion factors ( $F$ ) as these parameters have been calibrated (RQ7). The smaller the  $F$ , the bigger the critical  $\alpha_g$  (Figure 7) for each  $L_1$ ; and the differences in this undervaluing effect of OBS activities lower as  $F$  increases, where the determination of  $F$  within the interval is crucial  $[0, 0.4]$ . The higher the  $F$  value, the less permissive will the requirement be with OBS activities.

It is possible to discuss an  $F$  value according to the maximum proportion of  $OBS_g$ , which seems reasonable to admit, even for those banks with a

certain leverage risk ( $L_1 = c + n$ ). Although the banks whose failure probability is below 1% have a higher critical  $\alpha_g$  for each  $F$  (Figure 7), this limit is extended to the entire banking industry as a conservative criterion.

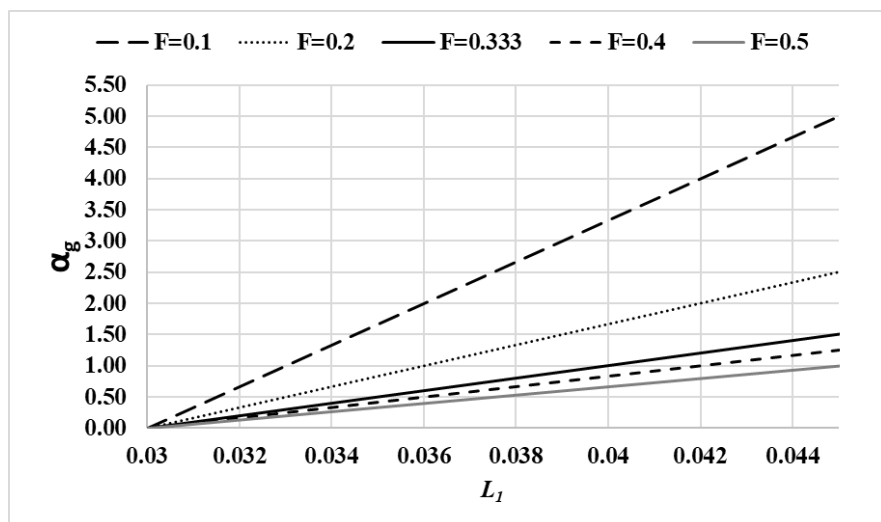


Figure 7. Critical  $\alpha_g$  value according to the leverage ratio, excluding OBS exposures ( $L_1$ ), for different CCF ( $F$ ).

Note that within the current Basel III framework, where  $F = 0.333$ ,  $\alpha_g = 0.45$  (Figure 7), i.e., for the banks on the leverage risk limit (1% failure probability,  $L_1 = 0.0345$ ), the critical value of OBS exposures without conversion into credit equivalent amounts ( $OBS_g$ ) means exceeding the  $A$  value by 45% ( $OBS_g = 0.45 \times A$ ).

The European Banking Authority results suggest that the volatility in the utilization rates of these commitments is quite low and an  $F = 0.1$  could be adequate (EBA 2016). Thus in previous drafts of this agreement,  $F = 0.1$  is for retail unconditionally cancellable commitments (BCBS 2014). Within this framework, critical  $\alpha_g = 1.5$ . Accordingly, banks with a 1% failure probability would become leveraged banks when  $OBS_g$  exceeds the  $A$  value 1.5-fold,

If we consider for the banks in our sample that  $OBS_g$  amounts to 18% of  $A$  on average (maximum = 51.5%, median = 15.4%), a proportion of 150% does not seem reasonable and the recalibration of  $F$  (BCBS 2017) is supported by the obtained results. This approach could serve as a guide for other countries, such as the USA, according to their credit equivalents for off-balance sheet activities (Boyd and Gertler 1994).

Table 3 suggests that, for the banks with  $0.03 < L_1 < 0.035$ ,  $F$  comes close to 0.2 and  $OBS_g/A$  is below critical  $\alpha_g$ , as suggested by Figure 7 ( $0.16 < \alpha_g < 0.83$ ).

For those banks reporting  $0.035 < L_1 < 0.04$ ,  $F$  moves within a wide range; and  $OBS_g/A$  is always below and very far from critical  $\alpha_g$  ( $0.4 < \alpha_g < 3.33$ , Figure 7). Finally, the banks in the sample with  $0.04 < L_1 < 0.045$  report a wide variety for  $F$  and  $OBS_g/A$ , with the latter always being very far from critical  $\alpha_g$  ( $0.73 < \alpha_g < 5$ , Figure 7).

Note that even those banks at a higher leverage risk (reporting  $0.03 < L_1 < 0.035$ ) would need to apply a very high  $F$  according to their proportion of  $OBS_g/A$  to not accomplish the minimum Basel III leverage requirement. This reinforces the thesis that the new CCFs ( $F$ ) seem appropriate for the European banking system.

**Table 3. The main statistics of  $OBS_g/A$  and CCFs ( $F$ ) for the banks in the sample with  $0.03 < L_1 < 0.045$**

		$0.03 < L_1 < 0.035$	$0.035 < L_1 < 0.04$	$0.04 < L_1 < 0.045$
$OBS_g/A$	average	0.107	0.151	0.183
	stand. dev	0.001	0.081	0.123
	max	0.108	0.222	0.364
	min	0.107	0.059	0.043
F	average	0.182	0.485	0.469
	stand. dev	0	0.356	0.268
	max	0.182	1	1
	min	0.181	0.181	0.298
	N	2	4	6

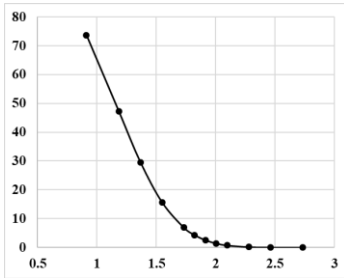
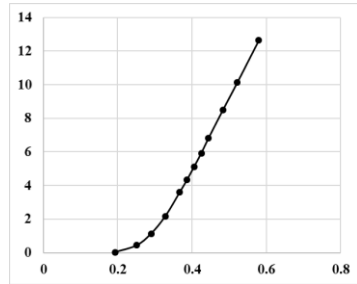
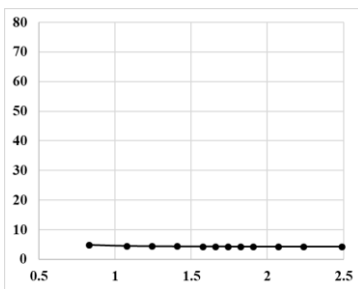
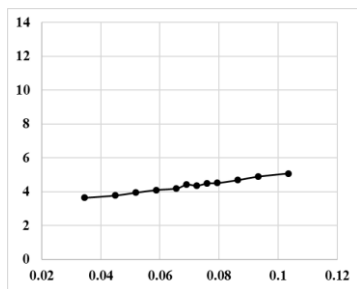
a) Mean  $L_1$  distributionb) Standard deviation of  $L_1$  distributionc) Shape parameter of  $\alpha$  distributiond) Scale parameter of  $\alpha$  distribution

Figure 8. The failure rate for the different values of the estimated parameters. The vertical axis is the failure rate (%), and the horizontal axis is the value of the analyzed parameter. Note the different scales of the vertical axis for the shape (mean) and scale (standard deviation) parameters.

It is necessary to know the sensitivity of the simulation results to changes in the parameters of the fitted distributions (Kuzubas 2016).

The failure rate is simulated for the different values of the fitted distributions, for  $F = 0.333$  and  $c = 0.03$ .  $F = 0$ ). The parameters are simulated within the range of 50% and 150% of their estimated value. This sensitivity analysis can be used to estimate the uncertainty of the results if changes in investment/financing behaviors occur, as well as the possibility of a bias in the data distribution fitting.

The results are very sensitive to the distribution chosen to simulate  $L_1$  and particularly to its mean (Figure 8.a). With the  $\alpha$  sequence, the results are more sensitive to its scale parameter (Figure 8.d), but the influence of this parameter on the results is far from the leverage distribution influence.

Note that a very broad variation range is considered. By considering a narrow variation range (close to the value estimated in Section 5.1), the volatility of the results considerably decreases, which supports the empirical validity of the obtained results.

## CONCLUSION

With the Basel III leverage requirement coming into force in the EU, an impact study of the relevance of OBS exposures on the ratio is necessary. Furthermore, after extensive debate about the calibration of the requirement and the exposure measure, the BCBS agreed making revisions to the leverage ratio framework in December 2017.

In this paper, Monte Carlo simulations are used to approximate the effect of including OBS exposures in the leverage ratio in the European banking industry. The different requirements discussed during the calibration of the leverage ratio, and the novelties that will come into force in January 2022, are considered in the simulations. This paper informs about the work of the European Commission on potential legislative proposals for the leverage ratio.

The simulations results suggest that the current Basel III framework allows the prevention of 4.3% of the banks in the industry being leveraged banks. In addition, 99% of risky leveraged banks would have a leverage ratio below 3.45% when OBS exposures are not included (6.5% of the banks in the European banking industry). The current European regulation is a preventive and conservative measure that extends the requirement and monitoring of OBS exposures to the whole industry, and helps prevent black swan events.

As regards the amendments made to Basel III (BCBS, 2017), the increase in the minimum leverage requirement for G-SIBs, through the introduction of a buffer, is estimated and is expected to affect many banks (between 6 and 35).

The also results evidence that the previous mild credit conversion factor (BCBS 2014) could smooth the effect of OBS exposures on the leverage



ratio and the new CCFs would seem appropriate for the European banking system.

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