

# Editorial

Editorial

## Human interactions and research developments

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This editorial aims to recognize the valuable contribution of the researchers who have devoted a great contribution to the *European Journal of Management and Business Economics (EJM&BE)*. The academic knowledge is driven by a rich ecosystem based on authors' contributions improved by comments and suggestions from the editorial board members, reviewers and associate editors. The increasing impact factor of *EJM&BE* such as CiteScoreTracker of 2.95 (updated on February 6th, 2020), shows their quality and commitment. The following comments are addressed to recognize researchers who have contributed in different ways to such achievement.

Last December, Rodolfo Vázquez Casielles Professor of Marketing at the University of Oviedo passed away unexpectedly. He was a Member of the Editorial Advisory Board of *EJM&BE* and showed a high commitment as an advisor and as a reviewer. His valuable human dimension was transferred in his reviews to the authors. He was always on time and looking for the helpfulness. He also made me comments about the future of publishing and the coming milestones of the *EJM&BE*. Our enormous gratitude, affect and memories are our return on his valuable human contribution to the academy. His papers on market orientation, service recovery, and service quality, to name a few, are showing his research interests. He was also close to others, offering quality in his reviews and looking for improving the quality of the papers reviewed. Rodolfo, your legacy is still knocking the doors of numerous researchers and will remain strongly connected in our minds.

*EJM&BE* wishes to recognize the invisible role of reviewers. Starting in 2018 the Annual Distinguished Reviewer Award of *EJM&BE* is based on computing the quality of the review as rated by the associate editor (50 percent), the timeliness in reviewing (40 percent) and the number of papers reviewed in 2018 (10 percent). In this first edition, Reyes Gonzalez-Ramirez Professor of Management from the University of Alicante completed four reviews with high-quality standards and timeliness. She chairs the Research Group Information Systems and Human Resources in Organizations of the University of Alicante. Her active research activity in publishing in international journals and research projects is fueling her valuable reviews to manuscripts under review. Congratulations on this award. More than deserved.

The 2018 Best Paper Award published in 2018 is based on the number of citations up to September 30th, 2019. In this edition, the awarded paper is titled Effects of the intensity of use of social media on brand equity: an empirical study in a tourist destination, authored by Igor Stojanovic, Luisa Andreu and Rafael Currás-Pérez from the Department of Marketing and Market Research of the University of Valencia. This paper published in Volume 27 Number 1, 2018 received six citations from both Scopus and ESCI databases. The paper found a positive effect on the intensity of social media use on brand awareness. Results also suggest that brand awareness influences other



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dimensions of brand equity and highlight the influence of the destination affective image on the intention to make word of mouth communication. Congratulations to the distinguished authors by their valuable paper.

**Enrique Bigne**

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# Investigating the determinants of firm performance

## A qualitative comparative analysis of insurance companies

Firm  
performance

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### Abstract

**Purpose** – The purpose of this paper is to use tenets of the complexity theory in order to study the effect of various determinants of firm's performance, such as CEO's compensation and age, for the case of 72 insurance companies.

**Design/methodology/approach** – The authors identify the asymmetries in the data set by creating quantiles and using contrarian analysis. Instead of ignoring this information and use a main effects approach, all the available information in the data set is taken into account. For this purpose, the authors use qualitative comparative analysis to find alternative equifinal routes toward high firm performance.

**Findings** – Five configurations are found which lead to high performance. Every one of the five configurations is found to be sufficient but not necessary for high firm performance.

**Originality/value** – The research findings contribute to a better understanding of the determinants of firm's performance taking into account the asymmetries in the data set. The authors identify alternative paths toward high firm performance, which could be vital information for the decision maker inside a firm.

**Keywords** Complexity theory, Qualitative comparative analysis, Contrarian analysis, Insurance companies, Compensation

**Paper type** Research paper

### 1. Introduction

The performance of a firm is affected by a variety of factors including organizational aspects such as the size, the history and the structure of the firm; environmental aspects such as socio-economic background and technological framework; and human aspects such as individual characteristics, motivation and skills. There is a debate across the literature about the effect of human factor on firm's performance, especially the effect of top managers. The neoclassical economic theory considers top managers as homogenous and perfect substitutes with each other (Bertrand and Schoar, 2003), while the managerial talent hypothesis indicates that managers affect the performance of the firm (Hubbard and Palia, 1995). The top ranked manager of the firm is the chief executive officer (CEO) or managing director who is responsible for the firm's overall operations and performance. According to managerial talent hypothesis, the effect of the CEO's individual performance should greatly influence the performance of the firm.

The scientific interest focuses on the specific factors and characteristics of CEOs which affect the firm. Motivation is considered among the most important factors, with compensation [1] and bonuses as its key determinants (Cashman, 2010; Livne *et al.*, 2011). In addition, based on the



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principal-agent theory the principal (board of directors) decides the optimal level and composition of the agent's (CEO) compensation in order to better align their interest. Therefore, total compensation (compensation and bonuses) provide motivation and align the CEO's interests with the interests of the firm. Furthermore, the CEO's characteristics, such as age (Sturman, 2003) and tenure (Mousa and Chowdhury, 2014), also influence his decisions and, consequently, the performance of the firm. The decremental theory of aging suggests that older individuals tend to have declining physical and mental skills (Giniger *et al.*, 1983). Nevertheless, older individuals tend to be more experienced which is important for complex jobs such as CEO.

The majority of the previous literature regarding the CEO characteristics and firm performance focus on non-financial sector. The relationship between CEO pay and performance is at the center of this literature and the argument is that shareholders' interests and managers' interests are better aligned when CEO compensation is connected with shareholders' gains and losses. However, this relationship has been questioned in the financial sector, especially in the aftermath of the global financial crisis. Specifically, the argument is about CEO incentives and whether or not they are aligned with shareholders' and firm's interests (Fahlenbrach and Stulz, 2011). Furthermore, CEOs in banks receive lower compensation and fewer incentives, while the pay-performance relationship is more sensitive (Houston and James, 1995). Therefore, it is important to examine the effect of CEO pay on firm performance in the financial sector.

In line with the above, this study focuses on the effect of various determinants of financial firm's performance, including the CEO's total compensation and age, the size and the age of the firm. Specifically, we examine the case of seventy-two insurance companies. The contribution lies both in the empirical literature of CEO compensation in general and the key factors of firm performance in financial sector in particular. Although a great variety of studies focus on the effect of CEO compensation on firm performance and a number of studies on the effect of other factors such as firm size and CEO age, only a few of them explore this link in financial sector. Furthermore, this is the first study to explore all these factors simultaneously, which allows us to take a broader look regarding the performance of a firm.

The vast majority of previous studies applies multiple regression analysis (MRA) in order to examine firm performance and its determinants, therefore assuming a linear relationship (Sun *et al.*, 2013; Sheikh *et al.*, 2018). Another strand in the literature argues that this relationship is non-linear and found various types of asymmetries (Fong *et al.*, 2015; Matousek and Tzeremes, 2016). This study uses the complexity theory tenets in order to examine possible asymmetrical relationships between antecedents (CEO's compensation and age among others) and the outcome condition (firm's performance). These tenets suggest equifinality, which implies that more than one path can lead to the desired outcome (Wu *et al.*, 2014). Furthermore, this study applies contrarian case analysis by creating quantiles in order to shed further light on the asymmetrical relationship among the variables. Moreover, configural analysis is applied, which uses Boolean algebra in order to find which combinations of simple antecedents lead to a high outcome condition. In addition, we perform a predictive validity test using a holdout sample in order to check the validity of our findings.

The paper is organized as follows. Section 2 reviews the current literature about the relationship among the firm's performance and its various determinants, which include CEO's compensation and age, the size and the age of the firm. Section 3 presents the description of the variables used, the contrarian analysis and the outline of the configural analysis. The results of the approach are presented in Section 4, and Section 5 concludes.

## 2. Theory and hypothesis

### 2.1 Review of the recent literature

The previous empirical literature mainly focuses on the effect of CEO compensation on industrial firm performance. The results indicate a positive relationship, however, the exact nature of this relationship has caused some debate whether the effect is high, moderate or low,

and also if high compensation leads to high performance or the opposite, therefore, if the relationship is symmetrical or asymmetrical. Hall and Liebman (1998) studied the case of publicly traded US companies and found a significant relationship among pay and performance, and they rejected the hypothesis that CEOs are paid as bureaucrats. The case of 455 US firms for the time period 1996–2002 was studied by Nourayi and Daroca (2008). The authors examined the relationship among the CEO's cash and total compensation, and the firm's size and performance. The results showed a small positive but significant relationship among compensation and performance. Ghosh (2010) examined the case of 324 Indian manufacturing firms for the year 2007 and found a small positive but significant relationship among CEO pay and firm performance. Raithatha and Komera (2016) investigated the linear relationship among firm performance and executive compensation in India and found a positive relationship between accounting performance and compensation; however, this finding is not verified for the case of stock market performance. Similarly, Sheikh *et al.* (2018) examined the linear relationship among firm performance, executive compensation and corporate governance in Pakistan, and verified the positive relationship between accounting performance and compensation, and no relationship between stock market performance and compensation.

On the other hand, a number of studies found evidence of non-linear relationship between firm performance and CEO compensation. The practical limits of incentive pay were highlighted by Mishra *et al.* (2000) who investigated 430 firms over the period 1974–1988. The findings indicated a non-linear relationship among the CEO's pay and firm performance. Specifically, increasing pay sensitivity results in higher firm performance up to a certain point, beyond which the results turn to be negative. Nourayi and Mintz (2008) examined the pay–performance relationship for 1,446 firms for the years 2001 and 2002. The results revealed that compensation of inexperienced CEOs with under three years in the office was related to firm performance, while there was no relationship for more experienced CEOs. Bulan *et al.* (2010) investigated 917 manufacturing firms for the time period 1992–2003 and found a non-linear relationship between CEO pay incentives and firm productivity. The findings revealed that pay incentives do not always achieve their purpose and excessive incentives might lead to opposite results. In fact, it is quite possible that in the absence of a supervisory board, the CEO will manipulate the firm's strategy in order to achieve higher compensation. Fong *et al.* (2015) found a non-linear relationship among the CEO's compensation and long-term firm's market value for 582 non-financial non-utility US firms for the time period 1991–1999. Specifically, the relationship was initially positive up to a threshold, and beyond that point the relationship became negative. Furthermore, there are studies which link low firm performance with CEO turnover, even if the low performance is due to factors beyond the control of the CEO (Jenter and Kanaan, 2015; Bennett *et al.*, 2017).

A number of studies across the literature focus on the financial sector. Crawford *et al.* (1995) found a strong positive relationship between bank performance and incentives for CEO's compensation and wealth (salary, bonus, stock options and common stock holdings) in the post-deregulation period. Hubbard and Palia (1995) confirmed the positive pay–performance relationship for the case where the interstate banking is permitted. Houston and James (1995) examined CEOs in 134 commercial banks and 134 non-banking firms and found that there are structural differences among CEOs in banks and CEOs in non-banking firms in terms of their compensation. Specifically, the results reveal that CEOs in banks receive lower compensation and fewer incentives, while the pay–performance relationship is more sensitive in banks. Ang *et al.* (2002) investigated CEOs and non-CEO top executives in 166 US banks and found that the pay–performance relationship is positive and significant for CEOs. Cünat and Guadalupe (2009) examined banking and financial sectors and demonstrated that increased competition and deregulation increased the pay–performance sensitivity. John *et al.* (2010) studied CEOs in 143 bank holding companies and found that the link between compensation and performance lessens with the leverage ratio and strengthens with outside monitoring. Sun *et al.* (2013) tested the relationship among CEO compensation and firm performance, measured by efficiency, in

the US property-liability insurance industry for the time period 2000–2006. The findings revealed that revenue efficiency was related to cash compensation, and cost efficiency was related to incentive compensation.

On the other hand, a negative or non-linear relationship between firm performance in financial sector and CEO compensation was reported by a number of studies. Barro and Barro (1990) were among the first to study the connection of CEO compensation and firm performance in financial sector. They examined the total compensation (salary and bonus) of CEOs in large commercial banks. The results revealed a positive relationship between total compensation and the firm's performance; however, more experienced CEOs were affected less by compensation changes. Livne *et al.* (2011) studied 152 firms (mainly commercial banks) for the time period 1996–2008. The authors found that cash bonus and firm performance were positively related, while equity-based compensation was negatively related with firm performance. Matousek and Tzeremes (2016) examined the effect of CEO compensation on the bank efficiency levels and found a significant non-linear relationship among them. Furthermore, the results indicated that CEO salary and bonus affected differently the level of the efficiency. In summary, we expect the effect of the CEO's compensation on firm performance to be substantial and positive at the beginning, with a diminishing rate for higher levels.

There is also a strand in the literature which explores the link between various types of compensation structures and risk taking, which indirectly affects firm performance; however, the results do not indicate a clear relationship among them. Specifically, Chen *et al.* (2006) investigated commercial banks during the time period 1992–2000 and found that after deregulation the CEO compensation was significantly based on stock options. As a result, the authors noted that the structure of CEO compensation encourage risk taking. Bebchuk *et al.* (2010) and Bhagat and Bolton (2014) examined the case of financial institutions and found that managerial incentive pay matters. Furthermore, they recommend the use of restricted stocks and restricted stock options in order to handle the induced risk taking, while Bolton *et al.* (2015) suggested to link credit default swaps with compensation in order to tackle the issue. Gande and Kalpathy (2017) examined large US firms before crisis and found that equity incentives, which were tied to the CEO compensation resulted in risk taking and solvency problems. At the same time, higher incentive alignment moderated the problems. On the other hand, Houston and James (1995) found no evidence that bank CEO compensation induces risk taking. This result is confirmed by Acrey *et al.* (2011) for the case of the largest US banks, that is, CEO compensation is either insignificantly or negatively correlated with common risk variables. In a similar framework, Bai and Elyasiani (2013) investigated the link between CEO compensation and bank stability, and found a bi-directional relationship among them. King *et al.* (2016) found that management education allows the CEOs to better manage risk-taking activities and innovative business models in order to achieve higher firm performance.

The CEO's individual characteristics could also have a significant effect on financial firm's performance. Specifically, the CEO's age could be an important factor; however, the effect is not clear and the results are mixed. On the one hand, older CEOs are more experienced, and, on the other hand, their physical and mental skills are naturally declining (Giniger *et al.*, 1983) and also they are reluctant to risk, which could lead to missed opportunities and lower firm performance. Based on these contradictory effects, Sturman (2003) hypothesized that the relationship between age and performance is non-linear (U-shaped). The results did not support his hypothesis about a U-shaped relationship; however, the nature of the relationship was indeed non-linear and significant. Mishra *et al.* (2000) confirmed that age affects CEO's motivation. Specifically, they found that younger CEOs tend to take more risks than older CEOs. McClelland *et al.* (2012) extends this rationale by arguing that older CEOs have shorter career horizons than younger CEOs, which lead them toward more risk-averse decisions and consequently to the firm's lower performance. Nguyen *et al.* (2018) investigated Australian

firms for the time period 2001–2011 and found that CEO age is a significant and negatively related factor for firm performance, meaning that younger CEOs achieve better results than older CEOs. Therefore, we build on the premise that younger CEOs are more motivated than older CEOs, which led them to achieve higher firm performance. However, we expect this relationship to be non-linear due to the essential experience of older CEOs.

Based on the above analysis, we can summarize that many scholars found a positive relationship among CEO compensation and firm performance which is either non-linear or significant only for younger CEOs (Barro and Barro, 1990; Mishra *et al.*, 2000; Nourayi and Mintz, 2008; Fong *et al.*, 2015). Therefore, we would expect that high compensation would lead to high firm performance in a configuration which a younger CEO is present:

*H1.* High CEO compensation for a younger CEO lead to high firm performance.

Firm size is a contingent factor and lies within the contingency theory framework of organizational design (Donaldson, 2006). The number of employees and total assets in a firm are indications of its size. Large firms differ structurally from small ones in a variety of terms such as rules and regulations, manager levels, budget and scale of operation. Chow and Fung (1997) examined manufacturing enterprises in Shanghai and found that larger firms achieve better performance. Lundvall and Battese (2000) investigated Kenyan manufacturing firms in four sectors and the results revealed that firm size is a significant indicator of performance for two sectors. Diaz and Sanchez (2008) analyzed the case of Spanish manufacturing firms and verified the significant positive relationship among firm size and performance. Chandran and Rasiah (2013) found evidence that firm size affects various aspects of firm's operational activities, such as its performance. Evidently, we expect that larger firms which have a better position in the market would achieve better performance than smaller firms. In financial literature, firm size is considered as an important factor to control the pay–performance sensitivity. John and Qian (2003) hypothesized that larger firms should have lower sensitivity regarding the pay–performance relationship and confirmed the hypothesis for the banking industry. Furthermore, Hubbard and Palia (1995), Bliss and Rosen (2001) and Ang *et al.* (2002) found a significant connection among bank size and CEO compensation.

Based on the above, we would expect large size in terms of assets and employees to be present in most of the configurations:

*H2.* Large-sized firms achieve high firm performance.

Another contingent factor is the age of the firm. Throughout different life stages firms evolve in terms of systems, procedures and regulations. Firms in the youth stage tend to be innovative and flexible, they are willing to take higher risks, they expand and hire, and, ultimately, they are pursuing higher growth. They are in the process to adopt and develop a framework for rules and regulations and distinguish levels of management. Firms in the maturity stage have all the above in place, have an established place in the market and significant experience in their field. On the one hand, some empirical studies show mixed results regarding how the age of firm affects firm performance (Lundvall and Battese, 2000; Söderbom and Teal, 2004). Giachetti (2012) argued that the experience is a significant factor of firm's performance. On the other hand, another strand in the literature argues that newer firms focus more on innovation, which leads them to perform better (Hansen, 1992; Balasubramanian and Lee, 2008). In line with these findings, Moreno and Castillo (2011) found an inverse relationship between age and firm's growth.

It has been reported that younger CEOs tend to take more risks than older CEOs and they also tend to be more innovative (Mishra *et al.*, 2000). Furthermore, newer firms focus more on innovation which leads them to perform better (Hansen, 1992; Balasubramanian and Lee, 2008). Therefore, we would expect that a younger CEO will lead to high firm performance in a newer firm. On the other hand, an older CEO, who is more experienced and

risk-averse, will be expected to achieve better results in an older firm where the experience is a significant factor of firm's performance (Giachetti, 2012):

*H3a.* Younger CEO in a newer firm leads to high firm performance.

*H3b.* Older CEO in an older firm leads to high firm performance.

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### 3. Methodology

MRA treats firm's performance as the dependent variable ( $Y$ ) and the CEO's total compensation and age as the independent variables ( $X$ ), along with other determinants of the firm's performance. MRA assesses if the effect of a single independent variable (e.g. the CEO's compensation) on firm's performance is significant (and positive or negative) after separating it from the effect of other independent variables (net effect). Such analysis investigates a symmetrical relationship among dependent and independent variables; high values of  $X$  associate with high values of  $Y$  and low values of  $X$  associate with low values of  $Y$ . On the contrary, asymmetrical techniques allow a number of values of  $X$  to have a counter effect than the observed net effect; for example, high values of  $X$  may associate with high values of  $Y$ , but low values of  $X$  could also associate with high values of  $Y$  (Woodside, 2013). Asymmetrical relationships are undoubtedly more often in real data set than symmetrical ones (Woodside, 2014).

#### 3.1 Variable description and data

In this study, we investigate the determinants of the performance of insurance companies with special focus on the effect of the CEO's total compensation and age. Throughout the literature, it is a common practice to use sales as a measure of the firm's performance (Anthony *et al.*, 1992; Feltham and Xie, 1994). Cook and Hababou (2001) marked the intensification of the financial services industry and the significant role of sales as a measure of their performance. In this study, we choose sales (in billion dollars) as a proxy for the performance of the insurance companies and use it as the outcome condition.

The data sample contains the top 72 insurance companies from around the world. The data set was manually extracted from multiple sources; the Forbes Global 2000[2] database, Datastream, Bloomberg and salaries.com[3]. Forbes Global 2000 is an annual ranking for the top 2,000 public companies in the world published by Forbes magazine. From the top 2,000 companies, we selected the 72 diversified insurance and life and health insurance companies. Table AI contains information about the companies in our group: the country of origin, the name of the CEO and the date they were founded. Apart from the CEO's total compensation and age, we also use additional determinants for firm performance. We use firm's assets (in billion dollars) and labor (measured as the number of employees) as measures of firm's size and key aspects of the production process. In addition, we use the number of years since the insurance company was founded as a measure of firm's seniority. The reference year for all variables is 2013. Table I presents the descriptive statistics of the variables used in the analysis, and Table II demonstrates the correlations of the variables used. The correlation matrix shows that some variables are related, while others are not related. Therefore, the symmetrical correlation test (Pearson's correlation) yields mixed results, however we suspect that our set contains asymmetrical data. In the next section, we search for these asymmetries.

#### 3.2 Cross-tabulation

This section presents a variable by variable analysis and searches for contrarian cases in the data. We construct the cross between sales (which is the outcome variable) and every one of the simple antecedent variables[4]. All the variables have been divided into

quantiles (Woodside, 2014); the first 20 percent of the observations are “very low,” 20–40 percent are “low,” 40–60 percent are “medium,” 60–80 percent are “high” and 80–100 percent are “very high.” Table III presents the cross of sales and total compensation. Each cell contains the number of observed cases; for example, the very low sales and very low compensation takes place five times. The percentage under the observed cases is the percentage within the row; 33 percent of the cases with very low compensation have very low sales. Furthermore, there are two rounded rectangles in every table. The one on the upper right-hand side shows the negative contrarian cases; the cases where the compensation is low and the sales are high. The other one on the lower left-hand side shows the positive contrarian cases; the cases where the compensation is high and the sales are low. In Table III, there are nine negative and eight positive contrarian cases. Furthermore, Somer’s *d* is provided in every table. This statistic is an asymmetrical test and it is used for the measurement of the association between two ordinal variables. In Table III, Somer’s *d* reveals that there is a significant association between sales and compensation[5].

Regarding the overall results of sales vs every other variable, there are 33 negative and 29 positive contrarian cases. Somer’s *d* shows that every variable, except the CEO’s age, has significant association with sales. The small Somer’s *d* for age indicates a small effect size, however we observe that contrarian cases are still present. The only combination of variables which has no contrarian cases is sales-assets. Rather than using symmetrical approaches which consider only positive or negative cases, we use fuzzy-set qualitative comparative analysis (QCA) which considers both positive and negative routes of the antecedents in order to reach a high outcome condition (Wu *et al.*, 2014).

### 3.3 Qualitative comparative analysis (QCA)

This paper employs QCA, which is a set-theoretic approach that uses Boolean algebra to investigate the relationships among the outcome condition and every possible combination of binary states (membership and non-membership) of the antecedent conditions (Longest and Vaisey, 2008). Since our variables are continuous, they need to be calibrated for the needs of the approach. QCA is naturally based on dichotomous variables with two states, membership and non-membership. Fuzzy sets allow the calibrated variables to range from 0

	Min.	Max.	Mean	SD
Sales (B\$)	1	138.9	25.71	29.99
Total compensation (\$)	65,178	7,651,345	2,024,571	1,730,414
Age (years)	45	79	57.5	6.84
Assets (B\$)	15	1,488.7	215.6	283.6
Number of employees	226	203,366	23,642	35,587
Operating years	12	231	91.4	56.88

**Table I.**  
Descriptive statistics  
of the variables

	Sales	Compensation	Age	Assets	Employees
Compensation	0.433* (0.000)				
Age	0.017 (0.889)	0.066 (0.581)			
Assets	0.773* (0.000)	0.310* (0.008)	-0.050 (0.679)		
Employees	0.730* (0.000)	0.164 (0.169)	0.011 (0.927)	0.670* (0.000)	
Years	0.255** (0.030)	0.266** (0.024)	0.058 (0.629)	0.133 (0.266)	-0.030 (0.800)

**Table II.**  
Correlation matrix  
for the variables used

**Notes:** \*,\*\*Significant at 0.01 and 0.05 levels, respectively

Compensation \* Sales Cross-tabulation

		Sales					Total
		Very low	Low	Medium	High	Very high	
Compensation	Very low	5 33.3%	3 20.0%	3 20.0%	3 20.0%	1 6.7%	15 100.0%
	Low	5 31.3%	3 18.8%	3 18.8%	4 25.0%	1 6.3%	16 100.0%
	Medium	2 16.7%	3 25.0%	5 41.7%	1 8.3%	1 8.3%	12 100.0%
	High	1 7.1%	4 28.6%	2 14.3%	3 21.4%	4 28.6%	14 100.0%
	Very high	2 13.3%	1 6.7%	1 6.7%	3 20.0%	8 53.3%	15 100.0%
Total		15 20.8%	14 19.4%	14 19.4%	14 19.4%	15 20.8%	72 100.0%

**Table III.**  
Cross-tab of CEO's  
compensation  
and firm's sales

**Notes:** Somer's *d*, 0.305; *p*-value, 0.001

(non-membership) to 1 (full membership) with intermediate thresholds (Ragin, 2000). The procedure of the calibration is analogous to *z*-scale transformation. According to Woodside (2013) the three breakpoints that need to be specified are: the original value covering the 5 percent of the data set which is the threshold for non-membership; the original value covering the 50 percent of the data set which is the median threshold for membership/non-membership; and the original value covering the 95 percent of the data set which is the threshold for full membership. Following Woodside (2013) and Beraha *et al.* (2018), this paper uses the fsQCA software for the calibration of the original variables into fuzzy sets[6].

After the calibration procedure, fsQCA uses every possible combination of simple and complex antecedent conditions to find every possible route toward a high outcome condition. A complex condition in Boolean algebra is made using the logical statement "and" which is equal to the lowest value of the simple antecedents which are used, and it is denoted as "•" (Woodside, 2014). For example, suppose the simple antecedents A, B and C which have already been calibrated into fuzzy sets and their values are 0.08, 0.60 and 0.45, respectively. The complex antecedent A•B•C means that all three simple antecedents must be present simultaneously and the value of the complex antecedent is 0.08. Furthermore, the symbol "~" means not present. For example, ~A means A is not present and its value is 1-A = 0.92 (Woodside, 2013). Having established the above, we can define the property space of QCA, which includes every possible combination of

antecedents (present and absent) toward the outcome condition (Ordanini *et al.*, 2014). Since there are five simple antecedent conditions in this study, the number of every possible combination of them is  $2^5 = 32$ . Table IV presents the property space.

Two very important indices for QCA are consistency and coverage. Consistency measures the sufficiency of the configurations (see Table IV) for the outcome condition (sales in this case). Essentially, consistency indicates the degree to which membership in each solution term is a subset of the outcome condition and it is considered as analogous to a correlation index in statistical approaches (Wu *et al.*, 2014). It is calculated as:

$$Consistency(X_i \leq Y_i) = \sum \left\{ \min(X_i, Y_i) / \sum X_i \right\}, \quad (1)$$

where  $Y_i$  is the membership score of the outcome set for the case  $i$  and  $X_i$  is the membership score of the  $X$  configuration for the case  $i$ . The final task is to remove redundant simple antecedents from the complex configurations. For example, suppose two consistent configurations: compensation•age•years and compensation•age•~years. It is easy to deduce that compensation•age is equivalent with the above two configurations, since it is present for both older and newer companies (presence and absence of “years”). For each

Antecedents	No. of cases	% of total space
~Compensation•~age•~assets•~employees•~year	7	9.72
~Compensation•age•~assets•~employees•~year	7	9.72
~Compensation•age•~assets•employees•year	4	5.56
Compensation•age•assets•employees•year	4	5.56
Compensation•~age•assets•employees•year	5	6.94
Compensation•age•~assets•~employees•year	3	4.17
Compensation•~age•assets•~employees•year	5	6.94
~Compensation•age•assets•employees•~year	3	4.17
~Compensation•~age•assets•employees•~year	4	5.56
Compensation•age•assets•employees•~year	3	4.17
Compensation•age•~assets•~employees•~year	2	2.78
Compensation•~age•assets•employees•~year	3	4.17
Compensation•~age•~assets•employees•~year	2	2.78
Compensation•~age•~assets•~employees•~year	2	2.78
~Compensation•~age•assets•employees•year	3	4.17
~Compensation•~age•~assets•employees•~year	2	2.78
Compensation•age•assets•~employees•~year	1	1.39
Compensation•~age•~assets•employees•year	1	1.39
Compensation•~age•~assets•~employees•year	2	2.78
~Compensation•age•assets•employees•year	1	1.39
~Compensation•age•assets•~employees•year	1	1.39
~Compensation•age•~assets•employees•year	1	1.39
~Compensation•age•~assets•employees•~year	1	1.39
~Compensation•~age•assets•employees•year	1	1.39
~Compensation•~age•~assets•~employees•year	1	1.39
~Compensation•~age•~assets•employees•year	1	1.39
~Compensation•~age•~assets•~employees•year	1	1.39
~Compensation•~age•~assets•~employees•year	0	0.00
~Compensation•~age•assets•~employees•~year	0	0.00
~Compensation•age•assets•~employees•~year	0	0.00
~Compensation•~age•assets•~employees•year	0	0.00
Total	72	100.00

**Table IV.** Configurations of binary states of antecedents that could influence firm performance

final configuration, coverage is calculated, which shows the proportion of memberships in the outcome that is explained by the solution. Coverage is considered as analogous to  $r^2$  in statistical approaches (Wu *et al.*, 2014). It is calculated as:

$$Coverage(X_i \leq Y_i) = \sum \left\{ \min(X_i, Y_i) / \sum Y_i \right\}. \quad (2)$$

#### 4. Empirical findings

##### 4.1 Test for fit validity

This section conducts QCA using the fsQCA computer software. Following Ragin (2008b), we have captured over 80 percent of the cases by setting a frequency threshold of 2.00 and also adapted consistencies over 0.75 (specifically the smallest consistency is about 0.85). Table V presents the results. Each of the five rows shows a complex antecedent condition which is sufficient for achieving high firm performance. The five configurations explain about 80 percent high firm performance in our sample (total coverage = 0.803) and the overall consistency is high (0.8875). The complex antecedents are explained as follows:

$$\text{Compensation*} \sim \text{age*assets*year}.$$

This complex configuration, which is the final antecedent in Table V, means that a path for achieving high firm performance is a younger CEO with high compensation and a large-size firm (indicated by high assets), which is in the market for many years. At first, none of the simple antecedent conditions are present in every complex solution, which implies that none of them is necessary for achieving high firm performance. However, we can see that high assets and high number of employees, which are both indicators of a large size firm, are present in four of the five solutions. Furthermore, the five different equifinal routes reveal that although every single one configuration is sufficient for high firm performance, none of them is necessary. Regarding the five sufficient configurations, the fourth (high CEO compensation, high assets and high employees) achieves the highest level of unique coverage (0.0897) meaning that it is the path which explains the largest share of the outcome variable. The complex antecedent which follows is the fifth solution (high CEO compensation, a younger CEO and a large-size firm with many years since established) with unique coverage of 0.0425. This path explains the second largest share of firm performance.

An overall examination of the results confirms *H1* – that a high CEO compensation for younger CEOs affects firm performance – since it is present in the second solutions with the highest unique coverage. This finding verifies the results of Barro and Barro (1990), who found a positive relationship between total compensation and firm’s performance; however, more experienced CEOs were affected less by compensation changes. *H2*, about the size of

	Raw coverage	Unique coverage	Consistency
~Age*employees*~year	0.42	0.03	0.87
Assets*employees*~year	0.47	0.04	0.98
~Age*assets*employees	0.55	0.01	0.98
Compensation*assets*employees	0.61	0.09	1.00
Compensation*~age*assets*year	0.43	0.04	0.92

##### Complex solution

Frequency cutoff: 2.00  
Consistency cutoff: 0.858746  
Solution coverage: 0.803021  
Solution consistency: 0.887564

**Table V.**  
Configurations  
predicting high  
firm performance

the firm, is validated in every configuration, since a larger size either in terms of assets or employees is present in every configuration, which is in line with the previous literature (Chow and Fung, 1997; Lundvall and Battese, 2000; Diaz and Sanchez, 2008). Furthermore, the results are contradictory regarding *H3*. Specifically, *H3a* – younger CEOs in newer firms achieve better firm performance – is verified in the first solution in Table V. This confirms the results of Nguyen *et al.* (2018) and is in line with the argument of Mishra *et al.* (2000) about the CEO's age and motivation. However, *H3b* – older CEOs in older firms achieve better firm performance – is not verified. In fact, the last solution in Table V shows that younger CEOs can achieve high firm performance in older and larger firms.

The results provide valuable insights for the decision maker. First, a higher compensation seems to lead to high firm performance in the case of larger firms. Furthermore, larger firms in terms of assets and number of employees achieve better firm performance with a younger and more motivated CEO. Last, investment in expanding the firm in terms of either assets and/or number of employees should lead to higher firm performance in most of the cases.

#### 4.2 Robustness check

This section conducts QCA but, instead of using sales, it used stock returns as a measure of firm performance. Core *et al.* (2006) and Li *et al.* (2015) argued that accounting-based variables are better proxies for firm performance and that it is a common practice for credit-rating agencies and banks. Furthermore, managers are often evaluated in terms of accounting-based indicators of firm performance. Furthermore, it can be argued that market-based indicators do not reflect the current firm performance, which can be addressed as an inverse cycle of production. An accounting-based indicator solves this issue. Various accounting-based indicators have been used across the literature such as return on assets (Matolcsy and Wright, 2011), return on equity (Li *et al.*, 2015), shareholder return (Ozkan, 2011). In this section, we follow Brick *et al.* (2006), Core *et al.* (2006) and Larcker *et al.* (2007), and use stock returns as a measure of firm performance.

Table VI presents the results. In this case, we have captured only the 66.6 percent of the cases by setting a frequency threshold of 2.00 and consistencies over 0.75. The coverage is smaller than the case of sales because there are more cases here with consistencies below the threshold of 0.75. Each of the five rows in Table VI show a complex antecedent condition which is sufficient for achieving high firm performance. The five configurations explain about 66.6 percent high firm performance in our sample (total coverage = 0.666) and the overall consistency is 0.687.

First, none of the simple antecedent conditions are present in every complex solution, which implies that none of them is necessary for achieving high firm performance. Furthermore, the five different equifinal routes reveal that although every single one configuration is sufficient for high firm performance, none of them is necessary. Regarding the five sufficient

	Raw coverage	Unique coverage	Consistency
Age*~assets*~employees*year	0.41	0.15	0.75
Compensation*~age*assets*employees	0.42	0.06	0.79
Compensation*~age*assets*years	0.39	0.02	0.77
~Age*assets*employees*year	0.37	0.01	0.78
Compensation*assets*employees*year	0.42	0.04	0.76

#### Complex solution

Frequency cutoff: 2.00

Consistency cutoff: 0.751767

Solution coverage: 0.666314

Solution consistency: 0.687159

**Table VI.**  
Configurations  
predicting high firm  
performance:  
robustness check

configurations, the first (high CEO age, low assets, low employees and high number of years) achieves the highest level of unique coverage (0.145326), meaning that it is the path which more frequently leads to high firm performance. This solution means that there is a path for small firms (in terms of assets and number of employees) to achieve high firm performance, and that is if they have an older and more experienced CEO and they are in market for a long time period. The complex antecedent which follows is the second solution (high CEO compensation, a younger CEO and a large-size firm) with a unique coverage of 0.055732.

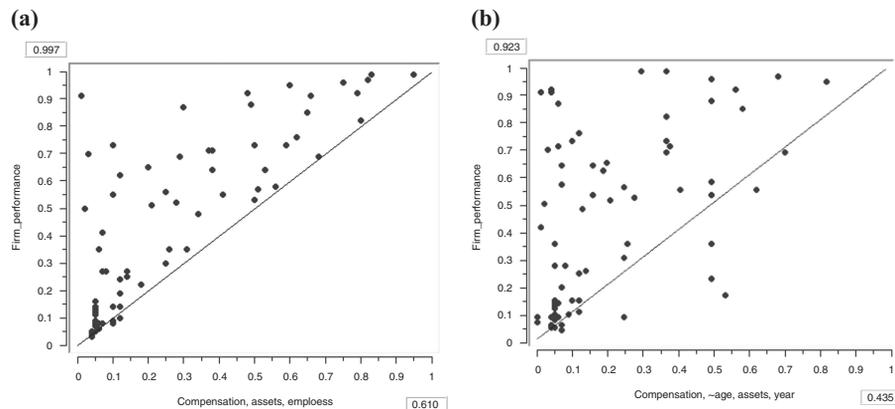
An overall examination of the results reveals that the new outcome variable does not contradict but at the same time does not reinforce previous results. Specifically, this confirms *H1* since it is present in the second and the third solutions in Table VI, which is in line with our previous findings. In contrast with the case of sales, we find evidence supporting the *H3b* but no evidence about *H3a*. Specifically, the first solution in Table VI, which is the solution with the higher unique coverage, supports that older CEOs in older firms achieve higher firm performance, even if the firm is small in size. There is also the fourth solution where younger CEOs achieve high firm performance in older and larger firms, but this solution has a significantly lower unique coverage than the previously mentioned. Last, *H3* is verified in all but the first solution.

Although there are various paths to firm performance, we can detect a pattern. A more experienced CEO seems to be a better solution for smaller firms while bigger firms should invest in younger more motivated CEOs which is contradicting with our hypotheses. A high CEO compensation and a long time period in the market seem to be good choices toward high firm performance since they are present in most of the solutions.

A comparison between the stock returns model in this section and the sales model in the previous section reveals that the later has a better fit in modelling terms. However, in terms of interpretation, they yield similar results. First, both of them support a higher CEO compensation toward high firm performance. Second, there is a solution (the best solution) in the case of stock returns which is different but not contradicting with the case of sales. This solution shows that smaller firms have indeed a path toward high firm performance. Apart from that solution, both of the models find that a younger CEO is preferred for larger firms and that a longer time period in the market is a good element for success.

#### 4.3 Test for predictive validity

Figure 1 presents the *XY* plot of fourth and fifth configurations in Table V and the outcome condition (firm performance). Each dot represents one or more firms since two or more firms



**Figure 1.**  
*XY* plot of complex antecedents with outcome condition (firm performance)

may achieve the same score. Figure 1(a) represents the configuration with the highest unique coverage and Figure 1(b) the configuration with the second highest unique coverage. The *XY* plots of remaining three configurations and firm performance are similar with either Figure 1 (a) or (b). Every *XY* plot in our study reveals that the relationships are indeed asymmetrical. For example, Figure 1(a) indicates that high values of the complex antecedent lead to high values of firm performance; however, low values of antecedent lead to both high and low values of firm performance. Therefore, high values of *X* are sufficient for high firm performance but not necessary, since low values of *X* could also lead to high firm performance (Woodside, 2013). This is a strong indication of an asymmetrical relationship. This finding could be associated with the results of Sturman (2003), Bulan *et al.* (2010) and Fong *et al.* (2015), who found that the CEO's compensation and age have a non-linear relationship with firm performance. This valuable information would have been taken into consideration if we had used regression analysis or other symmetrical approaches.

According to Gigerenzer and Brighton (2009), it is important to test not only for fit validity but also for predictive validity. Following Wu *et al.* (2014), we split our sample into two subsamples. We use the first as a modeling subsample and the second as a holdout subsample. Table VII presents the results of the modeling subsample where the second configuration:

#### Compensation\*assets\*employees

achieves by far the highest unique coverage (0.1885). Notice that the same configuration also achieved the highest unique coverage in the whole sample in Table V. Next, Figure 2 presents the *XY* plot where we test the findings of the modeling subsample using the data from the holdout subsample. The results show that the model is highly consistent (0.996) with high coverage (0.557), supporting that our model has high predictive validity.

## 5. Conclusions

In this study, we have used tenets of the complexity theory, in order to study the effect of CEO's compensation and age on the firm's performance. Instead of using MRA or other symmetrical approaches, we identified the asymmetries in the data set using contrarian analysis. The results reveal the presence of both positive and negative contrarian cases. Rather than ignoring this valuable information and use a main effects approach, we chose to exploit all the available information in the data set. For this purpose, we used QCA to find alternative equifinal routes toward high firm performance.

The empirical findings revealed five configurations which can lead to high firm performance. The configuration which leads to higher performance more often found to be the one with high CEO's compensation and a large-sized firm (a firm with both high assets and high number of employees). Furthermore, we confirmed that no single antecedent

	Raw coverage	Unique coverage	Consistency
~Compensation*employees*~year	0.40	0.04	0.92
Compensation*assets*employees	0.65	0.19	1.00
~Compensation*~age*assets*~year	0.35	0.05	0.97
~Compensation*age*~assets*employees	0.27	0.01	0.93
Compensation*~age*employees*~year	0.39	0.01	0.95

#### Complex solution

Frequency cutoff: 1.00

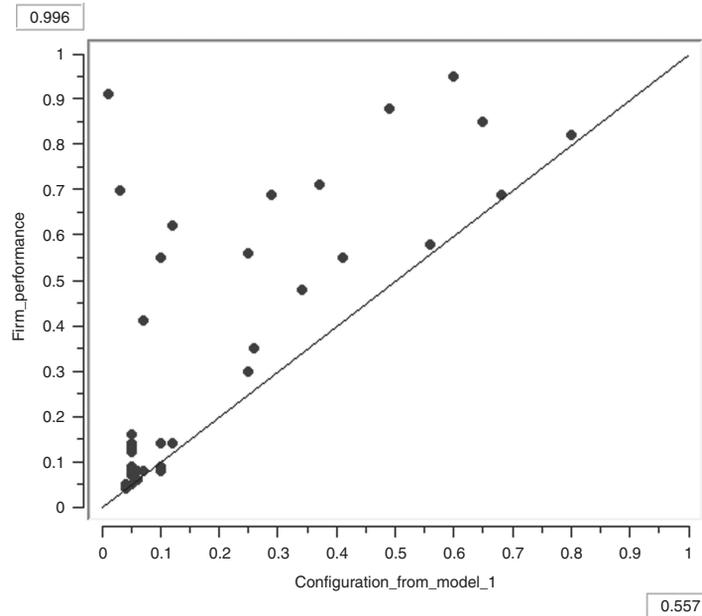
Consistency cutoff: 0.905297

Solution coverage: 0.8208833

Solution consistency: 0.0.941458

**Table VII.**  
Configurations predicting high firm performance for the modeling subsample

**Figure 2.**  
XY plot to test for predictive validity using the second configuration from the modeling subsample and the data from the holdout subsample



condition leads to high firm performance and there is a need for complex antecedents (which are consisted by simple antecedents). Also, the results showed that every single one of the final five configurations is sufficient for achieving high firm performance; however, none of them is necessary, since the high outcome could be achieved with alternative configurations, even if they are less frequently used by the firms. Finally, we tested for predictive validity using a modeling and a holdout subsample.

The results reveal that the CEO's high compensation relates to high firm performance, especially for younger CEOs, which is in line with the findings of previous studies (Barro and Barro, 1990). Furthermore, larger firms in terms of assets and number of employees, achieve better firm performance with a younger and more motivated CEO. On the other hand, a more experienced CEO appears as a better solution for smaller firms. Last, investment in the size of the firm, either in terms of assets or number of employees, leads to high firm performance, which confirms the findings of Chow and Fung (1997), Diaz and Sanchez (2008) and Lundvall and Battese (2000). The results of robustness check, where stock returns replace sales as the outcome condition, verify our findings. Specifically, there is strong evidence regarding the hypothesis that high compensation for a younger CEO lead to high firm performance.

The results provide useful policy implications for the interested groups (among others shareholders, CEOs, investors). Achieving high firm performance is multi-dimensional in nature and cannot be achieved by focusing only on a single element (e.g. CEO compensation). Also, there is no perfect "recipe" toward high firm performance. On the other hand, there are multiple alternative routes that a firm can follow to achieve high firm performance, as long as it adopts the correct strategy mix.

### 5.1 Limitations

This section presents the limitations of our analysis. First, the reference year for our data set is 2013. The data were manually collected and some data were only available for a year.

If more years were available, it would be very interesting to examine lagged models. Specifically, we could analyze the impact of lags in configuration on outcome predictive accuracy. We believe that such an analysis would add great depth to our model and also valuable insights for the decision maker.

Furthermore, there is a limitation regarding the use of market-based indicators as a measure of firm performance. We have addressed this issue in Section 4.2. Specifically, we argued that accounting-based variables may prove to be better proxies for firm performance. In this essence, we used stock returns as a measure of firm performance to perform a robustness check of our results.

### Notes

1. CEOs' compensation has attracted the research interest regarding many aspects of a firm, for example, risk exposure (Fahlenbrach and Stulz, 2011), regulation/deregulation (Cünat and Guadalupe, 2009), and mergers and acquisitions (Kroll *et al.*, 1990).
2. [www.forbes.com/global2000/list/](http://www.forbes.com/global2000/list/)
3. [www.salary.com/personal/executive-salaries/](http://www.salary.com/personal/executive-salaries/)
4. Independent variable.
5. The other four tables with the crosstabs of sales and each one of the remaining four antecedents (age, assets, number of employees and years since establishment) are available upon request.
6. For a detailed explanation of the calibration technique, see Ragin (2008a).

### References

- Acrey, J.C., McCumber, W.R. and Nguyen, T.H.T. (2011), "CEO incentives and bank risk", *Journal of Economics and Business*, Vol. 63 No. 5, pp. 456-471.
- Ang, J., Lauterbach, B. and Schreiber, B.Z. (2002), "Pay at the executive suite: how do US banks compensate their top management teams?", *Journal of Banking Finance*, Vol. 26 No. 6, pp. 1143-1163.
- Anthony, R.N., Dearden, J. and Govindarajan, V. (1992), *Management Control Systems*, Irwin, Boston, MA.
- Bai, G. and Elyasiani, E. (2013), "Bank stability and managerial compensation", *Journal of Banking Finance*, Vol. 37 No. 3, pp. 799-813.
- Balasubramanian, N. and Lee, J. (2008), "Firm age and innovation", *Industrial and Corporate Change*, Vol. 17 No. 5, pp. 1019-1047.
- Barro, J.R. and Barro, R.J. (1990), "Pay, performance, and turnover of bank CEOs", *Journal of Labor Economics*, Vol. 8 No. 4, pp. 448-481.
- Bebchuk, L., Cohen, A. and Spamann, H. (2010), "The wages of failure: executive compensation at Bear Stearns and Lehman 2000–2008", *Yale Journal on Regulation*, Vol. 27 No. 2, pp. 257-282.
- Bennett, B., Bettis, J.C., Gopalan, R. and Milbourn, T. (2017), "Compensation goals and firm performance", *Journal of Financial Economics*, Vol. 124 No. 2, pp. 307-330.
- Beraha, A., Bingol, D., Ozkan-Canbolat, E. and Szczygiel, N. (2018), "The effect of strategic flexibility configurations on product innovation", *European Journal of Management and Business Economics*, Vol. 27 No. 2, pp. 129-140.
- Bertrand, M. and Schoar, A. (2003), "Managing with style: the effect of managers on firm policies", *Quarterly Journal of Economics*, Vol. 118 No. 4, pp. 1169-1208.
- Bhagat, S. and Bolton, B. (2014), "Financial crisis and bank executive incentive compensation", *Journal of Corporate Finance*, Vol. 25, April, pp. 313-341.
- Bliss, R.T. and Rosen, R.J. (2001), "CEO compensation and bank mergers", *Journal of Finance Economics*, Vol. 61 No. 1, pp. 107-138.

- Bolton, P., Mehran, H. and Shapiro, J. (2015), "Executive compensation and risk taking", *Review of Finance*, Vol. 19 No. 6, pp. 2139-2181.
- Brick, I.E., Palmon, O. and Wald, J.K. (2006), "CEO compensation, director compensation, and firm performance: evidence of cronyism?", *Journal of Corporate Finance*, Vol. 12 No. 3, pp. 403-423.
- Bulan, L., Sanyal, P. and Yan, Z. (2010), "A few bad apples: an analysis of CEO performance pay and firm productivity", *Journal of Economics and Business*, Vol. 62 No. 4, pp. 273-306.
- Cashman, G.D. (2010), "Pay-performance sensitivity and firm size: insights from the mutual fund industry", *Journal of Corporate Finance*, Vol. 16 No. 4, pp. 400-412.
- Chandran, V.G.R. and Rasiah, R. (2013), "Firm size, technological capability, exports and economic performance: the case of electronics industry in Malaysia", *Journal of Business Economics and Management*, Vol. 14 No. 4, pp. 741-757.
- Chen, C.R., Steiner, T.L. and Whyte, A.M. (2006), "Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry", *Journal of Banking and Finance*, Vol. 30 No. 3, pp. 915-945.
- Chow, C.K.W. and Fung, M.K.Y. (1997), "Firm size and performance of manufacturing enterprises in P.R. China: the case of Shanghai's manufacturing industries", *Small Business Economics*, Vol. 9 No. 3, pp. 287-298.
- Cook, W.D. and Hababou, M. (2001), "Sales performance measurement in bank branches", *Omega*, Vol. 29 No. 4, pp. 299-307.
- Core, J., Guay, W. and Rusticus, T. (2006), "Does weak governance cause weak stock returns? An examination of firm operating performance and investors' expectations", *Journal of Finance*, Vol. 61 No. 2, pp. 655-687.
- Crawford, A.J., Ezzell, J.R. and Miles, J.A. (1995), "Bank CEO pay-performance relations and the effects of deregulation", *Journal of Business*, Vol. 68 No. 2, pp. 231-256.
- Cūnat, V. and Guadalupe, M. (2009), "Executive compensation and competition in the banking and financial sectors", *Journal of Banking Finance*, Vol. 33 No. 3, pp. 495-504.
- Diaz, M.A. and Sanchez, R. (2008), "Firm size and productivity in Spain: a stochastic frontier analysis", *Small Business Economics*, Vol. 30 No. 3, pp. 315-323.
- Donaldson, L. (2006), "The contingency theory of organizational design: challenges and opportunities", in Burton, R.M., Eriksen, B., Hakonsson, D.D. and Snow, C.C. (Eds), *Organization Design: The Evolving State-Of-Art*, Springer Science + Business Media, New York, NY, pp. 19-40.
- Fahlenbrach, R. and Stulz, R.M. (2011), "Bank CEO incentives and the credit crisis", *Journal of Financial Economics*, Vol. 99 No. 1, pp. 11-26.
- Feltham, G.A. and Xie, J. (1994), "Performance measure congruity and diversity in multi-task principal/agent relations", *Accounting Review*, Vol. 69 No. 3, pp. 429-453.
- Fong, E.A., Xing, X., Orman, W.H. and Mackenzie, W.I. Jr (2015), "Consequences of deviating from predicted CEO labor market compensation on long-term firm value", *Journal of Business Research*, Vol. 68 No. 2, pp. 299-305.
- Gande, A. and Kalpathy, S. (2017), "CEO compensation and risk-taking at financial firms: evidence from U.S. federal loan assistance", *Journal of Corporate Finance*, Vol. 47, December, pp. 131-150.
- Ghosh, S. (2010), "Firm performance and CEO pay: evidence from Indian manufacturing", *Journal of Entrepreneurship*, Vol. 19 No. 2, pp. 137-147.
- Giachetti, C. (2012), "A resource-based perspective on the relationship between service diversification and firm performance: evidence from Italian facility management firms", *Journal of Business Economics and Management*, Vol. 13 No. 3, pp. 567-585.
- Gigerenzer, G. and Brighton, H. (2009), "Homo heuristics: why biased minds make better inferences", *Topics in Cognitive Science*, Vol. 1 No. 1, pp. 107-143.
- Giniger, S., Dispenzari, A. and Eisenberg, J. (1983), "Age, experience, and performance on speed and skill jobs in applied setting", *Journal of Applied Psychology*, Vol. 68 No. 3, pp. 469-475.

- Hall, B.J. and Liebman, J.B. (1998), "Are CEOs really paid like bureaucrats?", *Quarterly Journal of Economics*, Vol. 113 No. 3, pp. 653-691.
- Hansen, J.A. (1992), "Innovation, firm size, and firm age", *Small Business Economics*, Vol. 4 No. 1, pp. 37-44.
- Houston, J.F. and James, C. (1995), "CEO compensation and bank risk: is compensation in banking structured to promote risk taking?", *Journal of Monetary Economics*, Vol. 36 No. 2, pp. 405-431.
- Hubbard, R.G. and Palia, D. (1995), "Executive pay and performance: evidence from the U.S. banking industry", *Journal of Financial Economics*, Vol. 39 No. 1, pp. 105-130.
- Jenter, D. and Kanaan, F. (2015), "CEO turnover and relative performance evaluation", *Journal of Finance*, Vol. 70 No. 5, pp. 2155-2184.
- John, K. and Qian, Y. (2003), "Incentive features in CEO compensation in the banking industry", *Economic Policy Review*, Vol. 9 No. 1, pp. 109-121.
- John, K., Mehran, H. and Qian, Y. (2010), "Outside monitoring and CEO compensation in the banking industry", *Journal of Corporate Finance*, Vol. 16 No. 4, pp. 383-399.
- King, T., Srivastav, A. and Williams, J. (2016), "What's in an education? Implications of CEO education for bank performance", *Journal of Corporate Finance*, Vol. 37, April, pp. 287-308.
- Kroll, M., Simmons, S.A. and Wright, P. (1990), "Determinants of chief executive officer compensation following major acquisitions", *Journal of Business Research*, Vol. 20 No. 4, pp. 349-366.
- Larcker, D.F., Richardson, S.A. and Tuna, I. (2007), "Corporate governance, accounting outcomes, and organizational performance", *The Accounting Review*, Vol. 82 No. 4, pp. 963-1008.
- Li, M.-Y.L., Yang, T.-H. and Yu, S.-E. (2015), "CEO stock-based incentive compensation and firm performance: a quantile regression approach", *Journal of International Financial Management & Accounting*, Vol. 26 No. 1, pp. 39-71.
- Livne, G., Markarian, G. and Milne, A. (2011), "Bankers' compensation and fair value accounting", *Journal of Corporate Finance*, Vol. 17 No. 4, pp. 1096-1115.
- Longest, K. and Vaisey, S. (2008), "Fuzzy: a program for performing qualitative comparative analysis (QCA) in STATA", *STATA Journal*, Vol. 8 No. 1, pp. 79-104.
- Lundvall, K. and Battese, G.E. (2000), "Firm size, age and efficiency: evidence from Kenyan manufacturing firms", *The Journal of Development Studies*, Vol. 36 No. 3, pp. 146-163.
- McClelland, P.L., Barker, V.L. III and Oh, W.-Y. (2012), "CEO career horizon and tenure: future performance implications under different contingencies", *Journal of Business Research*, Vol. 65 No. 9, pp. 1387-1393.
- Matolcsy, Z. and Wright, A. (2011), "CEO compensation structure and firm performance", *Accounting & Finance*, Vol. 51 No. 3, pp. 745-763.
- Matousek, R. and Tzeremes, N.G. (2016), "CEO compensation and bank efficiency: an application of conditional nonparametric frontiers", *European Journal of Operational Research*, Vol. 251 No. 1, pp. 264-273.
- Mishra, C.S., McConaughy, D.L. and Gobeli, D.H. (2000), "Effectiveness of CEO pay-for-performance", *Review of Financial Economics*, Vol. 9 No. 1, pp. 1-13.
- Moreno, J.J. and Castillo, L.L. (2011), "Corporate growth, age and ownership structure: empirical evidence in Spanish firms", *Journal of Business Economics and Management*, Vol. 12 No. 1, pp. 164-196.
- Mousa, F.-T. and Chowdhury, J. (2014), "Organizational slack effects on innovation: the moderating roles of CEO tenure and compensation", *Journal of Business Economics and Management*, Vol. 15 No. 2, pp. 369-383.
- Nguyen, P., Rahman, N. and Zhao, R. (2018), "CEO characteristics and firm valuation: a quantile regression analysis", *Journal of Management & Governance*, Vol. 22 No. 1, pp. 133-151.
- Nourayi, M.M. and Daroca, F.P. (2008), "CEO compensation, firm performance and operational characteristics", *Managerial Finance*, Vol. 34 No. 8, pp. 562-584.

- 
- Nourayi, M.M. and Mintz, S.M. (2008), "Tenure, firm's performance, and CEO's compensation", *Managerial Finance*, Vol. 34 No. 8, pp. 524-536.
- Ordanini, A., Parasuraman, A. and Rubera, G. (2014), "When the recipe is more important than the ingredients: a qualitative comparative analysis (QCA) of service innovation configurations", *Journal of Service Research*, Vol. 17 No. 2, pp. 134-149.
- Ozkan, N. (2011), "CEO compensation and firm performance: an empirical investigation of UK panel data", *European Financial Management*, Vol. 17 No. 2, pp. 260-285.
- Ragin, C. (2000), *Fuzzy-Set Social Science*, University of Chicago Press, Chicago, IL.
- Ragin, C. (2008a), *Redesigning Social Inquiry: Fuzzy Sets and Beyond*, University of Chicago Press, Chicago, IL.
- Ragin, C. (2008b), *User's Guide to Fuzzy Set/Qualitative Comparative Analysis*, Department of Sociology, University of Arizona, Tucson, AZ.
- Raithatha, M. and Komera, S. (2016), "Executive compensation and firm performance: evidence from Indian firms", *IIMB Management Review*, Vol. 28 No. 3, pp. 160-169.
- Sheikh, M.F., Shah, S.Z.A. and Akbar, S. (2018), "Firm performance, corporate governance and executive compensation in Pakistan", *Applied Economics*, Vol. 50 No. 18, pp. 2012-2027.
- Söderbom, M. and Teal, F. (2004), "Size and efficiency in African manufacturing firms: evidence from firm-level panel data", *Journal of Development Economics*, Vol. 73 No. 1, pp. 369-394.
- Sturman, M.C. (2003), "Searching for the inverted U-shaped relationship between time and performance: meta-analyses of the experience/performance, tenure/performance, and age/performance relationships", *Journal of Management*, Vol. 29 No. 5, pp. 609-640.
- Sun, F., Wei, X. and Huang, X. (2013), "CEO compensation and firm performance: evidence from the US property and liability insurance industry", *Review of Accounting and Finance*, Vol. 12 No. 3, pp. 252-267.
- Woodside, A.G. (2013), "Moving beyond multiple regression analysis to algorithms: calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory", *Journal of Business Research*, Vol. 66 No. 4, pp. 463-472.
- Woodside, A.G. (2014), "Embrace•perform•model: complexity theory, contrarian case analysis, and multiple realities", *Journal of Business Research*, Vol. 67 No. 12, pp. 2495-2503.
- Wu, P.-L., Yeh, S.-S., Huan, T.C. and Woodside, A.G. (2014), "Applying complexity theory to deepen service dominant logic: configural analysis of customer experience-and-outcome assessment of professional services for personal transformations", *Journal of Business Research*, Vol. 67 No. 8, pp. 1647-1670.

Company	Country of Origin	CEO name	Founded
Allianz	Germany	Michael Diekmann	1890
AXA Group	France	Henri De Castries	1852
American International Group	USA	Robert Benmosche	1919
Ping An Insurance Group	China	Mingzhe Ma	1988
MetLife	USA	Steven Kandarian	1999
Zurich Insurance Group	Switzerland	Martin Senn	1872
Munich Re	Germany	Nikolaus von Bomhard	1880
Generali Group	Italy	Mario Greco	1831
Swiss Re	Switzerland	Michael Lies	1863
Allstate	USA	Thomas Wilson	1931
ACE	Switzerland	Evan Greenberg	1985
Aegon	Netherlands	Alex Wynaendts	1969
CNP Assurances	France	Frederic Lavenir	1959
Mapfre	Spain	Antonio Huertas Mejias	1933
Talanx	Germany	Herbert Haas	1903
Sampo	Finland	Kari Henrik Stadigh	1909
Loews	USA	James Tisch	1904
Ageas	Belgium	Bart De Smet	1824
Suncorp Group	Australia	Patrick J Snowball	1902
Hartford Financial Services	USA	Liam McGee	1985
XL Group	Bermuda	Michael McGavick	1986
Scor	France	Denis Kessler	1855
Baloise Group	Switzerland	Martin Strobel	1864
Vienna Insurance Group	Austria	Peter Hagen	1898
Unipol Gruppo	Italy	Carlo Cimbri	1961
Everest Re Group	Bermuda	Joseph Taranto	1993
Reinsurance Group of America	USA	Albert Greig Woodring	1992
Assurant	USA	Robert Pollock	1969
Helvetia Holding	Switzerland	Stefan Loacker	1996
Ambac Financial Group	USA	Diana Adams	1971
Storebrand	Norway	Odd Arild Grefstad	1982
Uniqa	Austria	Andreas Brandsetter	1922
Delta Lloyd	Netherlands	Niek Hoek	1807
PartnerRe	Bermuda	Constantinos Miranthis	1993
American Financial Group	USA	Carl Lindner III	1872
Direct Line Insurance	UK	Paul Geddes	1985
Cincinnati Financial	USA	Steven Johnston	1950
Axis Capital Holdings	Bermuda	Albert Benchimol	2001
Markel	USA	Alan Kirshner	1930
Assured Guaranty	Bermuda	Dominic Frederico	1988
E-L Financial	Canada	Duncan N R Jackman	1968
Cattolica Assicurazioni	Italy	Giovan Battista Mazzucchelli	1896
Erie Indemnity	USA	Terrence Cavanaugh	1925
American Natl Ins	USA	Robert Moody	1905
China Life Insurance	China	Feng Wan	1949
ING Group	Netherlands	Ralph Hamers	1991
Prudential	UK	Tidjane Thiam	1848
Aviva	UK	Mark Wilson	1908
AIA Group	Hong Kong	Mark Tucker	1919
Manulife Financial	Canada	Donald Guloien	1887

(continued)

Table AI.  
Companies  
information

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Company	Country of Origin	CEO name	Founded
Aflac	USA	Daniel Amos	1955
Legal & General Group	UK	Nigel Wilson	1836
China Pacific Insurance	China	Guo fo Gao	1991
Sun Life Financial	Canada	Dean Connor	1865
Power Corp of Canada	Canada	Paul Desmarais Jr	1925
Standard Life	UK	David Nish	1825
Lincoln National	USA	Dennis Glass	1904
Prudential Financial	USA	John Strangfeld Jr	1875
Principal Financial Group	USA	Larry Zimpleman	1879
Unum Group	USA	Thomas Watjen	1848
Sanlam	South Africa	Johan van Zyl	1918
Mediolanum	Italy	Ennio Doris	1995
Phoenix Group Holdings	UK	Clive C Bannister	1782
Industrial Alliance Insurance	Canada	Yvon Charest	1905
Torchmark	USA	Larry Hutchison	1900
CNO Financial Group	USA	Edward Bonach	1979
MMI Holdings	South Africa	Nicolaas Kruger	1989
American Equity Investment	USA	John Matovina	1995
Symetra Financial	USA	Thomas Marra	1957

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Table A1.

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# An analysis of CEE equity market integration and their volatility spillover effects

CEE equity market integration

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## Abstract

**Purpose** – The purpose of this paper is to examine the conditional correlations and spillovers of volatilities across CEE markets, namely, Hungary, Poland, the Czech Republic, Romania and Croatia, in the post-2007 financial crisis period.

**Design/methodology/approach** – The authors use five-dimensional GARCH-BEKK alongside with the CCC and DCC models.

**Findings** – The estimation results of the three models generally demonstrate that the correlations between these markets are particularly significant. Also, own-volatility spillovers are generally lower than cross-volatility spillovers for all markets.

**Practical implications** – These results recommend that investors should take caution when investing in the CEE equity markets as well as diversifying their portfolios so as to minimize risk.

**Originality/value** – Unlike the previous studies in this field, this paper is the first study using multivariate GARCH-BEKK alongside with CCC and DCC models. The study makes an outstanding contribution to the existing literature on spillover effects and conditional correlations in the CEE financial stock markets.

**Keywords** Volatility spillovers, DCC, BEKK, CCC, CEE finance, Conditional correlations

**Paper type** Research paper

## 1. Introduction

The issue of financial liberalization and market integration is a central theme in international finance, and has received great attention in the financial literature, particularly after the financial market crisis in 1997–1998 (Bhar and Nikolova, 2009). Experiences to date confirm that financial integration has witnessed an increase at the end of the last century and associated with common globalization. As per Panda and Nanda (2018), the cause of driving international financial integration and volatility transmission is due to the rapid increase in the globalization of world financial markets and greater volatility transfer among the markets. More importantly, openness of financial markets not only makes substantial contribution to economic development but also makes developing countries more vulnerable to financial disruptions (Levine and Schmukler, 2007). The properties of volatilities commonly seen in equity returns consist of volatility clusters, varying over time, infinite non-divergence, varying according to price movements (Panda and Nanda, 2018). These determinants play a prominent role in the development of volatility models.

There are several kinds of methodologies to capture the volatility spillover effects. For instance, Hung (2018) employs multivariate EGARCH model to explore the volatility transmissions among foreign exchange markets in CEE countries. Kanas (2000) also uses the EGARCH model to investigate the interdependence of stock returns and exchange rates within the same economy. Prasad *et al.* (2018) use spillover index to study volatility



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spillovers among developed and emerging stock markets. Singh *et al.* (2010) highlight the price and volatility spillovers across North American, European and Asian stock markets using the VAR-GARCH model. Hung (2019) applies the ADCC model to perfectly capture the dynamic conditional correlation (DCC) between China and Southeast Asian countries. Overall, GARCH-type models are widely used to examine the volatility spillover effects and its persistence over a period of time.

In this paper, we used the sophisticated collection of volatility models for five Central and Eastern European equity markets (Hungary, Poland, the Czech Republic, Romania and Croatia), the models are based on the multivariate GARCH families as pioneered in Engle (2002). We investigate the spillover of volatility from one country to another for the system of countries after the global financial crisis. We find evidence that the structure of the conditional correlations was statistically significant. Further, modeling the spillover mechanism tremendously boosts the predictability of volatility throughout the region.

The empirical design aims at analyzing the conditional correlations and spillover effects utilizing three models, namely, multivariate GARCH-BEKK, CCC and DCC. The three models are commonly used in previous studies to investigate the volatility spillovers and its connectedness across stock markets, for example, Mohammadi and Tan (2015), Panda and Nanda (2018), Majdoub and Mansour (2014), Kim *et al.* (2015), Wong (2017), etc. These papers are closely related to this study in that we are interested in the following issues: obvious explanation of three types of spillover effects (mean-to-mean, volatility-to-mean and volatility-to-volatility) between the five CEE countries; and successful capture of DCCs in all pair countries. To address the above problems, we use MGARCH-BEKK, CCC and DCC models to estimate respectively. Overall, this paper provides a general picture of how the degree of co-movement and the conditional correlation between emerging and frontier markets in CEE region and thus contributes to the existing finance literature and research on equity market integration in CEE countries.

The rest of the paper is organized as follows: Section 2 represents a brief review of literature on the investigations of volatility spillovers across the markets. Section 3 describes the methodology and data. Section 4 reports the empirical results and discusses the findings in detail. Section 5 concludes the paper.

## 2. Literature review

One of the indispensable issues in stock market investments has been the all-inclusive concept of inter-market information spillovers as well as their interrelatedness. Voluminous studies have been devoted to exploring integration and spillover effects among stock markets. To the best of our knowledge, most of the studies have shed light on some common occurrences such as market liberation and market crisis on the transmission of information across borders. A collection of predominant empirical studies with regard to the interdependence among national stock markets has been brought out.

Most of the studies predominantly focus on the interdependence of developed markets such as the US, Japanese and major European markets (Koutmos and Booth, 1995; Ko and Lee, 1991; Maghyreh *et al.*, 2015). Some researchers have paid much attention to the developed Asian and emerging markets (Jebran *et al.*, 2017; Kim *et al.*, 2015). Early studies confirm that there are a slight integration and spillover effects between stock markets (Panton *et al.*, 1976; Bhar and Nikolova, 2009; Liu and Pan, 1997). However, most recent investigations applying the development of advanced technology and financial deregulation of financial markets has demonstrated strong interdependence between them (Jebran *et al.*, 2017; Okičić, 2015; Baumöhl *et al.*, 2018; Huo and Ahmed, 2017; Panda and Nanda, 2018; BenSaida *et al.*, 2018).

More recently, there are several exciting studies under the GARCH-type frameworks. For example, Majdoub and Mansour (2014) examine the conditional correlations across the US

market and a sample of five Islamic emerging markets (Turkey, Indonesia, Pakistan, Qatar and Malaysia) using multivariate GARCH-BEKK, CCC and DCC models. They state that the US and Islamic emerging markets are weakly correlated over time and the absence of volatility spillover from the US market to the Islamic emerging equity markets. At the same time, Gilenko and Fedorova (2014) focus on the mean-to-mean, volatility-to-mean and volatility-to-volatility spillover effects for the stock markets of BRIC countries. Their analysis from the four-dimensional GARCH-BEKK model reports that the impact of external spillovers from the developed stock markets of the US to Chinese market; Germany has a positive impact on Brazil and China and a negative one on Russia in the pre-crisis period. Further, the findings suggest that the linkages between the developed and the emerging BRIC stock markets have significantly changed after the crisis. In a same vein, Natarajan *et al.* (2014) provide useful insights into how information is transmitted and disseminated across stock markets. Mohammadi and Tan (2015) investigate the dynamics of daily returns and volatility in stock markets of the USA, Hong Kong and Mainland China over the period 2001–2013 by multivariate GARCH, CCC and DCC approach. The results indicate evidence of unidirectional return spillovers from the USA to the other markets, non-persistence of volatility spillover between Hong Kong and mainland China markets and there exist volatility spillovers from the USA to other three markets. Specifically, there is an increase in correlation between China and other stock markets based on the DCC model. Bissoondoyal-Bheenick *et al.* (2018) evaluate the stock market volatility spillover between three closely related countries, namely, the USA, China and Australia. Their conclusions indicate evidence of the significant bilateral causality between the countries, unidirectional volatility spillover from the USA to China, the insignificant volatility spillover from the Australian to Chinese stock markets when they take into consideration the market index level and across most of the industries for the full sample period 2007–2016. In the Asian emerging markets context, Jebran *et al.* (2017) compare the volatility spillover effects among five Asian emerging markets between pre and post-crisis period using the multivariate EGARCH model. The results highlight that the integration of emerging markets of Asia has significant implications for investors and policy makers. According to Vo and Ellis' (2018) correlation, return spillover and volatility spillover between Vietnamese stock market and other leading equity markets of the USA, Hong Kong and Japan are extremely significant employing the VAR-GARCH-BEKK frameworks. Panda and Nanda (2018) capture the return volatility and the extent of DCC between the stock markets of North America region using MGARCH-DCC. This paper reports that emerging markets are less linked to the developed market in terms of returns and weak co-movement between stock markets. More recently, Baumöhl *et al.* (2018) show the persistence of significant temporal proximity effects between markets and somewhat weaker temporal effects with regard to the US equity market, provide evidence of volatility spillovers that present a high degree of interconnectedness. The models used in this paper are ARFIMAX-GARCH. Abbas *et al.* (2019) employ Diebold and Yilmaz spillover index to investigate the interplay between return and volatility spillover effects of the stock markets and macroeconomic fundamentals for the G-7 countries, provide strong interactions between the returns and volatilities of the G-7 stock markets. Panda *et al.* (2019) explore the short-term and long-term interdependence and volatility spillovers among stock markets of Africa and Middle East region using VECM and MGARCH-BEKK models. The paper shows that the intercorrelations of stock markets are not uniform and volatility transmissions are significant across all the countries of the region.

In European countries context, Shields (1997) takes into account two emerging Eastern European markets (Hungary and Poland) to examine stock return volatility using the Tobit GARCH model. He concludes that no asymmetry exists in either emerging market. Scheicher (2001) studies the regional and global integration of stock markets in Hungary, Poland and

the Czech Republic by applying VAR-GARCH approach, and finds that there is an existence of limited interaction in returns both regional and global shocks, but news to innovations to volatility have a primarily regional character. At the same time, Murinde and Poshakwale (2001) examine volatility in the six emerging stock markets including Croatia, the Czech Republic, Hungary, Poland, Russia and Slovakia. Their estimations based on ARIMA, the BDSL procedure and symmetric as well as asymmetric GARCH models pointed out that daily return volatility exhibits significant conditional heteroskedasticity and non-linear effects. Recently, estimating the behavior of stock returns in the case of stock markets from Central and Eastern Europe mainly concerned with the relationship between returns and conditional volatility was conducted by Okičić (2015). The findings provide parsimonious approximations of conditional mean and volatility dynamics in daily return series based on ARIMA and GARCH specifications, and the author presents strong evidence of the existence of a leverage effect in the selected stock markets. In these Central and Eastern European countries, based on weekly data, Melik Kamisli *et al.* (2015) also look in the structure of conditional correlations between stock markets returns as well as observed the volatility transmission between countries. By using MGARCH-CCC-DCC models, the results of this study have some key findings analogous to Okičić (2015). The findings imply that most of the conditional correlations between stock markets returns of the selected nations are constant.

Despite the wealth of finance literature in connection with equity market return and volatility spillover effects, particularly under Central and Eastern European countries – the conditional correlations-spillover effects – there remains very little in this region. The aim and the outstanding contribution of this paper are to fill this gap.

### 3. Data and methodology

#### *Methodology*

The dynamic connectedness among indexes is captured by employing a multivariate MGARCH model. We first take into consideration the conventional BEKK model (Engle and Kroner, 1995) in this study because it has a good property according to which the conditional covariance matrices are positive definite by construction (Majdoub and Mansour, 2014). We then use the multivariate GARCH with constant conditional correlation of Bollerslev (1990) and the multivariate GARCH model with the DCC of Engle (2002) as a benchmark to estimate time-varying conditional correlation between stock markets.

*MGARCH (1,1) model.* A VEC-GARCH model is proposed by Bollerslev *et al.* (1988) in which the conditional variance and covariance are a function of all lagged conditional variance and covariance. The model can be written as:

$$vech(H_t) = C_0 + \sum_{i=1}^q A_i vech(\varepsilon_{t-1} \varepsilon'_{t-1}) + \sum_{i=1}^p B_i vech(H_{t-1}), \quad (1)$$

where “*vech*” is the operator that stacks the lower triangular portion of a symmetric matrix into a vector (Majdoub and Mansour, 2014).  $C_0$  is a  $k(k+1)/2 \times 1$  vector, and  $A_i$  and  $B_i$  are  $k(k+1)/2 \times k(k+1)/2$  matrices of parameters. The number of parameters is quite large in the formulation of multivariate GARCH model. The conventional BEKK model is utilized with multivariate GARCH (1,1) specification, whose conditional covariance matrix  $H_t$  is given by:

$$H_t = C'C + A' \varepsilon_{t-1} \varepsilon'_{t-1} A + B'H_{t-1}B, \quad (2)$$

where  $C$  is a  $k \times k$  lower triangular matrix of constants, and  $A$  and  $B$  are  $k \times k$  matrices. Note that off-diagonal elements of  $A$  and  $B$  provide information on news effect and volatility spillover effect, respectively, while diagonal elements relate to its own ARCH and GARCH

effects (Kim *et al.*, 2015). For example, we explore the volatility spillover effect from stock market 1 to stock market 2; we should test whether the coefficients  $a_{12}$  and  $b_{12}$  are statistically significantly different from zero and vice versa (Kumar, 2013). The parameters of the BEKK model can be estimated by applying the maximum likelihood estimation assuming a normal distribution of errors. The following likelihood function is maximized:

$$L(\theta) = -T \log(2\pi) - \frac{1}{2} \sum_{t=1}^T \left( \log |H_t| + \varepsilon_t' H_t^{-1} \varepsilon_t \right), \quad (3)$$

where  $T$  is the number of observations and  $\theta$  is the vector of parameters to be estimated. We utilize numerical maximization techniques to maximize the non-linear likelihood function. The Broyden–Fletcher–Goldfarb–Shanno algorithm is used to obtain the initial condition and the final parameter estimates of the variance-covariance matrix.

*The constant conditional correlation model.* We next apply the CCC model estimator (Bollerslev, 1990). The CCC-MGARCH model allows for time-varying conditional variances and covariances. The conditional variance matrix is now defined as:

$$H_t = D_t R D_t = \rho_{ij} \sqrt{h_{ii,t} h_{jj,t}}, \quad (4)$$

where  $D_t$  is the  $(n \times n)$  diagonal matrix that the diagonal elements are the conditional standard deviations, and  $R$  is a  $(n \times n)$  time-invariant correlation matrix.

A GARCH (1,1) specification of each conditional variance can be written as:

$$h_{ii,t} = c + a_i \varepsilon_{i,t-1}^2 + b_i h_{ii,t-1}, \quad (5)$$

$$h_{ij,t} = \rho_{ij} \sqrt{h_{ii,t} h_{jj,t}}, \quad i, j = \overline{1, n}, \quad (6)$$

where  $c$  is a  $n \times 1$  vector,  $a_i$  and  $b_i$  are diagonal  $(n \times n)$  matrices.

According to Gjika and Horvath (2013), the conditional correlations are constant may be restricted and unrealistic in many empirical applications, so Engle (2002) proposes the DCC model that is a direct generation of the CCC model of Bollerslev (1990) by making the conditional correlation matrix time dependent.

*The DCC model.* The DCC is employed. Engle (2002) introduced this estimator to capture the dynamic time-varying behavior of conditional covariance. The conditional covariance matrix  $H_t$  is now defined as:

$$H_t = D_t R_t D_t, \quad (7)$$

where  $D_t = \text{diag} \sqrt{\{H_t\}}$  is the diagonal matrix with conditional variances along the diagonal, and  $R_t$  is the time-varying correlation matrix.

Equation (7) can be re-parameterized with standardized returns as follows,  $e_t = D_t' \varepsilon_t$ :

$$E_{t-1} e_t e_t' = D_t^{-1} H_t D_t^{-1} = R_t = [\rho_{ij,t}]. \quad (8)$$

Engle (2002) suggests the following mean-reverting conditionals with the GARCH (1,1) specification:

$$\rho_{ij,t} = \frac{q_{ij,t}}{\sqrt{q_{ii,t} q_{jj,t}}}, \quad (9)$$

where:

$$q_{ij,t} = \bar{\rho}_{ij}(1-\alpha-\beta) + \alpha e_{i,t-1}e_{j,t-1} + \beta q_{ij,t-1}, \quad (10)$$

and  $\bar{\rho}_{ij}$  is the unconditional correlation between  $e_{i,t}$  and  $e_{j,t}$ . Scalar parameters  $\alpha$  and  $\beta$  must satisfy:

$$\alpha \geq 0, \beta \geq 0, \text{ and } \alpha + \beta < 1.$$

The value of  $(\alpha + \beta)$  close to 1 reveals high persistence in the conditional variance.

In the matrix form:

$$Q_t = \bar{Q}(1-\alpha-\beta) + \alpha e_{t-1}e'_{t-1} + \beta Q_{t-1}, \quad (11)$$

where  $\bar{Q} = Cov[e_t, e'_t] = E[e_t, e'_t]$  is the unconditional covariance matrix of the standardized errors  $\bar{Q}$  can be estimated as:

$$\bar{Q} = \frac{1}{T} \sum_{t=1}^T e_t e'_t, \quad (12)$$

$R_t$  is then obtained by:

$$R_t = (Q_t^*)^{1/2} Q_t (Q_t^*)^{1/2}, \quad (13)$$

where  $Q_t^* = \text{diag}\{Q_t\}$ .

To estimate the DCC model, Engle (2002) proposes a two-step approach; we have the log-likelihood function when  $k = 2$  is:

$$\begin{aligned} L &= -\frac{1}{2} \sum_{t=1}^T \left( 2 \ln(2\pi) + \ln|H_t| + \varepsilon'_t H_t^{-1} \varepsilon_t \right) \\ &= -\frac{1}{2} \sum_{t=1}^T \left( 2 \ln(2\pi) + \ln|D_t R_t D_t| + \varepsilon'_t D_t^{-1} R_t^{-1} D_t^{-1} \varepsilon_t \right) \\ &= -\frac{1}{2} \sum_{t=1}^T \left( 2 \ln(2\pi) + 2 \ln|D_t| + \ln|R_t| + \varepsilon'_t D_t^{-1} R_t^{-1} D_t^{-1} \varepsilon_t \right), \end{aligned}$$

replacing with  $\varepsilon'_t D_t^{-1} R_t^{-1} D_t^{-1} \varepsilon_t = e'_t e_t$  to it, we rewrite the log-likelihood as the volatility component  $L_V$  and correlation  $L_C$ . Let  $\phi$  denote a vector of parameters in  $D_t$  and  $\varphi$  be parameters in  $R_t$ . We have:

$$L(\phi, \varphi) = L_V(\phi) + L_C(\varphi),$$

where:

$$L_V(\phi) = -\frac{1}{2} \sum_{t=1}^T \sum_{i=1}^2 \left( \ln(2\pi) + \ln(h_{ii,t}) + \frac{\varepsilon_{i,t}^2}{h_{ii,t}} \right),$$

$$L_C(\varphi) = -\frac{1}{2} \sum_{t=1}^T \left( e'_t R_t^{-1} e_t - e'_t e_t + \ln|R_t| \right).$$

By maximizing  $L_V(\phi)$  and  $L_C(\varphi)$ , we may obtain the parameter  $\phi$  and  $\varphi$ , respectively.

*Data*

In this paper, we use daily data from Bloomberg over September 2008 through September 2017 of five Central and Eastern European countries, namely, Hungary, Poland, Czech Republic, Romania and Croatia. Table I represents the main indexes we use. The number of observations across the market is 2,123, which is less than the total number of observations because the joint modeling of five markets requires matching returns. The daily return data series are calculated as  $R_t = 100 \times \ln(P_t/P_{t-1})$ , where  $P_t$  is the price level of the market at time  $t$ . The logarithmic stock returns are multiplied by 100 to approximate percentage changes and avoid convergence problems in estimation. The study uses  $R$  in order to estimate the aforementioned models.

Table II provides several descriptive statistics for the stock returns across markets. These statistics refer to the first five moments of the series, their normality, heteroscedasticity and stationarity. According to the standard deviation of time series, Hungary and Romania embed the higher risk. Most of the series illustrate a positive kurtosis and negative skewness, while their distributions are leptokurtic. Further evidence of non-normal distribution forms is formally confirmed by the Jarque–Bera test statistics. Similarly, the PP and ADF test for the first log differences of CEE stock markets could not accept the existence of a unit root. Finally, the ARCH test illustrates the presence of autocorrelation and heteroskedasticity issues in data, underlying the necessity of applying a time-varying volatility GARCH-type models for studying the spillover effects of financial stress among the CEE nations. Table III documents the unconditional correlation matrix across stock market returns.

Figure 1 shows the fluctuation of the daily series of indexes for the five countries during the sample period covering over 2008–2017. Overall, the index series have almost the same trend overtime. The index returns in log differences are shown in Figure 2. Daily returns vary around zero and are characterized by volatility clustering.

Stock market	Benchmark
Hungary	Budapest Stock Exchange BUX
Poland	Warsaw Stock Exchange WIG
The Czech Republic	Prague Stock Exchange PX
Romania	Bucharest Stock Exchange BET
Croatia	Zagreb Stock Exchange CRON

**Table I.**  
Stock markets  
and indexes

Countries	Hungary	Poland	Czech	Romania	Croatia
Mean	0.0278	0.0218	-0.0159	0.0163	-0.0309
Median	0.0465	0.0554	0.0233	0.0504	-0.0047
Maximum	22.016	8.4639	12.364	10.564	14.778
Minimum	-14.985	-8.2888	-19.901	-14.754	-14.587
SD	1.7085	1.2903	1.5844	1.6108	1.2508
Skewness	0.3525	-0.3405	-1.2358	-1.0197	-0.6072
Kurtosis	23.391	9.5029	27.580	17.187	27.580
Jarque–Bera	36,825*	3,781.7*	53,986*	18,174*	75,053*
PP test	-45.349*	-42.929*	-44.718*	-44.696*	-43.424*
ADF test	-45.340*	-33.826*	-35.777*	-44.713*	-25.497*
ARCH test	92.763*	90.151*	360.76*	300.03*	300.45*

**Notes:** All returns are expressed in percentages. ADF and PP test represent the Augmented Dickey and Fuller test and Phillips–Perron test of stationarity, respectively. ARCH test is employed to test the presence of ARCH effect in the data sets. \* \*\* \*\*\*Significance at the 1, 5 and 10 percent levels, respectively

**Source:** Authors' estimates; calculations of the authors

**Table II.**  
Summary statistics  
for CEE daily  
stock returns

4. Results

Hypothesis testing

We test a diversity of hypotheses in connection with volatility spillovers among the concerned stock markets. We examine the presence of different conditional variance as follows.

Hypothesis:

$$H_0. a_{ij} = b_{ij} = 0.$$

*Ha.*  $a_{ij} \neq 0$  or  $b_{ij} \neq 0$  existence of volatility spillovers from the market  $i$  to the market  $j$ .

Volatility spillover

We commence the analysis of the econometric results of time-varying variance by the BEKK (1,1) model. The possibility of volatility spillovers across markets included in  $H_t$  implicates that the off-diagonal coefficients of the matrices  $A(a_{ij})$  and  $B(b_{ij})$  are statistically significant. The main feature of the BEKK model is that the causality relation among both variance and covariance can be explained systematically. Table V reports the results of estimated BEKK model. Throughout the empirical work, we denote the countries Hungary, Poland, Czech Republic, Romania and Croatia by 1, 2, 3, 4 and 5, respectively.

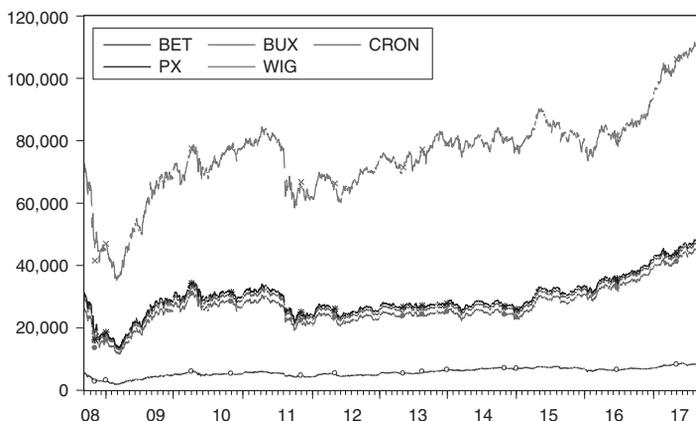
The estimation results of BEKK report that the majority of pairs are statistically significant. All diagonal elements ( $a_{ii}$ ) are significant, suggesting that each conditional variance depends on its own lagged shocks, while the off-diagonal elements of the matrix  $A$  reflect the past cross innovations. For example, the coefficient  $a(2,3)$  is equal to 0.165 and is statistically significant at 1 percent. It illustrates that the past cross shocks are transmitted from the Polish stock market to the Czech Republic stock market. This means

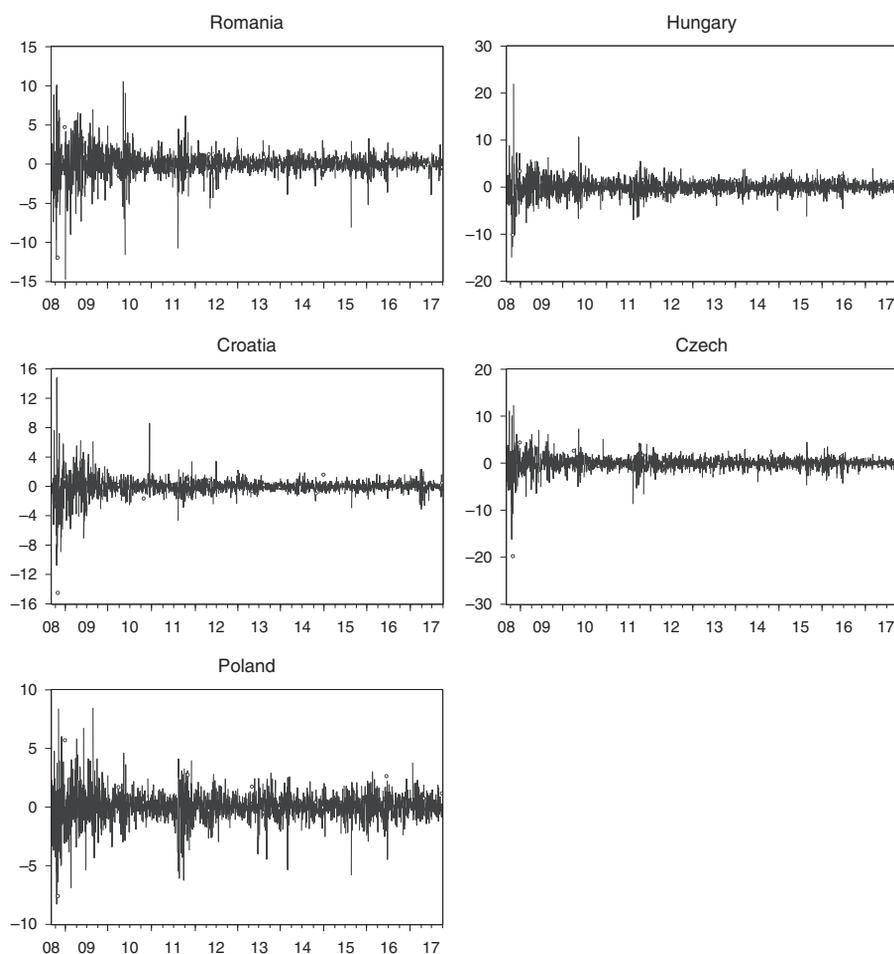
Table III.  
Unconditional  
correlation coefficients  
matrix of market  
return

	Hungary	Poland	Czech	Romania	Croatia
Hungary	1.000	0.602	0.612	0.188	0.418
Poland		1.000	0.690	0.170	0.472
Czech			1.000	0.190	0.567
Romania				1.000	0.173
Croatia					1.000

Source: Authors' estimates

Figure 1.  
Daily index series





**Figure 2.**  
Daily index returns

that, when shocks hit the Polish stock market, the Czech Republic stock market captures them. The coefficient  $a(3,2)$  reflects the same effects but in the opposite direction. It depicts a value  $(-0.046)$  that is statistically significant as well. Put another way, this is evidence of a bidirectional ARCH effect between the Polish and Czech Republic stock market. However, we also find evidence of non-persistence ARCH effect in cases of  $a(3,5)$ ,  $a(2,5)$  and  $a(5,3)$ .

Similarly, the GARCH parameters  $B(b_{ij})$  capture the responses of volatility in market  $i$  to past volatility in each of the five markets. For example, the coefficient of  $b(2,3)$  is equal to  $-0.13$  and is statistically significant at the 1 percent significance level. This means that the Polish stock market spills over the past conditional volatility to the Czech Republic stock market. Put differently, the volatility of the Czech Republic market depends on the volatility of the Polish market. The coefficient  $b(3,2)$  is equal to  $0.044$  and is statistically significant. In other terms, there is bidirectional volatility spillover between the Polish stock market and the Czech Republic stock market during the study period. Furthermore, we also find out that the cases of  $b(2,5)$ ,  $b(3,4)$ ,  $b(5,1)$  and  $b(5,2)$  are not statistically significant. We can conclude that there is uni-bidirectional volatility spillover from Hungary to Croatia, from Romania to the Czech Republic and non-persistence volatility spillover between Croatia and Poland.

The results tally with Kamisli *et al.* (2015). All five conditional variances depend on their own history ( $b_{ii}$ ) which are all statistically significant.

Consistently with previous studies, the volatility spillover effects are asymmetric, which means that the markets do not transmit innovations uniformly. This result is consistent with Bajo-Rubio *et al.* (2017), Jebran *et al.* (2017) and Bal *et al.* (2018), who found that negative shocks which have more significant impact than that of positive innovations in emerging economies. The findings also demonstrate that Romania is the main transmitter among the CEE countries. Indeed,  $b(4,1)$  is highest, at 0.11. The volatility transmission from Romania to Hungary amount to 11 percent, which implies that a 1 percent increase in returns of Romania transmits 11 percent volatility to the Hungarian stock market. This result is supported by the study of Okičić (2015) for the period from October 2005 to December 2013. Table IV summarizes volatility spillovers among the stock markets under consideration; we find strong evidence in favor of the existence of conditional variance ( $H_a$ ) of the spillovers in almost countries.

The results suggest a strong correlation of volatility transmission across markets in Central and Eastern European countries. Such findings give grounds for the healthy connectedness among stock markets, which constitutes a reason for international diversification and innovations spillovers between countries. Briefly, the volatility spillovers of CEE markets correlate highly with each other in both directions. This means that the stock markets are more substantially integrated after the global financial crisis. Also, it has an important connotation for both institutional and individual investors who could grasp the opportunity to invest in these markets and benefit from portfolio diversification to minimize risk.

*Constant and dynamic conditional correlations*

The conditional correlations of the extent of market integration are measured by the CCC and DCC models. The CCC estimates across markets are mostly high and all statistically significant at the 5 percent level. Thus, these results confirm that the innovations are correlated across markets. For instance, the highest correlation coefficient is  $r(3,2)$ , stand at 0.606, meaning that there is a strong interrelatedness between Poland and the Czech Republic. In contrast, the lowest CCC estimates between Croatia and Romania,  $r(5,4)$  is equal to 0.13 which is the lowest value. The significant implications of the CCC estimation are consistent with very strong conditional correlations between the volatilities. Such a, somewhat surprising, result for part of professional is in accordance to latest findings of Bissoondoyal-Bheenick *et al.* (2018), Jebran *et al.* (2017) and Vo and Ellis (2018).

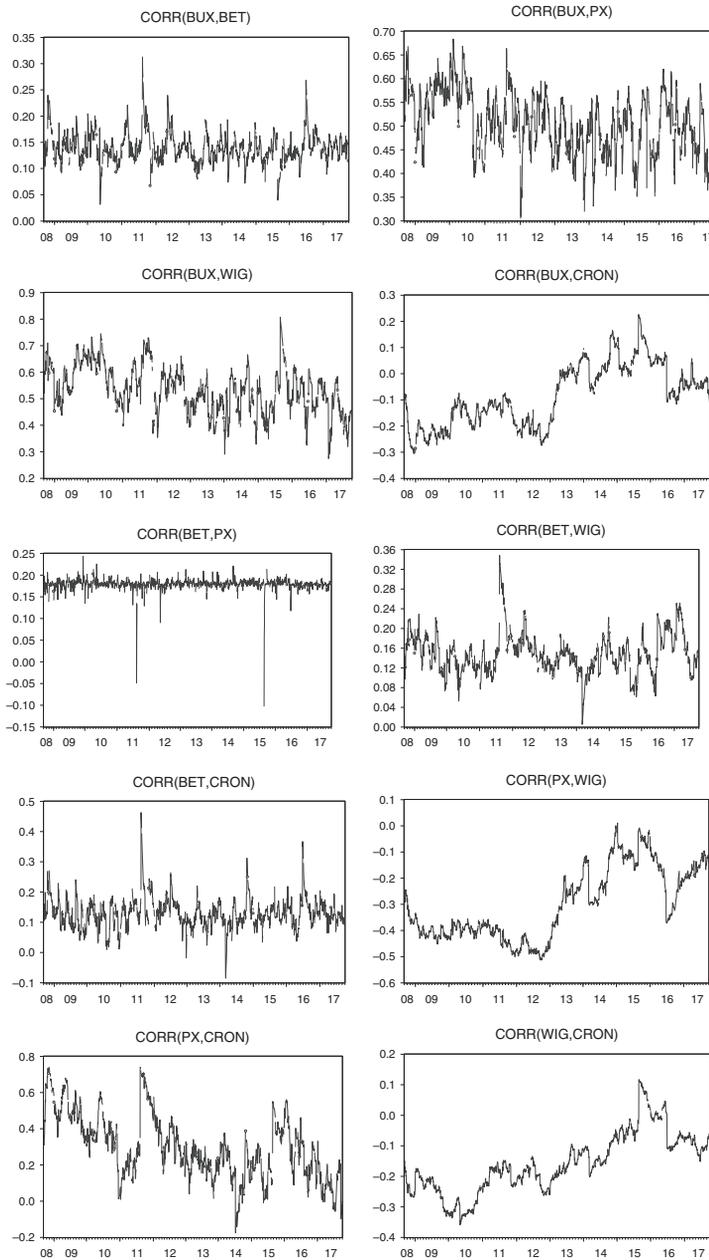
Nevertheless, our findings do not support the hypothesis of CCC but are in favor of dynamic conditional correlation. Note that all of the parameters of the DCC model are statistically significant, suggesting the existence of the own ARCH and GARCH effects. Specifically, the coefficient of the parameters  $a$  captures the previous shocks on the conditional correlation, while the coefficient of the parameters  $b$  captures the effects

	Hungary	Poland	Czech	Romania	Croatia
Hungary	$+(H_a)$	$+(H_a)$	$+(H_a)$	$+(H_a)$	$+(H_a)$
Poland	$+(H_a)$	$+(H_a)$	$+(H_a)$	$+(H_a)$	$-(H_0)$
Czech	$+(H_a)$	$+(H_a)$	$+(H_a)$	$-(H_0)$	$+(H_a)$
Romania	$+(H_a)$	$+(H_a)$	$+(H_a)$	$+(H_a)$	$+(H_a)$
Croatia	$-(H_0)$	$-(H_0)$	$+(H_a)$	$+(H_a)$	$+(H_a)$

**Table IV.**  
Summarizing  
volatility spillovers

**Notes:**  $-, (H_0)$ : non-existence of volatility spillovers from market  $i$  to market  $j$ ;  $+, (H_a)$ : existence of volatility spillovers from market  $i$  to market  $j$

of the previous period's conditional correlations. For example, the Polish equity market has the following statistically significant estimates:  $a_2 = 0.05$  and  $b_1 = 0.91$ . The sums of these parameters are fairly close to one for all nations, which means that the conditional volatility is persistent. Figure 3 gives the background information on the dynamic



**Figure 3.**  
Time-varying  
conditional  
correlations

conditional correlations plotted. Obviously, there are strong correlations between five stock markets. Furthermore, Table VI shows that the estimated  $\alpha$  and  $\beta$  parameters associated with the dynamic conditional correlation are statistically significant at the 1 percent level, supporting the time-varying nature of the conditional correlation. The coefficient of  $\alpha$  reflects the impact of the past shocks on current conditional correlation, while the second one captures the impact of past correlation. It is obvious that the DCC is favorable to the CCC. The sum of the parameters  $\alpha$  and  $\beta$  is close to 1. This means that the process described by the model is not mean reverting. Put differently, after the innovations occurred in the stock market, the dynamic correlation will not return to the long-run unconditional level (Tables IV and V).

The stylized facts confirm previous studies. For instance, Scheicher (2001) shows innovations to volatility in equity markets of Hungary, Poland and the Czech Republic. Okičić (2015) states strong evidence of the existence of a leverage effect in CEE nations. Kamisli *et al.* (2015) maintain that markets become more integrated when the conditional correlation varies over time (Table VI).

As it may be noticed, the results of the multivariate GARCH-BEKK model alongside with the CCC and DCC models are not notable differences of volatility transmission mechanism between financial stock markets during the research period. The remarkable findings play a prominent role in terms of minimization of risk and portfolio choice. Further, the DCC model could be clarified in terms of its forecast ability relative to the unconditional correlations (Majdoub and Mansour, 2014). Finally, the integration of stock markets should be mentioned in CEE financial markets in particular, European countries in general. Our findings are consistent with Patev *et al.* (2006), Vo and Ellis (2018) and Jebran *et al.* (2017) and opposite to Panda and Nanda (2018). These results are intimately connected with some features of CEE finance industry: the screening of the CEE equity index prohibiting sectors in terms of a cause of volatility; imposing stringent restrictions on leverage ratios and interest-related dealings; and preventing purely speculative investments.

The robustness of the estimations of our study, we have used the multivariate ARCH LM test on the residuals of each model to determine whether the ARCH effect still exists in the model. As we can see from the estimates, there exist problems of ARCH effect for all selected countries during study period providing some indications of misspecification in each model. It is a limitation of this investigation. In this regard, we have read through the number of relevant articles, which are employed MGARCH models to estimate volatility across markets without diagnostic test (Vo and Ellis, 2018; Kim *et al.*, 2015; Majdoub and Mansour, 2014; Kumar, 2013; Panda and Nanda, 2018). Yet, their results had been confirmed when measuring the dynamic correlation of the economic indicators as well as its noteworthy implications. Hence, we believe that three models employed under study adequately capture volatility spillover effects and correlation processes between our variables of interest.

## 5. Conclusion

Our aspiration for this paper is to analyze the correlation of volatility between indexes of a sample of CEE emerging (Hungary, Poland, the Czech Republic) and frontier (Croatia, Romania) equity markets through the study of the dynamic conditional correlation based on five-dimensional GARCH-BEKK model. The persistence of volatility spillover effects is truly remarkable on the time period under study. The findings shed new light into the CEE Area's volatility transmission literature. Obviously, there is strong evidence that there exist multiple links between the CEE financial markets. Depending on the framework discussed, the main receivers and transmitters of spillover effects vary.

The analysis of interaction channels between the CEE stock markets illustrated the following. The estimates stemming from the estimation of the GARCH-BEKK model reveal that all pair countries present strong interconnection and existence of channels of shock

Parameters	Coefficient	SE	t-statistics	Prob.
$\mu_1$	0.075345644	0.025824804	2.91757	0.00352772*
$\mu_2$	0.065833098	0.019543558	3.36853	0.00075570*
$\mu_3$	0.047470929	0.021133112	2.24628	0.02468595**
$\mu_4$	0.035911485	0.021459451	1.67346	0.09423721***
$\mu_5$	0.004079988	0.015394922	0.26502	0.79099276
$c(1,1)$	0.229502448	0.031241093	7.34617	0.00000000*
$c(2,1)$	0.109359747	0.024112911	4.53532	0.00000575*
$c(2,2)$	0.206119394	0.011450294	18.00123	0.00000000*
$c(3,1)$	0.140077111	0.028026987	4.99794	0.00000558*
$c(3,2)$	0.130089156	0.025066447	5.18977	0.00000021*
$c(3,3)$	-0.050133447	0.021776303	-2.30220	0.02132379*
$c(4,1)$	0.128464659	0.024017483	5.34880	0.00000009*
$c(4,2)$	-0.060482306	0.030969161	-1.95298	0.05082138**
$c(4,3)$	0.100949177	0.045293567	2.22878	0.02582887**
$c(4,4)$	0.091923995	0.033091132	2.77790	0.00547108*
$c(5,1)$	-0.046919150	0.010980810	-4.27283	0.00001930*
$c(5,2)$	0.023549815	0.012542412	1.87761	0.06043392**
$c(5,3)$	0.000773416	0.016257004	0.04757	0.96205549
$c(5,4)$	0.051855647	0.014455978	3.58714	0.00033432*
$c(5,5)$	-0.001568240	0.029834503	-0.05256	0.95807878
$a(1,1)$	0.044947848	0.020025045	2.24458	0.02479500**
$a(1,2)$	0.065982223	0.015807728	4.17405	0.00002992*
$a(1,3)$	-0.047176780	0.016819316	-2.80492	0.00503296*
$a(1,4)$	0.085967928	0.015654973	5.49141	0.00000004*
$a(1,5)$	0.031380032	0.009180966	3.41794	0.00063096*
$a(2,1)$	0.038071641	0.015855790	2.40112	0.01634501**
$a(2,2)$	0.129085538	0.013160646	9.80845	0.00000000*
$a(2,3)$	0.165386250	0.012266274	13.48301	0.00000000*
$a(2,4)$	0.039450365	0.019862573	1.98617	0.04701491**
$a(2,5)$	0.014619467	0.009264733	1.57797	0.11457261
$a(3,1)$	0.169276863	0.016534583	10.23775	0.00000000*
$a(3,2)$	-0.046464943	0.016580751	-2.80234	0.00507330*
$a(3,3)$	0.117908448	0.014764519	7.98593	0.00000000*
$a(3,4)$	0.087959104	0.018739165	4.69386	0.00000268*
$a(3,5)$	0.008887421	0.010841846	0.81973	0.41236821
$a(4,1)$	-0.211193576	0.014983040	-14.09551	0.00000000*
$a(4,2)$	-0.129776856	0.011963119	-10.84808	0.00000000*
$a(4,3)$	-0.154583318	0.012060675	-12.81714	0.00000000*
$a(4,4)$	0.272512838	0.016813667	16.20782	0.00000000*
$a(4,5)$	-0.053524886	0.008414304	-6.36118	0.00000000*
$a(5,1)$	0.050644088	0.014595182	3.46992	0.00052062*
$a(5,2)$	0.027826194	0.009745112	2.85540	0.00429826*
$a(5,3)$	0.015617580	0.013850870	1.12755	0.25950906
$a(5,4)$	0.061550069	0.017951891	3.42861	0.00060668*
$a(5,5)$	0.259371223	0.012874033	20.14685	0.00000000*
$b(1,1)$	0.967843326	0.008573333	112.88998	0.00000000*
$b(1,2)$	-0.026142173	0.007346966	-3.55823	0.00037337*
$b(1,3)$	0.069679133	0.008550430	8.14920	0.00000000*
$b(1,4)$	-0.057286191	0.013567246	-4.22239	0.00002417*
$b(1,5)$	0.009870473	0.004613127	2.13965	0.03238312**
$b(2,1)$	0.057952646	0.014231100	4.07225	0.00004656*
$b(2,2)$	0.922647933	0.008468068	108.95613	0.00000000*
$b(2,3)$	-0.130431483	0.009551626	-13.65542	0.00000000*
$b(2,4)$	-0.027482205	0.013839375	-1.98580	0.04705575**

(continued)

**Table V.**  
Estimates results of  
multivariate GARCH-  
BEKK model

Parameters	Coefficient	SE	t-statistics	Prob.
$b(2,5)$	-0.008396569	0.005353815	-1.56833	0.11680325
$b(3,1)$	-0.137562846	0.011358234	-12.11129	0.00000000*
$b(3,2)$	0.044021149	0.009691062	4.54245	0.00000556*
$b(3,3)$	0.954285332	0.007479993	127.57837	0.00000000*
$b(3,4)$	-0.002818504	0.010557215	-0.26697	0.78948901
$b(3,5)$	-0.019626351	0.004918574	-3.99025	0.00006600*
$b(4,1)$	0.111126812	0.013944281	7.96935	0.00000000*
$b(4,2)$	0.086215454	0.007852146	10.97986	0.00000000*
$b(4,3)$	0.081539408	0.009531739	8.55452	0.00000000*
$b(4,4)$	0.936867536	0.004656983	201.17479	0.00000000*
$b(4,5)$	0.022584372	0.004248512	5.31583	0.00000011*
$b(5,1)$	-0.004403585	0.009694522	-0.45423	0.64966017
$b(5,2)$	-0.004967523	0.007580649	-0.65529	0.51228108
$b(5,3)$	0.030150342	0.008305727	3.63007	0.00028335*
$b(5,4)$	-0.015069785	0.008409466	-1.79200	0.07313257**
$b(5,5)$	0.961145014	0.004307193	223.14882	0.00000000*
<i>Model diagnostics</i>				
ARCH LM		2,493.65		0.0008

**Notes:** This table shows the estimates of the multivariate GARCH-BEKK model. 1, 2, 3, 4 and 5 denote, respectively, Hungary, Poland, Czech Republic, Romania and Croatia. The parameters  $c_{ij}$ ,  $a_{ij}$  and  $b_{ij}$  are the off-diagonal elements of the matrices C, A and B, respectively, as presented in Section 2. \*, \*\*, \*\*\*Significant at 1, 5 and 10 percent levels, respectively

Table V.

propagation within CEE markets during study period. The estimates of conditional correlations are statistically significant in all most case, so the spillover of innovations among these markets is significant.

Econometrically, by utilizing time-return interaction terms based on CCC and DCC models, taking into account time-varying (heteroscedastic) volatility of the indices is appropriate. Indeed, these markets have a long memory and are strongly integrated, which can be a reason for international diversifications. Our main results do not confirm previous studies (Majdoub and Mansour, 2014; Panda and Nanda, 2018). In this scenario, the strong conditional correlations over time puts forward that the CEE stock markets are tightly integrated and the volatility transmissions among them are significant as well. Furthermore, a better forecasting of conditional correlations in CEE markets provides managers to optimize portfolio diversification.

Our main intention is to highlight the primary implications of our results for the CEE portfolio managers, investors, policy makers and corporations. The process of globalization and financial liberalization is the major factor to enhance further international linkages (Vo and Ellis, 2018). The integrations among CEE financial markets indicate low potential diversification opportunities for investors (Jebran *et al.*, 2017). Investors might aim to obtain their investment strategies by taking into account the integrations of divergent financial markets. Additionally, Singhal and Ghosh (2016) document that investors tend to diversify their investment portfolio and hedging in order to maximize returns and minimize risks. Similarly, Ahmed and Huo (2018) suggest that market integration would formally issue several new opportunities to accelerate productivity and economic growth; new economic partnership would expand the region's global competitiveness in attracting investment. Furthermore, policy makers should consider previous market condition and integration of financial markets before implementing policy on the stock market as there are dramatic influences on the financial performance of the markets from one market to other markets.

	CCC			DCC		
	Coefficient	t-statistic	Prob.	Coefficient	t-statistic	Prob.
$\mu_1$	0.0797563776	3.20530	0.00134924*	0.0768442872	3.02707	0.00246938*
$\mu_2$	0.0609335815	3.13862	0.00169748*	0.0601954860	2.73108	0.00631272*
$\mu_3$	0.0363385172	1.75394	0.07944059***	0.0380149389	1.58589	0.11276425
$\mu_4$	0.0528866556	2.73432	0.00625094*	0.0527164718	2.57050	0.01015530**
$\mu_5$	0.0079614547	0.52138	0.60210523	0.0099456350	0.64669	0.51783052
$c(1)$	0.0546931428	4.77410	0.00000181*	0.0307128299	3.56543	0.00036325*
$c(2)$	0.0266018780	5.41338	0.00000006*	0.0148710299	4.24934	0.00002144*
$c(3)$	0.0523474363	5.59595	0.00000002*	0.0292440069	4.47998	0.00000747*
$c(4)$	0.0554420934	6.48233	0.00000000*	0.0513266053	5.48211	0.00000004*
$c(5)$	0.0147910732	5.32985	0.00000010*	0.0105073929	4.01356	0.00005981*
$a(1)$	0.0749088960	6.79133	0.00000000*	0.0776578626	6.59866	0.00000000*
$a(2)$	0.0426568511	7.59083	0.00000000*	0.0501821882	8.90060	0.00000000*
$a(3)$	0.0799602157	7.26966	0.00000000*	0.0832184317	8.29212	0.00000000*
$a(4)$	0.2402567392	16.58626	0.00000000*	0.2465209994	10.19657	0.00000000*
$a(5)$	0.1071641940	9.35041	0.00000000*	0.1141903715	9.27744	0.00000000*
$b(1)$	0.8974772593	62.91123	0.00000000*	0.9167198744	74.75856	0.00000000*
$b(2)$	0.9344069830	115.40540	0.00000000*	0.9431915321	154.39916	0.00000000*
$b(3)$	0.8816726473	59.85706	0.00000000*	0.9092090825	87.72779	0.00000000*
$b(4)$	0.7601901464	56.01244	0.00000000*	0.7665307271	40.26037	0.00000000*
$b(5)$	0.8769939544	74.86007	0.00000000*	0.8892809469	82.56190	0.00000000*
$r(2,1)$	0.5475020116	38.23011	0.00000000*	–	–	–
$r(3,1)$	0.5234915621	34.62113	0.00000000*	–	–	–
$r(3,2)$	0.6060293352	43.81264	0.00000000*	–	–	–
$r(4,1)$	0.1413728602	7.51260	0.00000000*	–	–	–
$r(4,2)$	0.1519891327	7.51281	0.00000000*	–	–	–
$r(4,3)$	0.1798502537	9.27228	0.00000000*	–	–	–
$r(5,1)$	0.2533761563	13.86171	0.00000000*	–	–	–
$r(5,2)$	0.3262800433	17.83819	0.00000000*	–	–	–
$r(5,3)$	0.3358289152	18.32144	0.00000000*	–	–	–
$r(5,4)$	0.1303644778	7.40253	0.00000000*	–	–	–
$\alpha$	–	–	–	0.0126180618	6.42334	0.00000000*
$\beta$	–	–	–	0.9840458675	362.78222	0.00000000*

## Model diagnostics

ARCH LM 1,941.11 0.0078 1,941.26 0.0026

**Notes:** This table shows the estimates of the multivariate GARH CCC and DCC models. 1, 2, 3, 4 and 5 denote, respectively, Hungary, Poland, Czech Republic, Romania and Croatia. The parameters  $a_i$ ,  $b_i$  and  $r_{ij}$  are the off-diagonal elements of the matrices A, B and R, respectively, as presented in Section 2. \*, \*\*, \*\*\*Significant at 1 and 5 percent levels, respectively

**Table VI.**  
Estimate results of  
CCC and DCC models

## References

- Abbas, G., Hammoudeh, S., Shahzad, S.J.H., Wang, S. and Wei, Y. (2019), "Return and volatility connectedness between stock markets and macroeconomic factors in the G-7 countries", *Journal of Systems Science and Systems Engineering*, Vol. 28 No. 1, pp. 1-36.
- Ahmed, A.D. and Huo, R. (2018), "China–Africa financial markets linkages: volatility and interdependence", *Journal of Policy Modeling*, Vol. 40 No. 6, pp. 1140-1164.
- Bajo-Rubio, O., Berke, B. and McMillan, D. (2017), "The behaviour of asset return and volatility spillovers in Turkey: a tale of two crises", *Research in International Business and Finance*, Vol. 41 No. 41, pp. 577-589.
- Bal, G.R., Manglani, A. and Deo, M. (2018), "Asymmetric volatility spillover between stock market and foreign exchange market: instances from Indian market from pre-, during and post-subprime crisis periods", *Global Business Review*, Vol. 19 No. 6, pp. 1567-1579.

- Baumöhl, E., Kočenda, E., Lyócsa, Š. and Výrost, T. (2018), "Networks of volatility spillovers among stock markets", *Physica A: Statistical Mechanics and its Applications*, Vol. 490 No. 490, pp. 1555-1574.
- BenSaïda, A., Litimi, H. and Abdallah, O. (2018), "Volatility spillover shifts in global financial markets", *Economic Modelling*, Vol. 73 No. 73, pp. 343-353.
- Bhar, R. and Nikolova, B. (2009), "Return, volatility spillovers and dynamic correlation in the BRIC equity markets: an analysis using a bivariate EGARCH framework", *Global Finance Journal*, Vol. 19 No. 3, pp. 203-218.
- Bissoondoyal-Bheenick, E., Brooks, R., Chi, W. and Do, H.X. (2018), "Volatility spillover between the US, Chinese and Australian stock markets", *Australian Journal of Management*, Vol. 43 No. 2, pp. 263-285.
- Bollerslev, T. (1990), "Modelling the coherence in short-run nominal exchange rates: a multivariate generalized ARCH model", *The Review of Economics and Statistics*, Vol. 72 No. 3, pp. 498-505.
- Bollerslev, T., Engle, R.F. and Wooldridge, J.M. (1988), "A capital asset pricing model with time-varying covariances", *Journal of Political Economy*, Vol. 96 No. 1, pp. 116-131.
- Engle, R. (2002), "Dynamic conditional correlation: a simple class of multivariate generalized autoregressive conditional heteroskedasticity models", *Journal of Business and Economic Statistics*, Vol. 20 No. 3, pp. 339-350.
- Engle, R.F. and Kroner, K.F. (1995), "Multivariate simultaneous generalized ARCH", *Econometric Theory*, Vol. 11 No. 1, pp. 122-150.
- Gilenko, E. and Fedorova, E. (2014), "Internal and external spillover effects for the BRIC countries: multivariate GARCH-in-mean approach", *Research in International Business and Finance*, Vol. 31 No. 31, pp. 32-45.
- Gjika, D. and Horvath, R. (2013), "Stock market co-movements in Central Europe: evidence from the asymmetric DCC model", *Economic Modelling*, Vol. 33 No. 33, pp. 55-64.
- Hung, N.T. (2018), "Volatility behaviour of the foreign exchange rate and transmission among Central and Eastern European countries: evidence from the EGARCH model", *Global Business Review*, pp. 1-21, doi: 10.1177/0972150918811713.
- Hung, N.T. (2019), "Equity market integration of China and Southeast Asian countries: further evidence from MGARCH-ADCC and wavelet coherence analysis", *Quantitative Finance and Economics*, Vol. 3 No. 2, pp. 201-220.
- Huo, R. and Ahmed, A.D. (2017), "Return and volatility spillovers effects: evaluating the impact of Shanghai-Hong Kong Stock connect", *Economic Modelling*, Vol. 61 No. 61, pp. 260-272.
- Jebran, K., Chen, S., Ullah, I. and Mirza, S.S. (2017), "Does volatility spillover among stock markets varies from normal to turbulent periods? Evidence from emerging markets of Asia", *The Journal of Finance and Data Science*, Vol. 3 Nos 1-4, pp. 20-30.
- Kamisli, M., Kamisli, S. and Ozer, M. (2015), "Are volatility transmissions between stock market returns of Central and Eastern European countries constant or dynamic? Evidence from MGARCH models", *The Conference Proceedings of 10th MIBES Conference, Larisa, October 15-17*, pp. 190-203.
- Kanas, A. (2000), "Volatility spillovers between stock returns and exchange rate changes: international evidence", *Journal of Business Finance & Accounting*, Vol. 27 Nos 3-4, pp. 447-467.
- Kim, B.H., Kim, H. and Lee, B.S. (2015), "Spillover effects of the US financial crisis on financial markets in emerging Asian countries", *International Review of Economics and Finance*, Vol. 39 No. 39, pp. 192-210.
- Ko, K.S. and Lee, S.B. (1991), "A comparative analysis of the daily behavior of stock returns: Japan, the US and the Asian NICs", *Journal of Business Finance and Accounting*, Vol. 18 No. 2, pp. 219-234.

- Koutmos, G. and Booth, G.G. (1995), "Asymmetric volatility transmission in international stock markets", *Journal of International Money and Finance*, Vol. 14 No. 6, pp. 747-762.
- Kumar, M. (2013), "Returns and volatility spillover between stock prices and exchange rates: empirical evidence from IBSA countries", *International Journal of Emerging Markets*, Vol. 8 No. 2, pp. 108-128.
- Levine, R. and Schmukler, S.L. (2007), "Migration, spillovers, and trade diversion: the impact of internationalization on domestic stock market activity", *Journal of Banking & Finance*, Vol. 31 No. 6, pp. 1595-1612.
- Liu, Y.A. and Pan, M.S. (1997), "Mean and volatility spillover effects in the US and Pacific-Basin stock markets", *Multinational Finance Journal*, Vol. 1 No. 1, pp. 47-62.
- Maghyereh, A.I., Awartani, B. and Al Hilu, K. (2015), "Dynamic transmissions between the US and equity markets in the MENA countries: new evidence from pre-and post-global financial crisis", *The Quarterly Review of Economics and Finance*, Vol. 56 No. 56, pp. 123-138.
- Majdoub, J. and Mansour, W. (2014), "Islamic equity market integration and volatility spillover between emerging and US stock markets", *The North American Journal of Economics and Finance*, Vol. 29 No. 29, pp. 452-470.
- Mohammadi, H. and Tan, Y. (2015), "Return and volatility spillovers across equity markets in mainland China, Hong Kong and the United States", *Econometrics*, Vol. 3 No. 2, pp. 215-232.
- Murinde, V. and Poshakwale, S. (2001), "Volatility in the emerging stock markets in central and Eastern Europe: evidence on Croatia, Czech Republic, Hungary, Poland, Russia and Slovakia", *European Research Studies*, Vol. 4 Nos 3-4, pp. 73-101.
- Natarajan, V.K., Singh, A.R.R. and Priya, N.C. (2014), "Examining mean-volatility spillovers across national stock markets", *Journal of Economics Finance and Administrative Science*, Vol. 19 No. 36, pp. 55-62.
- Okičić, J. (2015), "An empirical analysis of stock returns and volatility: the case of stock markets from Central and Eastern Europe", *South East European Journal of Economics and Business*, Vol. 9 No. 1, pp. 7-15.
- Panda, A.K. and Nanda, S. (2018), "A GARCH modelling of volatility and M-GARCH approach of stock market linkages of North America", *Global Business Review*, Vol. 19 No. 6, pp. 1538-1553.
- Panda, A.K., Nanda, S. and Paital, R.R. (2019), "An empirical analysis of stock market interdependence and volatility spillover in the stock markets of Africa and Middle East region", *African Journal of Economic and Management Studies*, available at: <https://doi.org/10.1108/AJEMS-10-2018-0293>
- Panton, D., Lessig, V. and Joy, O. (1976), "Co-movement of international equity markets: a taxonomic approach", *The Journal of Financial and Quantitative Analysis*, Vol. 11 No. 3, pp. 415-432, doi: 10.2307/2330417.
- Patev, P., Kanaryan, N. and Lyroudi, K. (2006), "Stock market crises and portfolio diversification in Central and Eastern Europe", *Managerial Finance*, Vol. 32 No. 5, pp. 415-432.
- Prasad, N., Grant, A. and Kim, S.J. (2018), "Time varying volatility indices and their determinants: evidence from developed and emerging stock markets", *International Review of Financial Analysis*, Vol. 60 No. 60, pp. 115-126.
- Scheicher, M. (2001), "The comovements of stock markets in Hungary, Poland and the Czech Republic", *International Journal of Finance & Economics*, Vol. 6 No. 1, pp. 27-39.
- Shields, K.K. (1997), "Threshold modelling of stock return volatility on Eastern European markets", *Economics of Planning*, Vol. 30 Nos 2-3, pp. 107-125.
- Singh, P., Kumar, B. and Pandey, A. (2010), "Price and volatility spillovers across North American, European and Asian stock markets", *International Review of Financial Analysis*, Vol. 19 No. 1, pp. 55-64.

Singhal, S. and Ghosh, S. (2016), "Returns and volatility linkages between international crude oil price, metal and other stock indices in India: evidence from VAR-DCC-GARCH models", *Resources Policy*, Vol. 50 No. 50, pp. 276-288.

Vo, X.V. and Ellis, C. (2018), "International financial integration: stock return linkages and volatility transmission between Vietnam and advanced countries", *Emerging Markets Review*, Vol. 36 No. 36, pp. 19-27.

Wong, H.T. (2017), "Real exchange rate returns and real stock price returns", *International Review of Economics and Finance*, Vol. 49 No. 49, pp. 340-352.

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# Macroeconomic determinants of credit risks: evidence from high-income countries

Macroeconomic determinants of credit risks

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## Abstract

**Purpose** – The purpose of this paper is to empirically assess the significant indicators of macroeconomic environment that influence credit risk in high-income countries.

**Design/methodology/approach** – The study employs the system generalized method of moments estimator to avoid the dynamic panel bias and endogeneity issues. Different indices of economic growth are used in each model in order to find the most significant proxy of the economic cycle that influences problem loans. The analysis is carried out using a sample of 49 developed countries covering a 16-year period (2000–2015).

**Findings** – The overall empirical results highlight that the development of industrial sectors and exports are the main drivers of loan performance in high-income countries. The findings specifically recommend adopting an expansionary fiscal policy to boost per capita income and potential productivity for the safety of the banking system.

**Practical implications** – The findings have direct practical applicability for stabilizing the financial system. The study recommends the government to increase the productivity of export-oriented industries in order to boost employment and increase the payment obligations of individuals and business firms. More importantly, it highlights the essentiality of perfect economic policy to control default risks.

**Originality/value** – To the best of the authors' knowledge, this is the first empirical study that compares the relative effect of three alternative proxies of the economic cycle on credit risk and identifies the most significant proxy. The current study also empirically shows that industrial development could be one of the crucial factors to improve financial health in developed countries.

**Keywords** Financial stability, Trade openness, Industrial policy, National expenditure, Non-performing loan, Per capita income

**Paper type** Research paper

## 1. Introduction

The banking system is a fundamental part of an economy that makes low-cost economic transactions between the lender and the depositor possible. The banking system has a strong impact on the entire economy (Festić *et al.*, 2011; Rashid and Intartaglia, 2017;



**JEL Classification** — E44, G21

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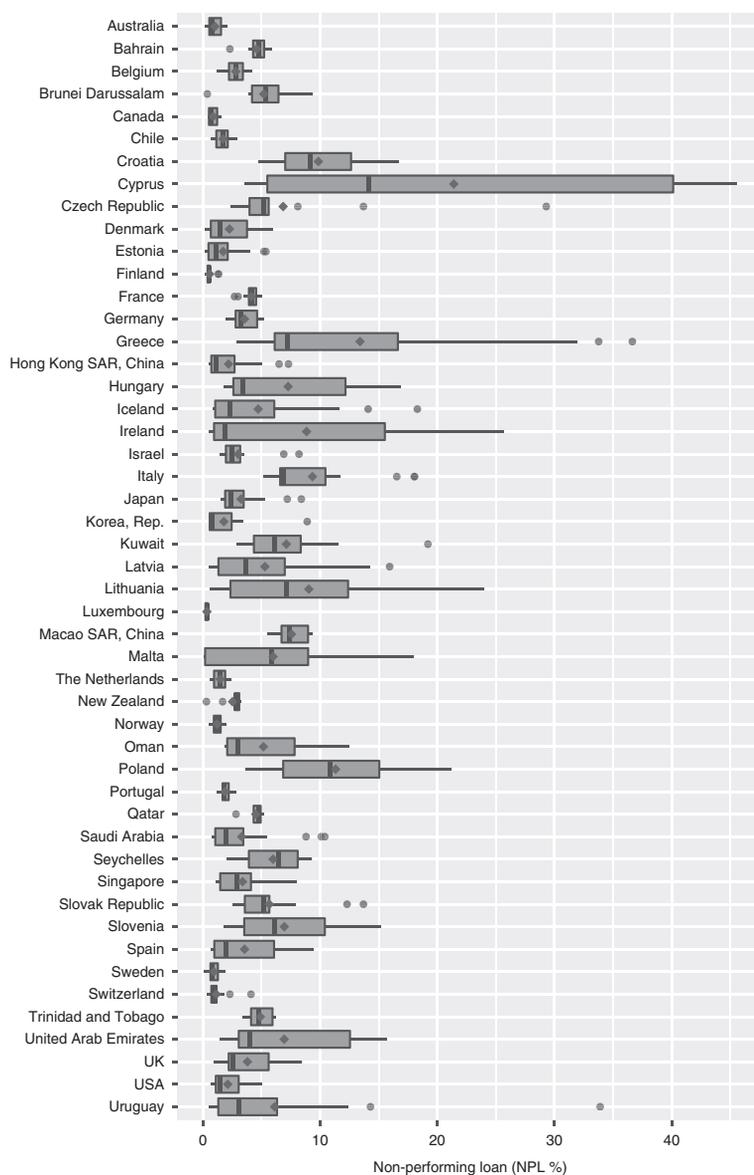
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Rodríguez-Moreno and Peña, 2013) because financial resources cannot be allocated effectively in the absence of a sound banking system. The major portion of banking risks is covered by credit risk, which is one of the major causes of the economic downturn and an important indicator of financial vulnerability (Dudian and Popa, 2013). Empirical studies on the determinants of credit risks are, therefore, essential for a stable economy.

While financial institutions are influenced by non-performing loan (NPL), the NPL itself is influenced by economic growth. An economic downturn significantly influences the banking performance and this effect is much higher than the effect on other industries (Fiordelisi and Marques-Ibanez, 2013; Festic and Beko, 2008). Despite its strong impact on the financial institutions (Al-Jarrah, 2012; Castro, 2013), the macroeconomic environment is beyond the control of a banking system. A sound economy with an open financial policy is fundamental to preventing future financial crises (Dao, 2017). The 1997 Asian financial crisis and the global financial crisis 2007 have shown that poor economic policies are associated with rising NPL in the banking industries, which in turn are associated with the financial crisis. Therefore, a deeper understanding of the macroeconomic environment is essential for formulating effective economic policies in order to enable the financial institutions to cope up with the fluctuating economic cycle effectively.

As far as the impact of the macroeconomic environment on credit risk is concerned, the empirical literatures are vast and diverse. A common finding from these literature is that economic growth is a key driver of credit quality. The studies by Castro (2013), Festić *et al.* (2011), Jakubík and Reiningger (2013), Roland *et al.* (2013) and Buncic and Melecky (2012) show that the credit risk is strongly affected by macroeconomic environments, especially during the recession period. Particularly, the GDP growth, share prices, exchange rates and lending rates have been identified as the most significant macroeconomic indicators of NPL by a majority of studies (Nkusu, 2011; Beck *et al.*, 2015). Furthermore, the studies on the European banking system (Baselga-Pascual *et al.*, 2015), the Eurozone banking system (Makri *et al.*, 2014), the Tunisian banking system (Abid *et al.*, 2014), the US banking system (Ghosh, 2015) and the Kenyan banking system (Warue, 2013) have revealed strong effects of public debt, inflation, gross domestic product and unemployment rate (UR) on the credit risk. The present study takes into consideration the empirical evidence from previous studies to identify the macroeconomic variables that have potentially significant effects on the NPL.

The recent financial crisis, which had its origin in advanced economies and the increasing role of developed countries in the global economy have warranted studies evaluating the impact of macroeconomic indicators on banking stability in the developed countries (Nkusu, 2011; Kauko, 2012). However, only a handful of studies have analyzed high-income countries (classified as developed economies by the World Bank and International Monetary Fund (IMF)) with policy implications while investigating the determinants of problem loans. Moreover, previous studies have included only one variable (either GDP growth rate (GDPGR), GDP per capita or GNI per capita) as a proxy of economic cycle to link between economic growth and credit risk (e.g. Salas and Saurina, 2002; Jiménez and Saurina, 2006; Khemraj and Pasha, 2009; Louzis *et al.*, 2012; Rajan and Dhal, 2003; Dash and Kabra, 2010; Fofack, 2005; Škarica, 2014; Klein, 2013). These studies did not evaluate the relative contribution of alternative proxies in their analyses to identify the most significant proxy of the economic cycle. They also lack the panel of high-income countries as a sample. The present study contributes to the literature in four ways. First, the present study is among the limited studies that have applied different economic cycle proxies in a single paper. Second, the study chiefly focuses on finding the most significant proxy of the economic cycle that impacts the financial fragility. Third, the study evaluates the impact of the macroeconomic environment on credit risk using a unique data sample covering a large number of advanced economies (49 countries) (see Figure 1) over a much longer period (16 years) than most previous studies. Fourth, the study links the findings with specific recommendations for



**Figure 1.** Boxplot showing the lower quartile, upper quartile, median and mean values of the non-performing loans in 49 high-income countries for a 16-year period (2000–2015)

formulating effective economic policies to boost employment, per capita income, productivity and industrial output in the developed economies. The findings of the current study could be of considerable use to policymakers and supervisory authorities of high-income countries to control default risks.

## 2. Data and methods

### 2.1 Sources of data

The study includes 49 high-income countries classified as the developed economies by the World Bank and the IMF. The data span a period of 2000–2015 covering both the pre- and post-global financial crisis period and are on an annual basis. They are chiefly obtained from the IMF and the Global Financial Stability reports. The choice of the countries and the time period is based on the availability of data.

### 2.2 Macroeconomic variables

Based on the extensive review of the literature, eight macroeconomic variables are selected as the potential determinants of NPL. Their descriptions and the possible relations with the NPL are discussed below.

The trade openness policy is proxied by the exports of goods and services (EOGS), which is measured by the percent of GDP. A high volume of exports indicates the efficacy of the trade policy. Efficient trade policy is believed to improve the financial position of the corporate firms causing an overall economic growth of the nation. The studies by Clichici and Colesnicova (2014) in Moldova and Mileris (2014) in Lithuania suggested the need to raise exports to reduce credit risk, which indicates that export is negatively related to the NPL level.

The GDPGR, GDP per capita growth rate (GDPPCGR) and gross national income per capita growth rate (GNIPCGR) have been widely used as the proxies of the economic cycle. Among these, GDPGR is the most commonly used macroeconomic indicator. In this study, these three variables are alternatively used in each model in order to identify the most significant proxy determining the NPL level. As shown by Festic and Beko (2008), Kjosevski and Petkovski (2017) and Klein (2013), we expect their positive effect on banking stability.

Industry value added (IVA) reflects the industrial development and includes the compensation of employees, taxes on production, gross operating surplus, etc. The perfect industrial policy raises IVA values, which strengthens the productivity of the nation, enlarges the economic activities and ultimately improves the payment capacity.

Unemployment is the state of not having a job by the working age people. It is a widely used measure of the economic situation and an important predictor of credit risk (Gambera, 2000). Following previous studies (e.g. Bofondi and Ropele, 2011; Louzis *et al.*, 2012), we expect a positive association between UR and NPL.

The gross national expenditure (GNE) measures the final consumption of a nation and includes public and private expenditures. A high GNE value implies high economic activities and high economic growth that are essential for lowering default risks. Because GNE symbolizes the development of investment, a high GNE is expected to improve the overall credit quality.

Inflation is a proxy of monetary policy and measures the general increase in the price level. Inflation affects the performance of banking sectors in the form of money supply and price stability. Hyper-inflation not only increases the lending rate but also impedes the debtors' ability to service their loan payment on time (Klein, 2013; Baselga-Pascual *et al.*, 2015; Fofack, 2005). Hence, the inflation rate is assumed to have a positive effect on NPL.

The NPL is not immediately written down from the balance sheet. Therefore, this study incorporates the past realization of NPL using a dynamic panel model. Because the NPL ratio has been shown to be positively autoregressive (Balgova *et al.*, 2016; Chaibi and Ftiti, 2015; Kjosevski and Petkovski, 2017), the lagged dependent variable is used as an explanatory variable to evaluate its effect on the current NPL. A brief description and the expected signs of the study variables are shown in Table I.

### 2.3 Econometric estimation

The study variables are converted into logarithmic forms before the empirical analyses. Prior to estimation, the test for non-stationary (unit root) is performed by employing the

Augmented Dickey–Fuller (ADF) test, Levin, Lin and Chu test (Levin *et al.*, 2002) and Im, Pesaran and Shin *W*-stat test (Im *et al.*, 2003) in order to determine the integration of variables and to avoid the spurious regression coefficients. The unit root test results (see Table II) show that all variables are stationary in level with the exception of GNE, EOGS and IVA. The non-stationary variables in level become stationary after first differencing.

The past studies encourage designing a dynamic panel model for consistent estimation of parameters. The lagged dependent variable is treated as a regressor on the right-hand side to show some degree of persistence in the level of NPL:

$$NPL_{it} = \alpha NPL_{it-1} + \beta X_{it} + \eta_i + \varepsilon_{it}, \quad |\alpha| < 1, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \quad (1)$$

where subscripts *i* and *t* denote the cross-sectional and time dimension of the panel, respectively.  $X_{it}$  is the vector of macroeconomic variables other than the lagged NPL.  $\alpha$  and  $\beta$  are the vector of coefficients to be estimated.  $\eta_i$  is the unobserved country-specific effect and  $\varepsilon_{it}$  is the error term. Equation (1) assumes that the error term  $\varepsilon_{it}$  satisfies the orthogonality conditions.

In Equation (1),  $NPL_{it-1}$  is correlated with the fixed effects, which is called the dynamic panel bias that cannot be solved by the static panel data models. In the presence of lagged dependent variable, ordinary least square estimation gives upward biased results. Similarly, the random effects estimator gives downward biased results in the dynamic panel data model (Baltagi, 2008). The within-group estimators also cannot solve the dynamic panel bias (Nickell, 1981; Bond, 2002). The generalized method of moments (GMM) proposed by Arellano and Bond (1991) and generalized by Arellano and Bover (1995) and Blundell and Bond (1998) is found to be more efficient in solving the dynamic panel bias. These general estimators address such problems by first differencing Equation (1) as follows:

$$\Delta NPL_{it} = \alpha \Delta NPL_{it-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it}. \quad (2)$$

Variables	Description	Expected sign
Exports of goods and services (EOGS)	Exports as percent of GDP	(-)
GDP growth rate (GDPGR)	Percent change in GDP	(-)
GDP per capita growth rate (GDPPCGR)	Percent change in GDP per capita	(-)
GNI per capita growth rate (GNIPCGR)	Percent change in GNI per capita	(-)
Industry value to GDP (IVA)	Industry value as percent of GDP	(-)
Unemployment rate (UR)	Unemployed to labor force	(+)
Gross national expenditure (GNE)	National expenditure as % of GDP	(-)
Inflation rate (IR)	Percent change in CPI	(+)

**Table I.**  
Description of  
variables and their  
expected signs

Variables	Fisher type-		Levin, Lin and		Im, Pesaran and Shin	
	ADF $\chi^2$	Probability	Chu test	Probability	<i>W</i> -stat	Probability
NPL	124.017	0.039	-4.76373	0.000	-2.01626	0.0219
EOGS	77.9752	0.9323	-3.11016	0.000	0.70254	0.7588
GDPGR	209.907	0.000	-10.2124	0.000	-6.88212	0.000
GDPPCGR	211.393	0.000	-9.79517	0.000	-6.94987	0.000
GNIPCGR	208.933	0.000	-8.10699	0.000	-6.87863	0.000
IVA	79.6461	0.8546	-3.46993	0.000	0.29531	0.6161
UR	140.231	0.0022	-5.10928	0.000	-2.59173	0.0048
GNE	71.7170	0.9788	-0.81665	0.2071	1.21767	0.8883
IR	161.117	0.000	-5.97564	0.000	-3.76590	0.000

**Table II.**  
Panel unit root  
test results

In Equation (2), the fixed effect is removed but the lagged dependent variable is still correlated with the new error term. Such endogeneity problems are also solved by the GMM estimations. Both difference GMM and system GMM are designed to remove the dynamic panel bias (Arellano and Bond, 1991; Arellano and Bover, 1995; Holtz-Eakin *et al.*, 1988) through instrumental variables. However, the system GMM is an extended form of difference GMM and is more reliable in estimating robust results.

GMM is a popular econometric trick designed for a short time dimension with a large number of cross sectionals' panel, and where all the independent variables are not strictly exogenous. It is precisely the case in our sample where  $T=16$  and  $N=49$ . In order to elude the problem of dynamic panel bias and endogeneity in autoregressive panel data, this study uses system GMM proposed by Arellano and Bover (1995) and Blundell and Bond (1998). To ensure reliable estimation results, the number of instruments does not exceed the number of cross-sections (countries) over the study period in all specifications (Roodman, 2006). Literature has shown that the system GMM estimator has a lower bias and higher efficiency than all the other estimators, including the standard first-differences GMM estimator (Soto, 2009).

This study builds six dynamic models with different economic proxies and a varying number of instruments in order to examine highly significant proxy of the economic cycle and evaluate consistency in the magnitude of the study variables. Both one and two period lagged values are used as instruments for estimations. The number of instruments used in Models 1–3 is different from those used in Models 4–6. For example, 35 instruments (both one and two period lagged values) are used in Models 1–3 and 48 instruments (both one and two period lagged values) in Models 4–6. The main aim of using different specifications is to cross verify the estimated results. In order to identify the most significant proxy of the economic cycle, the three economic proxies (GDPGR, GDPPCGR and GNI per capita growth rate) are alternatively used in six models. For example, the specifications 1 and 4 contain GDPGR, specifications 2 and 5 contain GDPPCGR, while specifications 3 and 6 contain GNI per capita growth rate as the proxy of the economic cycle.

In order to check the fitness of GMM specification models, we apply two specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). First, we perform the over-identifying restrictions test via Sargan specification to check the validity of the instruments used as the moment conditions. Second, we test the fundamental assumption of serial uncorrelated error.

Table III details the correlation between the variables used in this study. The GDPPCGR and the GDPGR are strongly correlated ( $r=0.88$ ), which can bias the model output. However, these variables are alternatively used in each model. Therefore, the model does not suffer from multicollinearity problem.

	EOGS	GDPGR	GDPPCGR	GNIPCGR	IVA	UR	GNE	IR
EOGS	1	0.137	0.051	0.067	-0.086	-0.080	-0.477	0.007
GDPGR		1	0.887	0.561	0.148	-0.083	-0.142	0.116
GDPPCGR			1	0.681	0.008	0.023	0.060	0.082
GNIPCGR				1	-0.039	0.047	0.017	0.127
IVA					1	0.021	-0.192	0.138
UR						1	0.140	-0.092
GNE							1	0.101
IR								1

**Table III.**  
Correlation matrix of  
sample indices

### 3. Results and discussions of findings

Figure 1 shows the proportions of NPL in 49 high-income countries for a 16-year period (2000–2015). The median NPL ratio across high-income countries ranges from less than 1 percent in Luxembourg to about 14 percent in Cyprus. Among the 49 high-income countries, Luxembourg, Sweden, Finland, Switzerland, Norway and Canada have a fairly constant NPL ratio below 2 percent throughout the 16-year period, which indicates high economic stability in these countries. The wide dispersion in the level of NPL across other high-income countries could be likely due to varying UR, economic growth rates, productivity and government policies.

The empirical estimation results are reported in Table IV. The lagged NPL is strongly positively significant in all models, which confirms the presence of strong persistence in the credit risk (Ghosh, 2015; Espinoza and Prasad, 2010; Kjosevski and Petkovski, 2017). The result shows that the previous years' NPL explains 79–87 percent of the current NPL, which indicates that the NPL shock likely has a prolonged effect in the banking system.

The specifications 2 and 3 show a significant negative effect of export (EOGS) on NPL, which confirms that effective trade policy is essential for prudent banking behavior. This is consistent with the findings of Mileris (2014), Festic *et al.* (2011) and Clichici and Colesnicova (2014). The current finding together with previous findings suggests that a high volume of export reduces the ratio of problem loans. This is clearly exemplified by the Ireland economy in 2015, which shows a decline in problem loans from 20.65 to 14.94 percent with an increase in exports from 113.71 to 121.42 percent of GDP. Similarly, Luxembourg, which has the highest export percent of GDP in the world, has the lowest problem loans. The high export volume prevents trade deficit and increases the national saving that can be mobilized for economic development, which proportionately reduces the problem loans. This is likely the reason for a decreasing trend of NPL ratio in Switzerland, Luxembourg and Germany. Furthermore, Fofack (2005) showed that in Sub-Saharan Africa, the depreciation in the exchange rate makes exports more competitive and imports more expensive due to the cost-push inflation and hence increases the overall credit quality.

In the remaining specifications (1, 4, 5 and 6), the coefficient of exports is very small as well as statistically insignificant, which is consistent with the finding of Balgova *et al.* (2016). This indicates that the degree of trade openness of some developed countries is not well enough to control problem loans. It can also explain why the loan portfolios for the export-oriented firms are comparatively low in some high-income countries, such as Chile, Lithuania, New Zealand, Greece and Uruguay. The export can significantly reduce the NPL level only in countries where export policy plays a significant role to increase productivity (e.g. the USA, Germany, France and the Netherlands). Our results confirm that the boost in exports improves the NPL ratio and suggests increasing the lending activities when the export trade is high because, during that period, there is high industrial production, high economic activities and also high earnings of individuals.

The estimation results show a strong influence of the economic cycle on NPL suggesting that business cycles determine the level of credit quality in the banking system. The overall estimations show the negative linkage between the economic cycle and NPL. This indicates that during an economic downturn, the credit quality could degrade in the banking system. The higher and significant negative coefficients of the GDPGR, GNI per capita growth rate and GDPPCGR explain that the slowdown in economic activities causes high problem loans in the financial system. For instance, during an economic recession, the demand for loan portfolios decreases, which lowers down the economic transactions. Consequently, the revenue income decreases, which hinders the debt servicing ability of the borrowers and hence increases the NPL level (Dash and Kabra, 2010; Festic *et al.*, 2011; Nkusu, 2011; Buncic and Melecky, 2012; Louzis *et al.*, 2012; Roland *et al.*, 2013; Tanasković and Jandrić, 2015; Vö *et al.*, 2016; Kjosevski and Petkovski, 2017). In 2015, the GDPGR, GDPPCGR and GNI

**Table IV.**  
GMM estimation  
results of high-income  
countries

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Lagged NPL	0.8588*** (46.93)	0.8772*** (47.53)	0.8267*** (33.38)	0.8265*** (18.78)	0.8405*** (19.64)	0.7938*** (17.71)
Exports	-0.1582 (-1.49)	-0.1713* (-1.69)	-0.2735** (-2.39)	-0.1612 (-0.82)	-0.2101 (-1.29)	-0.2482 (-0.95)
GDP growth rate	-1.0796*** (-13.51)			-1.0499*** (-4.34)		
GDPPC growth rate		-1.1488*** (-12.85)			-1.0872*** (-4.49)	
GNIPC growth rate			-4.1763*** (-9.69)			-4.4885*** (-5.16)
Industry value	-0.5052*** (-5.71)	-0.5379*** (-6.48)	-0.5932*** (-4.50)	-0.5362** (-2.11)	-0.5290** (-2.13)	-0.7193*** (-2.58)
Unemployment	0.2438*** (7.13)	0.2296*** (7.73)	0.3249*** (7.49)	0.2876*** (2.93)	0.2720*** (3.01)	0.3322*** (3.66)
Gross national exp.	-0.2907 (-1.05)	-0.3557 (-1.31)	-0.4244 (-1.24)	-0.4409 (-0.71)	-0.6266 (-1.12)	-0.5583 (-0.91)
Inflation	0.0597 (1.03)	0.0535 (0.98)	0.1033 (1.29)	0.0974 (0.79)	0.0803 (0.69)	0.1033 (0.74)
Sargan test $\beta$ -value	0.0518	0.0481	0.0534	0.2979	0.2776	0.2433
A-B AR (2) test p value	0.3348	0.3519	0.1112	0.3134	0.3255	0.1103
Observations	735	735	723	735	735	723

**Notes:** *t*-statistics are given in parentheses. The number of instruments used in Models 1-3 is different from those used in Models 4-6 (35 vs 48 instruments). The specifications 1 and 4 contain GDP growth rate, specifications 2 and 5 contain GDP per capita growth rate, while specifications 3 and 6 contain GNI per capita growth rate as the proxy of economic cycle. \*, \*\*, \*\*\*Significant at 10, 5 and 1 percent levels, respectively

growth rate of Uruguay, respectively, declined from 3.24 to 0.98 percent, 2.89 to 0.63 percent and 0.042 to 0.012 percent, causing an increase in the NPL ratio from 1.28 to 1.6 percent. The empirical results reconfirm that poor economic condition is one of the major causes of problem loans. More specifically, the results show that the GNI per capita growth rate has stronger explanatory power compared to the GDPGR and the GDPPCGR over the study period. This implies that the per capita income level is a stronger indicator than the GDPGR to forecast the NPL level. Furthermore, it clearly shows that the financial obligation of debtors is very sensitive to the purchasing power of the inhabitants. The findings of the current study indicate that the gradually worsening per capita income is the initial symptom of a banking crisis.

The IVA influences problem loans negatively, stating that the boost in industry improves credit quality. In the overall analysis, the effect of IVA on NPL is unchanged and statistically significant, which indicates that high IVA accelerates the productivity of the nation and consequently increases the purchasing capacity of the individuals and corporate firms. The expansion of the industrial sector increases productivity, employment opportunities as well as the firm's profitability, which proportionately increases the payment capacity of the borrowers. The negative significant effect of IVA on NPL in all the models of empirical estimations indicates that high-income countries usually have high industrial development, which enables them to break the vicious cycle of problem loans.

The entire estimation results show a statistically significant positive relation between NPL and the UR. This is plausible because high unemployment lowers the demand for consumption and reduces the economic activities. In return, the repayment debt obligation becomes poor and the NPLs increase (Salas and Saurina, 2002; Jiménez and Saurina, 2006; Klein, 2013). The studies of Bofondi and Ropele (2011), Vogiazas and Nikolaidou (2011), Makri *et al.* (2014), Škarica (2014), Mileris (2014) and Donath *et al.* (2014) confirmed that failure to control unemployment invites low economic activities, higher default risk and proportionately initial banking crises. Such a situation can be seen in Greece, Spain, Italy and Cyprus, where unemployment and NPL are comparatively high. The findings indicate that perfect economic policies could bring a significant change in the unemployment level in the economy. On these views, the government should guarantee to provide equal job opportunities through perfect fiscal, monetary, trade and industrial policies.

The governments in these high-income countries are apparently providing regular incentives to manufacturing companies to make optimal use of scarce resources thereby making a larger contribution to the gross national income. As the income levels of citizens in the industrially developed countries are generally higher, it enhances their capacity to save and repay loans. The problem loans, therefore, decline when IVA increases.

The coefficient of inflation is positive in all the specifications. It is assumed that inflation decreases the purchasing power of money in the economy. Hence, the borrowers (both individuals and investors) have less income and profit to pay back their interest and principal. This leads to the growth in NPL but this effect is not statistically significant in the overall analyses, which supports the findings of Tanasković and Jandrić (2015), Makri *et al.* (2014) and Dimitrios *et al.* (2016). However, this is in contrast to most previous studies (Abid *et al.*, 2014; Ghosh, 2015; Kjosevski and Petkovski, 2017) who found a statistically significant effect of inflation on NPL. Our findings confirm that the tool of monetary policy is not as effective as expected in the advanced economy. Although the coefficient of GNE is negative in all the models, the effect is not statistically significant. The results show that the GNE is not a significant mediator to reduce NPL level in the developed countries.

The results of the Sargan test suggest that the selected instruments are valid in all specifications. The *p*-values of the autoregressive (AR) meet the requirements of the Arellano Bond test for autocorrelation. The results of these two tests indicate that the estimated results are consistent and reliable. Similarly, the magnitudes of the macroeconomic environment

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remain unchanged with the change in proxies of the economic cycle and the number of instruments, which confirm that our estimated models are free from bias and could be reliable for forecasting.

#### 4. Conclusions

This study reassesses the vulnerability of the banking industries using aggregate NPL data of 49 high-income countries over 2000–2015 by linking it with the macroeconomic variables (GDPGR, GDPPCGR, GNI per capita growth rate, unemployment, exports, IVA, GNE and inflation). The statistically significant and large coefficients of the GDPGR, GNI per capita growth rate, GDPPCGR and UR confirm that the economic cycle fluctuation heavily influences the credit risk taking trend. More importantly, the per capita income has a strong explanatory power compared to other variables in the entire analyses. This indicates that the purchasing power of the citizens is the most significant macroeconomic indicator that can lead to a faster change in the NPL level and could be strictly used as a significant predictor of the NPL ratio. In addition, our results reveal exports, IVA and gross national income as the significant indicators of NPLs other than the GDPGR, share price, nominal effective exchange rate of the local currency, unemployment, current account, house price, equity price and lending rate shown by previous studies (e.g. Beck *et al.*, 2015; Nkusu, 2011; Kauko, 2012). Moreover, full employment is found to be beneficial for improving loan performance. In the same vein, the findings suggest that the payment ability of debtors in high-income countries can be mainly improved by increasing productivity and competitive export trade. The negative coefficient of exports and IVA show that the incentives provided for industrial development and trade openness greatly reduce the possibility of a financial crisis. Therefore, policymakers should focus more on providing incentives that could be helpful to manufacturing companies and export trade. This could be achieved by reducing taxes, providing low-cost loans, exploring the new international market and making special free trade agreements with the neighboring countries.

With respect to the economic policies proxies, the per capita income, employment, industrial development and trade openness seem to be crucial for improving the overall credit quality. The present study highlights the importance of perfect fiscal policy, industrial policy and trade openness policy in reducing the possibility of the financial crisis in high-income countries. The study suggests increasing the per capita income and employment by promoting industrial development and offering free trade services. The findings recommend the government to focus more on increasing exports and developing the industrial sectors. The study also recommends increasing incentives that could directly help to improve the per capita income. The negative coefficient of GNE indicates the essentiality of government spending to increase aggregate demand and consumption. The findings of this research could be useful to the supervisory authorities, government and banking institutions for forecasting NPL and stress testing. The outcome could be equally useful in formulating the perfect economic and credit policies according to the changing monetary, trade, industrial and fiscal policies.

The main findings of the current study have practical applicability and policy implications related to industrial development, trade openness, employment generation and economic growth. Similarly, the evidence highlights the importance of economic policies (industrial policy, fiscal policy and trade policy) in controlling default risks. The findings specifically recommend adopting an expansionary fiscal policy to boost employment, per capita income, productivity and industrial output so as to maintain a stable banking system. The findings of this study could be particularly useful to some developed countries, such as Germany, the USA, Japan, Italy and Canada that are top ranked in terms of the manufacturing environment, trade openness and industrial output to improve their economic policies, cost considerations, workforce investments and infrastructures.

**References**

- Abid, L., Ouertani, M.N. and Zouari-Ghorbel, S. (2014), "Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: a dynamic panel data", *Procedia Economics and Finance*, Vol. 13, pp. 58-68.
- Al-Jarrah, I.M. (2012), "Evaluating the riskiness of the banking sector of Jordan", *European Journal of Economics, Finance and Administrative Sciences*, Vol. 48, pp. 86-95.
- Arellano, M. and Bond, S. (1991), "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *The Review of Economic Studies*, Vol. 58 No. 2, pp. 277-297.
- Arellano, M. and Bover, O. (1995), "Another look at the instrumental variable estimation of error-components models", *Journal of Econometrics*, Vol. 68 No. 1, pp. 29-51.
- Balgova, M., Nies, M. and Plekhanov, A. (2016), "The economic impact of reducing non-performing loans", Working Paper No. 193, European Bank for Reconstruction and Development, London.
- Baltagi, B. (2008), *Econometric Analysis of Panel Data*, John Wiley & Sons, NJ.
- Baselga-Pascual, L., Trujillo-Ponce, A. and Cardone-Riportella, C. (2015), "Factors influencing bank risk in Europe: evidence from the financial crisis", *The North American Journal of Economics and Finance*, Vol. 34, pp. 138-166.
- Beck, R., Jakubik, P. and Piloju, A. (2015), "Key determinants of non-performing loans: new evidence from a global sample", *Open Economies Review*, Vol. 26 No. 3, pp. 525-550.
- Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87 No. 1, pp. 115-143.
- Bofondi, M. and Ropele, T. (2011), "Macroeconomic determinants of bad loans: evidence from Italian banks", Bank of Italy Occasional Papers No. 89, Rome.
- Bond, S.R. (2002), "Dynamic panel data models: a guide to micro data methods and practice", *Portuguese Economic Journal*, Vol. 1 No. 2, pp. 141-162.
- Buncic, D. and Melecky, M. (2012), "Macroprudential stress testing of credit risk: a practical approach for policy makers", *Journal of Financial Stability*, Vol. 9 No. 3, pp. 347-370.
- Castro, V. (2013), "Macroeconomic determinants of the credit risk in the banking system: the case of the GIPSI", *Economic Modelling*, Vol. 31, pp. 672-683.
- Chaibi, H. and Ftiti, Z. (2015), "Credit risk determinants: evidence from a cross-country study", *Research in International Business and Finance*, Vol. 33, pp. 1-16.
- Clichici, D. and Colesnicova, T. (2014), "The impact of macroeconomic factors on non-performing loans in the Republic of Moldova", *Journal of Financial and Monetary Economics*, Vol. 1 No. 1, pp. 73-78.
- Dao, M.Q. (2017), "Determinants of the global financial crisis recovery: an empirical assessment", *Journal of Economic Studies*, Vol. 44 No. 1, pp. 36-46.
- Dash, M.K. and Kabra, G. (2010), "The determinants of non-performing assets in Indian commercial bank: an econometric study", *Middle Eastern Finance and Economics*, Vol. 7 No. 2, pp. 94-106.
- Dimitrios, A., Helen, L. and Mike, T. (2016), "Determinants of non-performing loans: evidence from Euro-area countries", *Finance Research Letters*, Vol. 18, pp. 116-119.
- Donath, L., Cerna, V.M. and Oprea, I.M. (2014), "Macroeconomic determinants of bad loans in Baltic countries and Romania", *SEA: Practical Application of Science*, Vol. 2 No. 4, pp. 71-80.
- Dudian, M. and Popa, R.A. (2013), "Financial development and economic growth in Central and Eastern Europe", *Theoretical and Applied Economics*, Vol. 20 No. 8, pp. 59-68.
- Espinoza, R.A. and Prasad, A. (2010), "Non-performing loans in the GCC banking system and their macroeconomic effects", Working Paper No. 10/224, International Monetary Fund, Washington, DC.
- Festic, M. and Beko, J. (2008), "The banking sector and macroeconomic indicators: some evidence from Hungary and Poland", *Our Economy*, Vol. 54 No. 5, pp. 118-125.

- Festić, M., Kavkler, A. and Repina, S. (2011), "The macroeconomic sources of systemic risk in the banking sectors of five new EU member states", *Journal of Banking & Finance*, Vol. 35 No. 2, pp. 310-322.
- Fiordelisi, F. and Marques-Ibanez, D. (2013), "Is bank default risk systematic?", *Journal of Banking & Finance*, Vol. 37 No. 6, pp. 2000-2010.
- Fofack, H.L. (2005), "Non-performing loans in Sub-Saharan Africa: causal analysis and macroeconomic implications", Working Paper No. 3769, World Bank Policy Research, Washington, DC.
- Gambera, M. (2000), "Simple forecasts of bank loan quality in the business cycle", *Emerging Issues*, Federal Reserve Bank of Chicago, IL.
- Ghosh, A. (2015), "Banking-industry specific and regional economic determinants of non-performing loans: evidence from US states", *Journal of Financial Stability*, Vol. 20, pp. 93-104.
- Holtz-Eakin, D., Newey, W. and Rosen, H.S. (1988), "Estimating vector autoregressions with panel data", *Econometrica*, Vol. 56 No. 6, pp. 1371-1395.
- Im, K.S., Pesaran, M.H. and Shin, Y. (2003), "Testing for unit roots in heterogeneous panels", *Journal of Econometrics*, Vol. 115 No. 1, pp. 53-74.
- Jakubík, P. and Reininger, T. (2013), "Determinants of non-performing loans in Central, Eastern and Southeastern Europe", *Focus on European Economic Integration*, Vol. 3, pp. 48-66.
- Jiménez, G. and Saurina, J. (2006), "Credit cycles, credit risk, and prudential regulation", *International Journal of Central Banking*, Vol. 2 No. 2, pp. 65-98.
- Kauko, K. (2012), "External deficits and non-performing loans in the recent financial crisis", *Economics Letters*, Vol. 115 No. 2, pp. 196-199.
- Khemraj, T. and Pasha, S. (2009), "The determinants of non-performing loan: an econometric case study of Guyana", Munich Personal RePEc Archive Paper No. 53128, University Library of Munich.
- Kjosevski, J. and Petkovski, M. (2017), "Non-performing loans in Baltic states: determinants and macroeconomic effects", *Baltic Journal of Economics*, Vol. 17 No. 1, pp. 25-44.
- Klein, N. (2013), "Non-performing loans in CESEE: determinants and impact on macroeconomic performance", Working Paper No. 13/72, International Monetary Fund, Washington, DC.
- Levin, A., Lin, C.-F. and Chu, C.-S.J. (2002), "Unit root tests in panel data: asymptotic and finite-sample properties", *Journal of Econometrics*, Vol. 108 No. 1, pp. 1-24.
- Louzis, D.P., Vouldis, A.T. and Metaxas, V.L. (2012), "Macroeconomic and bank-specific determinants of non-performing loans in Greece: a comparative study of mortgage, business and consumer loan portfolios", *Journal of Banking & Finance*, Vol. 36 No. 4, pp. 1012-1027.
- Makri, V., Tsagkanos, A. and Bellas, A. (2014), "Determinants of non-performing loans: the case of Eurozone", *Panoeconomicus*, Vol. 61 No. 2, pp. 193-206.
- Mileris, R. (2014), "Macroeconomic factors of non-performing loans in commercial banks", *Ekonomika*, Vol. 93 No. 1, pp. 22-39.
- Nickell, S. (1981), "Biases in dynamic models with fixed effects", *Econometrica*, Vol. 49 No. 6, pp. 1417-1426.
- Nkusu, M. (2011), "Non-performing loans and macrofinancial vulnerabilities in advanced economies", Working Paper No. 161, International Monetary Fund, Washington, DC.
- Rajan, R. and Dhal, S.C. (2003), "Non-performing loans and terms of credit of public sector banks in India: an empirical assessment", *Retrieved from Reserve Bank of India Occasional Papers*, Vol. 24 No. 3, pp. 81-121.
- Rashid, A. and Intartaglia, M. (2017), "Financial development – does it lessen poverty?", *Journal of Economic Studies*, Vol. 44 No. 1, pp. 69-86.
- Rodríguez-Moreno, M. and Peña, J.I. (2013), "Systemic risk measures: the simpler the better?", *Journal of Banking & Finance*, Vol. 37 No. 6, pp. 1817-1831.
- Roland, B., Petr, J. and Anamaria, P. (2013), "Non-performing loans: what matters in addition to the economic cycle?", Working Paper No. 1515, European Central Bank, Frankfurt.

- 
- Roodman, D. (2006), "How to do xtabond2: an introduction to 'difference' and 'system GMM in stata'", Working Paper No. 103, Center for Global Development, Washington, DC.
- Salas, V. and Saurina, J. (2002), "Credit risk in two institutional regimes: Spanish commercial and savings banks", *Journal of Financial Services Research*, Vol. 22 No. 3, pp. 203-224.
- Škarica, B. (2014), "Determinants of non-performing loans in Central and Eastern European countries", *Financial Theory and Practice*, Vol. 38 No. 1, pp. 37-59.
- Soto, M. (2009), "System GMM estimation with a small sample", Working Paper No. 395, Barcelona Graduate School of Economics, Barcelona.
- Tanasković, S. and Jandrić, M. (2015), "Macroeconomic and institutional determinants of non-performing loans", *Journal of Central Banking Theory and Practice*, Vol. 4 No. 1, pp. 47-62.
- Võ, H.T.N., Lê, T.V. and Hồ, D. (2016), "Macro determinants on non-performing loans and stress testing of Vietnamese commercial banks' credit risk", *VNU Journal of Science: Economics and Business*, Vol. 30 No. 5E, pp. 1-16.
- Vogiazas, S.D. and Nikolaidou, E. (2011), "Investigating the determinants of non-performing loans in the Romanian banking system: an empirical study with reference to the Greek crisis", *Economics Research International*, Vol. 2011, pp. 1-13.
- Warue, B.N. (2013), "The effects of bank specific and macroeconomic factors on nonperforming loans in commercial banks in Kenya: a comparative panel data analysis", *Advances in Management and Applied Economics*, Vol. 3 No. 2, pp. 135-164.

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# Is satisfaction a necessary and sufficient condition to avoid switching? The moderating role of service type

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## Abstract

**Purpose** – The purpose of this paper is to study the drivers of service provider switching intention other than satisfaction and, additionally, analyse the moderating role of the type of service (utilitarian vs hedonic). Specifically, the authors study the effects of alternative attractiveness, post-purchase regret, anticipated regret and past switching behaviour.

**Design/methodology/approach** – A representative survey with 800 consumers of mobile phone services (utilitarian) and holiday destinations (hedonic) was carried out.

**Findings** – Satisfaction is not a significant antecedent of switching intention in the hedonic service and its effect is marginal in the utilitarian service. In the utilitarian service, the main predictor of switching intention is post-purchase regret, whereas in the hedonic service, the main determinants of switching intention are past switching behaviour and anticipated regret.

**Originality/value** – The main contribution of this study is the analysis of the determinants of provider switching behaviour that may explain abandonment by satisfied customers, to see if their influence is greater or smaller than that of satisfaction itself, which has been the most analysed variable. Furthermore, there are expected to be differences between utilitarian and hedonic services, an aspect which is also studied in this work.

**Keywords** Utilitarian and hedonic services, Switching behaviour, Alternative attractiveness, Anticipated and post-purchase regret, Variety seeking

**Paper type** Research paper

## 1. Introduction

Consumers are becoming increasingly more demanding and more knowledgeable about products and brands thanks, in part, to new technologies development that leads to lower information costs. This situation discourages consumers from remaining loyal to their service providers even when they are satisfied (Fraering and Minor, 2013), and poses the challenge of achieving repatronage behaviours for companies. There is consensus on the fact that loyal customers are more profitable than new ones because they provide increasing income with decreasing costs (Anderson *et al.*, 2004; Anderson and Mittal, 2000; Lin *et al.*, 2016; Mittal and Lassar, 1998). Furthermore, a loyal customer is more willing to continue doing business with the company even when prices rise (Baumann *et al.*, 2012; Keaveney and Parthasarathy, 2001; Zeithaml, 2000). Hence, customer retention is a priority for service organisations and also has received a great deal of attention by scholars (Balaji, 2015; Miranda-Gumucio *et al.*, 2013; Pan *et al.*, 2012).

## JEL Classification — M31

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The design of successful loyalty strategies involves finding out the main determinants of consumer switching behaviour (Maicas *et al.*, 2006; Ryals and Knox, 2006). Traditionally, it has been assumed that satisfaction leads to repatronage behaviour and dissatisfaction results in switching (Chuah, Marimuthu, Kandampully and Bilgihan, 2017). The expectancy confirmation theory (ECT) has been generally adopted to explain customers' decisions to remain loyal or exit (Liao *et al.*, 2017). This theory assumes that consumers compare the product or service performance with prior expectations and this comparison results in satisfaction or dissatisfaction that, in turn, leads to loyalty or switching (Chih *et al.*, 2012; Oliver, 2010).

However, increasingly, scholars are claiming that satisfaction does not always translate into loyalty and that dissatisfaction does not always cause switching behaviour (Chuah, Marimuthu, Kandampully and Bilgihan, 2017; Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen, 2017; Liao *et al.*, 2017) and that "the variance explained by just satisfaction is rather small" (Kumar *et al.*, 2013, p. 246). Thus, new approaches are needed to further explain consumer continuity or switching decisions because despite decades of satisfaction research, "the true role of satisfaction in customer loyalty" is still not clear (Mittal, 2016).

In this vein, Liao *et al.* (2017) point out that there is an alternative paradigm to the ECT that employs external reference points (the performance of competitors or the non-chosen alternatives) to explain retention or switching. Indeed, Liao *et al.* (2017) highlight a gap in the literature regarding the joint analysis of both paradigms adding to the classical ECT variables such as regret and alternative attractiveness to better explain repatronage or switching behaviour. Under this approach, anticipated regret (the regret consumers predict they could feel if they decide to switch to a different provider) is expected to affect buying decisions (pre-purchase influence), whereas after the purchase, consumers will compare the chosen alternative with the foregone ones and will experience regret if the last ones were better even if satisfied with the current provider (Liao *et al.*, 2017). In addition, if consumers perceived that there are other attractive alternatives available, this could also trigger switching in spite of being satisfied (Calvo-Porrall *et al.*, 2017; Liao *et al.*, 2017).

With the aim of filling this gap in the literature, this present study analyses the influence of anticipated regret, post-purchase regret and alternative attractiveness on switching intention along with satisfaction in order to contribute further insights into the actual role played by satisfaction in switching decisions when variables related to external reference points are included. Furthermore, since our main interest is to identify alternative explanations for switching beyond satisfaction, past switching behaviour is also considered because it is a good reflection of variety-seeking tendencies and can motivate satisfied customers to change to a different provider.

Finally, this work aims to address another research gap pointed out by Mittal (2016). The author calls for more research to reveal the role of service type within service switching or loyalty models. The proposed relationships are tested in utilitarian and hedonic services in order to establish a comparison of both that allow elucidation of whether the determinants of switching intentions differ according to the utilitarian or hedonic nature of the service. To our knowledge, this moderating role of service type (hedonic vs utilitarian) has not been addressed in the service marketing literature despite reports from some scholars of significant differences between utilitarian and hedonic services in relation to evaluation of the service (Jiang and Wang, 2006; Lien and Kao, 2008; Ryu *et al.*, 2010).

In summary, we propose that a consumer's decision to switch to a different service provider is not only explained by satisfaction (comparison of current supplier performance and prior expectations) but also by anticipated regret (the regret or lack of it that individuals think they will experience if they decide to switch); post-purchase regret (comparison of

current service performance and performance of non-chosen providers); the existence of other attractive alternatives in the market; and variety-seeking behaviour (past switching).

Therefore, the main contribution of this study is the analysis of the determinants of provider switching behaviour that may explain abandonment by satisfied customers, to see if their influence is greater or smaller than that of satisfaction itself, which has been the most analysed variable. Furthermore, there are expected to be differences between utilitarian and hedonic services, an aspect which is also studied in this work.

To test this proposal, a representative study with 800 Spanish users of mobile phone services and holiday destinations, as utilitarian and hedonic services, respectively, was conducted.

The paper is organised as follows. Section 2 presents the conceptual framework for the investigation and proposes the theoretical model to be estimated on the basis of the hypotheses. Section 3 presents the methodology used in the empirical study, the research context and sampling method. Section 4 presents and discusses the main findings from estimation of the model and the multigroup analysis run to test the moderating effect of service type. Finally, Section 5 summarises the main conclusions, limitations of the study and possible future lines of research.

## 2. Conceptual framework and hypotheses

### 2.1 Consumer switching behaviour in services

Identification of the main factors behind consumer decisions to change service providers may help companies to design more effective strategies that enable them to prevent new customers from leaving or recover those that have already left (Stewart, 1998; Thomas *et al.*, 2004). This approach would lead to significant increases in business profitability, given that it is widely accepted that retaining a customer costs much less than capturing a new one (Hur *et al.*, 2013; Hwang and Kwon, 2016; Zeithaml, 2000).

Table I shows the main factors identified by the literature as determinants in the decision to change service providers (it is not an exhaustive examination of antecedents of switching but an overview of the most relevant).

Out of all the above determinants, researchers have paid greater attention to perceived quality, satisfaction, switching costs and service failures (An and Noh, 2009; Antón *et al.*, 2007; Bansal *et al.*, 2005; Li *et al.*, 2007; Manrai and Manrai, 2007; Olsen and Johnson, 2003), and the first two in particular.

Scholars and practitioners alike have assumed that satisfaction leads to loyalty and so they have emphasised the study of customer satisfaction levels and their effects (Chuah, Marimuthu, Kandampully and Bilgihan, 2017; Jones and Sasser, 1995; Miranda-Gumucio *et al.*, 2013). Consequently, it is thought that one of the main causes leading customers to abandon their providers is dissatisfaction due to a problem with the company (Coulter and Ligas, 2000; Roos, 1999).

Without undermining the undoubted influence of satisfaction and perceived quality on the decision to change provider, the need to seek other reasons to explain switching behaviour has been noted (Keaveney and Parthasarathy, 2001; Liao *et al.*, 2017).

In fact, not all consumers who decide to change provider are dissatisfied because in some cases, the change is due to other factors like variety seeking, the existence of more attractive alternatives or regret (Antón *et al.*, 2007; Calvo-Porrá *et al.*, 2017; Liao *et al.*, 2017).

In addition, the factors behind the decision to change provider may be contingent upon the type of service and so there will be differences between continuous and discrete services or between utilitarian and hedonic services (Pollack, 2015).

### 2.2 Satisfaction

Satisfaction can be examined from one of two approaches: the approach based on a specific transaction and the overall or accumulated satisfaction approach adopted in this work

Antecedents	Researchers
Perceived service quality	Antón <i>et al.</i> (2007), Bansal <i>et al.</i> (2005), Chakravarty <i>et al.</i> (2004), Colgate and Norris (2001), Coulter and Ligas (2000), Cronin <i>et al.</i> (2000), Grace and O’Cass (2001), Gray <i>et al.</i> (2017), Jung <i>et al.</i> (2017), Lee and Cunningham (2001), Malhotra and Malhotra (2013), McDougall and Levesque (2000), Liang <i>et al.</i> (2013), Srivastava and Sharma (2013)
Satisfaction	Athanassopoulos (2000, 2001), Bansal <i>et al.</i> (2005), Calvo-Porrall and Lévy-Mangin (2015a, b), Chih <i>et al.</i> (2012), Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen (2017), Cronin <i>et al.</i> (2000), Henning-Thurau <i>et al.</i> (2002), Jones, Mothersbaugh and Beatty (2000), Keaveney and Parthasarathy (2001), Lee <i>et al.</i> (2001), Lemon <i>et al.</i> (2002), Li <i>et al.</i> (2007), McDougall and Levesque (2000), Manrai and Manrai (2007), Panther and Farquhar (2004), Wangenheim and Bayón (2004a)
Switching costs	Antón <i>et al.</i> (2007), Bansal and Taylor (2002), Bansal <i>et al.</i> (2005), Colgate and Lang (2001), Colgate and Norris (2001), Chih <i>et al.</i> (2012), Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen (2017), Augusto de Matos <i>et al.</i> (2013), Jung <i>et al.</i> (2017), Hu and Hwang (2006), Jones <i>et al.</i> (2000), Lee <i>et al.</i> (2001), Lee and Cunningham (2001), Low and Johnston (2006), Malhotra and Malhotra (2013), Roos <i>et al.</i> (2004), Wu <i>et al.</i> (2017)
Service failures	Antón <i>et al.</i> (2007), Chakravarty <i>et al.</i> (2004), Colgate and Hedge (2001), Colgate and Norris (2001), Chih <i>et al.</i> (2012), Coulter and Ligas (2000), Augusto de Matos <i>et al.</i> (2013), Gerrard and Cunningham (2004), Grace and O’Cass (2001), Liang <i>et al.</i> (2013), Piha and Avlonitis (2015), Roos <i>et al.</i> (2004)
Perceived value	Bansal <i>et al.</i> (2005), Blackwell <i>et al.</i> (1999), Calvo-Porrall and Lévy-Mangin (2015a, b), Chiu <i>et al.</i> (2005), Cronin <i>et al.</i> (2000), McDougall and Levesque (2000)
Trust	Bansal <i>et al.</i> (2005), Jung <i>et al.</i> (2017), Lai <i>et al.</i> (2012), Lee <i>et al.</i> (2011), Li <i>et al.</i> (2007), Wu <i>et al.</i> (2017), Xu <i>et al.</i> (2013)
Commitment	Antón <i>et al.</i> (2007), Bansal <i>et al.</i> (2004), Bansal <i>et al.</i> (2005), Choi and Ahluwalia (2013), Fullerton (2003), Henning-Thurau <i>et al.</i> (2002), Li <i>et al.</i> (2007), Piha and Avlonitis (2015)
Variety seeking	Bansal <i>et al.</i> (2005), Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen (2017), Jung <i>et al.</i> (2017), Park and Jang (2014)
Alternative attractiveness	Antón <i>et al.</i> (2007), Bansal <i>et al.</i> (2005), Calvo-Porrall and Lévy-Mangin (2015a, b), Colgate and Lang (2001), Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen (2017), Colgate and Norris (2001), Jones <i>et al.</i> (2000), Jung <i>et al.</i> (2017), Li <i>et al.</i> (2007), Roos <i>et al.</i> (2004)
Anticipated and post purchase regret	Bolton <i>et al.</i> (2000), Bui <i>et al.</i> (2011), Lemon <i>et al.</i> (2002), Liao <i>et al.</i> (2017), Sánchez-García and Currás-Pérez (2011), Zeelenberg and Pieters (2004b)
Normative and cultural influences	Bansal and Taylor (1999, 2002), Bansal <i>et al.</i> (2005), Cheng <i>et al.</i> (2005), Coulter and Ligas (2000), Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen (2017), East <i>et al.</i> (2001), Liang <i>et al.</i> (2013), Lin and Mattila (2006), Liu <i>et al.</i> (2001), Wangenheim and Bayón (2004a, b)
Perceived risk	Choi and Ahluwalia (2013), Keaveney and Parthasarathy (2001), Lee <i>et al.</i> (2011), Wu <i>et al.</i> (2017)
Past switching behaviour	Bansal <i>et al.</i> (2005), Cheng <i>et al.</i> (2005), Farah (2017), Ganesh <i>et al.</i> (2000), Jung <i>et al.</i> (2017), Hsieh <i>et al.</i> (2012)
Attitude towards switching	Bansal and Taylor (2002), Bansal <i>et al.</i> (2005), Cheng <i>et al.</i> (2005), Farah (2017), Lee <i>et al.</i> (2011)

Source: Own elaboration

Table I. Antecedents of service switching behaviour

(Garbarino and Johnson, 1999; Olsen and Johnson, 2003; Yang and Peterson, 2004). The specific transaction approach defines satisfaction as the consumer’s response to the most recent transaction with the organisation (Oliver, 1993), which will therefore be influenced by the situational variables present at that moment, whereas overall satisfaction considers that the opinion emitted by the consumer is the result of an accumulation of experiences, including both satisfaction associated with specific products and satisfaction with various aspects of the company (Cronin and Taylor, 1992; Homburg and Giering, 2001). In this regard, Homburg and Giering (2001) consider satisfaction to be “the result of a cognitive and affective evaluation in which perceived performance is compared with a comparative standard. The satisfaction

judgment is related to all the experiences with the specific provider in relation to its products, sales process and after-sales service”.

As noted above, satisfaction continues to be considered as one of the main precursors of consumer loyalty (Bolton and Lemon, 1999; Chen, 2012; Jones *et al.*, 2000; Lam *et al.*, 2004; Lee *et al.*, 2017; Tam, 2011) and, so, of market share (Rego *et al.*, 2013) and profitability (Lee *et al.*, 2017).

Analogously, it has been widely proved that dissatisfaction increases consumer switching behaviour (Keaveney and Parthasarathy, 2001; Roos, 1999) and switching intention (Bansal and Taylor, 1999; Gray *et al.*, 2017; Liu *et al.*, 2016; Lucia-Palacios *et al.*, 2016; Manrai and Manrai, 2007). Therefore, it is proposed that:

*H1.* Satisfaction has a negative influence on consumer switching intention.

In spite of the strong support received in the literature for the above hypothesis, the relationship between (dis)satisfaction and behavioural intentions is more complex than it first appears (Hau and Thuy, 2012; Mittal and Kamakura, 2001; Oliver, 1999; Pan *et al.*, 2012).

The relationship between satisfaction and loyalty is non-linear and asymmetric (Chuah, Marimuthu, Kandampully and Bilgihan, 2017; Liao *et al.*, 2017; Tuu and Olsen, 2010). Thus, it is likely that the factors that prevent customers from feeling dissatisfied are not necessarily the same that make them loyal to the company (Anderson and Mittal, 2000; Mittal *et al.*, 1998, 1999; Tsiros, 1998). Consequently, in the great majority of cases dissatisfaction causes individuals to leave the company but satisfaction does not guarantee loyalty. In this vein, Mittal *et al.* (1998) offer empirical support for the existence of an asymmetric relationship between the attributes performance, overall satisfaction and behavioural intentions. Thus, a negative performance of an attribute will have a greater impact on overall satisfaction and on repurchase intentions than a positive performance (Yoon and Kim, 2000). In addition, overall satisfaction presents a decreasing sensitivity to the performance level of the attributes so that, at high levels of positive or negative performance of the attribute, it will be less affected than at intermediate levels. Therefore, the determinants and consequences of satisfaction and loyalty may differ from the determinants and consequences of dissatisfaction and disloyalty (Bloemer *et al.*, 2002; Bloemer and Kasper, 1995). Furthermore, and closely related to the above, satisfaction does not always translate into loyalty and dissatisfaction does not always lead the customer to abandon the provider (Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen, 2017; Liao *et al.*, 2017). The relationship between satisfaction/dissatisfaction and consumer behaviour may therefore be weak or even non-significant. Several studies offer support for this assertion. For instance, the meta-analysis carried out by Szymanski and Henard (2001), although it shows the influence of satisfaction on repurchase, reveals that this only explains, generally, a quarter of the variance of behavioural intentions. Similarly, the study by Burnham *et al.* (2003) shows that exchange costs explain, in isolation, a greater proportion of the variance of repurchase intention than satisfaction itself (30 vs 16 per cent). Likewise, Reichheld (1996) reports that more than 65 per cent of customers who abandon their providers were satisfied. Kumar *et al.* (2013) also point out that the variance explained by satisfaction alone is quite small. In addition, several studies have found a non-significant influence of (dis)satisfaction on repurchase/switching. See, for example, Bodet (2008), Carpenter (2008) and Hellier *et al.* (2003).

Among the reasons that can make dissatisfied consumers stay with their current provider, the most cited are switching costs and inertia (Dagger and David, 2012). In contrast, satisfied customers may decide to switch providers because they perceive that there are more attractive alternatives in the market (Andreassen and Lervik, 1999; Liu *et al.*, 2016) because they realise that another alternative could have been more satisfactory, thus making them regret the choice (Liao *et al.*, 2017; Tsiros and Mittal, 2000; Zeelenberg and

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Pieters, 2004), or just for the sake of variety (Bansal *et al.*, 2005; Ratner *et al.*, 1999; Sánchez-García *et al.*, 2012), among others.

With the aim of providing new insights into why satisfied customers switch service providers, this work analyses the effect of alternative attractiveness, anticipated and post-purchase regret and variety seeking on consumer switching intentions.

### 2.3 *Alternative attractiveness*

In their purchase decisions, consumers have to deal with a myriad of alternatives that are constantly changing due to strong competitive pressure. Furthermore, it is becoming increasingly easy to obtain information on different purchase options through personal and impersonal sources, such as blogs, virtual communities and newsletters, among others. This situation is reducing the length of the relationship between customers and providers (Buckinx and Van den Poel, 2005).

Alternative attractiveness refers to consumer perceptions about the extent to which there are other satisfactory alternatives available in the marketplace (Jones *et al.*, 2000). The existence of a significant relationship between alternative attractiveness and consumer switching intentions has been supported by a number of researchers (Bansal *et al.*, 2005; Lin *et al.*, 2016; Liu *et al.*, 2016; Roos *et al.*, 2004). If consumers do not perceive that there are more attractive alternatives in the market, they may stay with their provider even though they are dissatisfied (Anderson and Narus, 1990; Jones *et al.*, 2000). Consumers may also decide to switch providers despite being satisfied if they think there are better options (Andreassen and Lervik, 1999). Consequently, we posit that:

H2. Alternative attractiveness has a positive influence on consumer switching intention.

### 2.4 *Consumer regret*

Regret has been defined in different ways and, so, scholars have not always studied the same phenomenon using the same term (Connolly *et al.*, 1997). There is broad agreement on the fact that regret is an emotion with a cognitive base because it is necessary to think about “what might have been” to experience this emotion (Brehaut *et al.*, 2003; Zeelenberg and Pieters, 2007). There is no consensus, however, on whether regret is necessarily linked to self-responsibility for the decision (Connolly *et al.*, 1997; Zeelenberg and Pieters, 2007) or if the outcomes of the non-chosen alternatives must be known or if it is enough imagine what might have been (Tsiros and Mittal, 2000; Zeelenberg and Pieters, 2007). In the present work, we adopt the definition by Zeelenberg and Pieters (2007) because it is one of the most comprehensive. Thus, regret is conceived as “the emotion that we experience when realizing or imagining that our current situation would have been better, if only we had decided differently. It is a backward looking emotion signalling an unfavourable evaluation of a decision. It is an unpleasant feeling, coupled with a clear sense of self blame concerning its causes and strong wishes to undo the current situation” (Zeelenberg and Pieters, 2007, p. 3).

The regret theory posits that post purchase behaviour is determined both by the disconfirmation of expectations and by the foregone alternatives (Zeelenberg and Pieters, 2007). This theory is quite similar to the well-known cognitive dissonance theory although there are subtle differences. The cognitive dissonance theory posits that, when making an important purchase decision, consumers may feel psychological discomfort if they think they are not selecting the best option and these tensions can appear in any stage of the purchase and consumption process (Herrmann *et al.*, 1999; Wilkins *et al.*, 2016). When cognitive dissonance arises, consumers try to reduce it in different ways including blaming others, such as sellers, for the decision (Wilkins *et al.*, 2016). The regret theory, however, is associated with self-blame because of an erroneous purchase decision so that satisfaction with the chosen option depends not only on the performance of the selected alternative but

also on the foregone ones (Zeelenberg and Pieters, 2007). Regret is usually associated with the post-purchase stage and can appear in any kind of purchase.

The common reasoning underlying both theories, the cognitive dissonance theory and the regret theory, offer support for the thesis defended in this work: post-purchase behaviour is not only dependent on an internal comparison analysis (perceived performance with prior expectations), but also on an external one (perceived performance with real or imagined performance of foregone alternatives).

In the service provider switching behaviour context, this implies that if consumers regret their choice because they think other alternatives might have been better, they could decide to switch to another provider even though they are satisfied (Tsiros and Mittal, 2000). Indeed, Zeelenberg and Pieters (1999, 2004) obtained support for a direct effect of post-purchase regret on consumer switching intention. Hence, we hypothesise that:

*H3.* Post-purchase regret has a positive influence on consumer switching intention.

Although, as noted above, the regret theory usually makes reference to post-purchase regret, several studies have addressed the role of anticipated regret in consumer behaviour (Chernev, 2004; Greenleaf, 2004; McConnell *et al.*, 2000). These and other researchers defend that, when choosing among several alternatives, individuals anticipate the regret that they will feel if they make a wrong decision, and their choice is affected by this anticipated regret (Connolly and Butler, 2006; Zeelenberg and Pieters, 2007).

In the domain of service switching behaviour, "anticipated regret refers to a consumer's active consideration of the regret he/she would feel after dropping a service" (Lin *et al.*, 2016, p. 124). Lemon *et al.* (2002) proved that consumers take into account not only past and present but also anticipate the future regret when deciding whether or not to switch service providers. They performed an experiment with students using a fictitious online grocery store and found a significant effect of anticipated regret on intentions to drop the service. Likewise, Lin *et al.* (2016) also demonstrated through a real sample of customers from a health club that anticipated regret had a negative and significant effect on intention to renewal or exit.

Thus, if consumers anticipate regretting finishing the relationship with their provider, this will reduce the likelihood of switching (Lemon *et al.*, 2002; Lin *et al.*, 2016). Therefore:

*H4.* Anticipated regret has a negative influence on consumer switching intention.

### 2.5 Variety seeking

Although variety-seeking research has a long tradition in marketing, there are still several topics than deserve investigation (Berné *et al.*, 2001; Bigné *et al.*, 2009). Most researchers have focussed on goods, so studies on the service industry are still scarce, and quite recent (Barroso *et al.*, 2007; Niininen *et al.*, 2004; Vázquez and Foxall, 2006). Specifically, the relationship between variety seeking and loyalty in services is an under-researched topic in the marketing literature (Berné *et al.*, 2001, 2005).

Variety-seeking propensity has been found to be an important driver of consumer switching behaviour (Bansal *et al.*, 2005; Van Trijp *et al.*, 1996), since it is defined as a consumer tendency to change the item consumed in the last purchase (Givon, 1984; Kahn *et al.*, 1986) or the propensity to seek diversity in the choice of goods and services (Kahn, 1995). It should be noted that we refer to intrinsic or true variety seeking, which involves switching brands, products or providers for the sake of variety and not because of the functional value of the alternatives (Berné *et al.*, 2005; Van Trijp *et al.*, 1996).

Many studies have measured consumer variety seeking propensity through an objective measure consisting of actual brand or provider switching behaviour conducted by a consumer in a concrete period of time (Menon and Kahn, 1995; Trivedi, 1999). It has been

suggested in the literature that consumers' past behaviour has a direct influence on their behavioural intentions (Bigné *et al.*, 2009; Cheng *et al.*, 2005; Leone *et al.*, 1999). Consumer past switching behaviour has been defined as the extent to which consumers have switched providers in the past (Bansal *et al.*, 2005). The greater the past switching behaviour, the lower the perception of switching costs (Burnham *et al.*, 2003; Hu and Hwang, 2006) and, therefore, the higher the switching intention (Farah, 2017). Consequently, it is proposed that:

*H5.* Past switching behaviour has a positive influence on consumer switching intention.

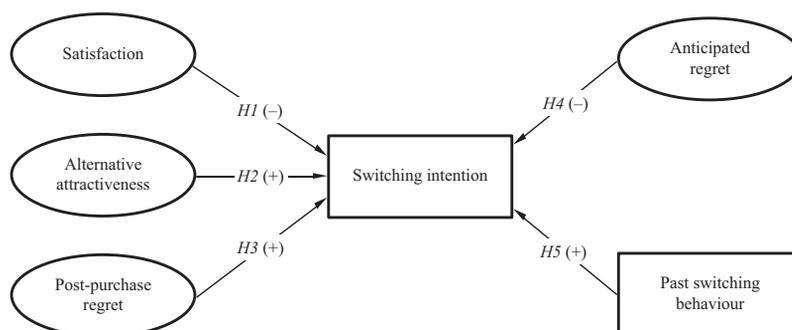
To sum up, customers may switch service providers even when satisfied if they perceive there are more attractive alternatives in the market because they realise or imagine that they could have been more satisfied with a different choice or just for the sake of variety. In contrast, the probability of switching will be lower if they anticipate they could regret the decision. The proposed model is depicted in Figure 1.

### 2.6 Hedonic vs utilitarian services: moderating effects

There is strong consensus in the literature that consumer behaviour is driven by hedonic and utilitarian motivations (Childers *et al.*, 2001; Dhar and Wertenbroch, 2000; Fernandes and Pedroso, 2017; Lin, 2011). Utilitarian motivations are described as “mission critical, rational, decision effective, and goal-oriented” (Lin, 2011, p. 297) whereas hedonic motivations are related to “the search for happiness, fantasy, awakening, sensuality, and enjoyment” (Lin, 2011, p. 297).

In the same vein, most scholars conceive perceived value as a multidimensional construct and, although there is no agreement over its dimensions, the majority agree that it comprises a functional or utilitarian value and an emotional or hedonic value (Hur *et al.*, 2013; Sheth *et al.*, 1991; Sweeney and Soutar, 2001). Whereas hedonic value reflects the potential for entertainment and enjoyment, utilitarian value is associated with the accomplishment of a task (Babin *et al.*, 1994, 2005; Chandon *et al.*, 2000). Chaudhuri and Holbrook (2001) define hedonic value as a product's potential to provide pleasure and utilitarian value as the ability of the product to perform functions in the consumer's daily life.

In relation to the above, some authors talk of utilitarian or hedonic products and services (Dhar and Wertenbroch, 2000). In fact the same product may possess both types of value (Chaudhuri and Holbrook, 2001; Gursoy *et al.*, 2006; Sloot *et al.*, 2005), although consumers characterise some products as mainly hedonic and others as mainly utilitarian (Dhar and Wertenbroch, 2000). Hedonic products provide consumption that is more experiential, fun, pleasure and excitement, whereas utilitarian products are mainly instrumental and functional (Dhar and Wertenbroch, 2000). Therefore, to distinguish between utilitarian



**Figure 1.** Antecedents of service provider switching intention

and hedonic services, the core benefit or main reason for consumption should be considered (Ng *et al.*, 2007).

Finally, some authors differentiate between hedonic and utilitarian at attribute level (Baltas *et al.*, 2017). For example Falk *et al.* (2010) attempt to explain the asymmetric relationship between service quality and satisfaction, by considering the hedonic or utilitarian nature of the different attributes of quality.

In this present study, we focus on analysing the moderating effect of the type of service, utilitarian vs hedonic, on the influence of the different antecedents of intention to switch provider.

At the product level, several studies have shown that product type (hedonic vs utilitarian) plays a moderator role in several areas of consumer behaviour, for instance, in the selection of purchase channel (Kushwaha and Shankar, 2013); country-of-origin effects (Sharma, 2011) and the effect of brand equity on consumer stock-out responses (Sloot *et al.*, 2005), among others.

In the services domain, various works have shown that the nature of the service moderates the relationship between various evaluative variables. For example, Jiang and Wang (2006) demonstrated that pleasure and arousal had stronger impact on consumers' perceived quality and satisfaction in hedonic than in utilitarian product/services. In the same vein, Hellén and Sääksjärvi (2011) showed that the effect of happiness on perceived quality and commitment varied depending on whether the service was hedonic or utilitarian. Similarly, Pollack (2015) found that the relationship between satisfaction and behavioural intentions differed according to the type of service. For example, they found that variety seeking was significant for discrete services with experiential benefits whereas switching costs were more important in utilitarian services. Likewise, the study by Lien and Kao (2008) showed that whereas technical quality is more influential on consumer satisfaction in the case of utilitarian services, functional quality is the most relevant driver of satisfaction in hedonic services. In addition, Baek and King (2011) found that the effects of perceived value for money, perceived quality and information costs on purchase intention differ between utilitarian and hedonic services.

In our case, as noted above, hedonic value reflects the fun and potential enjoyment of a service whereas utilitarian value is related to task completion, that is, utilitarian services are purchased for their functional features whereas hedonic ones are bought for the pleasure they provide (Babin *et al.*, 2005; Bigné *et al.*, 2008; Chiu *et al.*, 2005; Shukla and Babin, 2013). These differences regarding purchase or consumption reasons lead to differences in how consumers evaluate both service types. In this way, when evaluating utilitarian services consumers use more cognitive cues. However, affective appraisals dominate hedonic services because the importance of experiencing personal pleasure and enjoyment during the service consumption is more salient here (Lien and Kao, 2008; Ng *et al.*, 2007).

The above-mentioned differences between utilitarian and hedonic services suggest a moderating effect of service type on the determinants of service evaluation that has received only limited attention in the literature.

The previous divergences between utilitarian and hedonic services lead us to expect that the moderating role of service type could also be extended to the determinants of switching, that is, we propose that the determinants of consumers' switching intentions will differ depending on the hedonic or utilitarian nature of the service because evaluation is also different. This idea is also reinforced by the fact that consumer variety-seeking behaviour is higher when the product has more hedonic attributes (Kahn and Lehmann, 1991; Van Trijp *et al.*, 1996). Thus, the tendency of consumers to look for variety in the acquisition of hedonic services could lead them to search for a new provider or alternate among familiar ones despite being satisfied with the service because of the need for stimulation (Barroso *et al.*, 2007; Vázquez and Foxall, 2006). We hypothesise then that in hedonic services, consumers

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will switch providers more than in utilitarian services (Carroll and Ahuvia, 2006; Van Trijp *et al.*, 1996) independently of alternative attractiveness perception, satisfaction and post-purchase regret, as reflected in the following research questions:

- RQ6a.* The influence of satisfaction on consumer switching intention will be weaker for hedonic services than for utilitarian services.
- RQ6b.* The influence of alternative attractiveness on consumer switching intention will be weaker for hedonic services than for utilitarian services.
- RQ6c.* The influence of post-purchase regret on consumer switching intention will be weaker for hedonic services than for utilitarian services.

Jiang and Wang (2006) and Hellén and Sääksjärvi (2011) proved that the influence of affect/emotions on satisfaction, perceived quality and commitment was moderated by service type (hedonic vs utilitarian). Since anticipated regret is also an emotion, its influence on switching intention is expected to be moderated by the nature of the service. The idea is that in hedonic services consumers get pleasure from switching and, so, we reason that they will anticipate lower regret than in utilitarian services, reinforcing their decision to switch service provider. Therefore:

- RQ6d.* The influence of anticipated regret on consumer switching intention will be stronger for hedonic services than for utilitarian services.

As noted in the introduction past switching behaviour is considered a good proxy for variety seeking behaviour (Chintagunta, 1999). The search for variety has been identified as an important motivation for brand/provider switching behaviour (Bansal *et al.*, 2005; Van Trijp *et al.*, 1996), since it is defined as “the tendency of an individual to seek diversity in the choice of goods or services, changing the item consumed on the last occasion” (Berné *et al.*, 2001, 2005).

As pointed out previously, there is strong consensus over the more salient role played by variety seeking in hedonic vs utilitarian services (Pollack, 2015). Thus, in hedonic services, variety seeking will have a stronger impact on exit/repurchase intentions than in utilitarian services. Since variety seeking is captured here through past switching, it is hypothesised that past switching behaviour will have a stronger positive effect on switching intention in hedonic than in utilitarian services. Rational arguments therefore dominate exit decisions in utilitarian services and, so, more intense switching behaviour in the past does not necessarily imply a higher tendency to switch again. However, in hedonic services, past switching is carried out for the sake of variety and it is expected to be a strong predictor of new exiting behaviour. Hence, we postulate that:

- RQ6e.* The influence of past switching behaviour on consumer switching intention will be stronger for hedonic services than for utilitarian services.

### 3. Method

#### 3.1 Research context

Mobile phone services and holiday destinations have been selected as the research setting. Several reasons led to the choice of mobile phone services for the present study. First, although currently mobile phones provide both hedonic and utilitarian benefits, the choice of a mobile phone company is guided mainly by functional reasons, such as the fees or the characteristics of the phone offered. Second, it can be considered a relational service, where consumers tend to continue with the same provider because of inertia and/or the presence of switching costs (Hu and Hwang, 2006; Lee *et al.*, 2001). In fact, the mobile phone industry in the study context (Spain) is characterised by having barriers to switching that increase the risk for consumers. There are different types of switching costs: procedural (e.g. complex

procedures for changing provider, excessively long waiting times, abusive long-term contract commitments etc.), financial (e.g. compensations for switching provider), functional (e.g. risk of not keeping the telephone number when switching provider, unexpected changes in coverage, etc.). According to the latest data from Spain's Committee on Markets and Competition (Comisión Nacional de los Mercados y la Competencia, CNMC), in December 2017, in Spain, there were 52,009,637 mobile lines with a penetration rate over the population of 111.8. Finally, due to market saturation and strong competitive pressure in Spain, deeper knowledge of the determinants of consumer tendencies to switch mobile companies has relevant managerial implications.

The main motivation for selecting holiday destinations is twofold. First, because there is consensus in the literature concerning the predominance of hedonic motivations in the purchase of leisure and tourism services (Decrop and Snelders, 2005; Gursoy *et al.*, 2006). Second, variety seeking plays a significant role in this product category (Barroso *et al.*, 2007; Jang and Feng, 2007). The present work focusses on holiday destinations as opposed to weekend and long weekend trips. This makes it possible to identify different tourist profiles depending on their propensity to switch destinations: those who seek variety and those who prefer to return to the same destination for their holidays (Decrop and Snelders, 2005).

### 3.2 Research approach and sampling

The study is mainly quantitative, although two focus groups were used to adapt the measurement scales to the field of study. The focus of the research is causal and the information was collected in Spain by means of a structured questionnaire. In the case of mobile phone services, the target population comprises individuals between 18 and 65 years old who have a mobile phone for private use. Regarding holiday destinations, the target population consists of individuals between 18 and 65 years old who have travelled on their main holiday at least once in the last two years, excluding lodging in relatives and friends' houses or their own secondary residence. A two-year period rather than a one-year period was established in order to make sample recruitment easier, as the proportion of Spanish inhabitants who travel for leisure is around 57 per cent but this figure would be even lower if secondary residences were excluded, as in the case of the present study. The variables under study focus on the last main holiday destination giving rise to a set of 172 holiday destinations visited by interviewees: sun-and-beach (e.g. Ibiza, Tenerife and Cuba, to name the most popular), urban destinations (e.g. Barcelona, Madrid, London, Paris) and rural holiday destinations (e.g. Pyrenees, Asturias).

The sample selection was a result of a combination of the random route sampling method and the establishment of gender and age quotas to ensure that the sample shows the same sociodemographic structure as the target population. Data were gathered in eight Spanish cities (A Coruña, Alicante, Bilbao, Madrid, Seville, Valencia, Valladolid and Zaragoza), and the questionnaire was administered personally to the respondents in their homes. Participants came from households chosen using the random route procedure in the above cities. After selecting the household, sample representativeness was ensured by fixing *a priori* gender and age quotas for the interviewees. This procedure was monitored by a company specialising in field work, with duly trained professional interviewers.

We finally obtained a sample size of 800 individuals, 400 for each service, with 4.9 per cent sample error, for a confidence level of 95.5% ( $p = q = 0.5$ ). Table II shows the sociodemographic characteristics of the sample by the type of service. These samples comprise a similar number of males and females, with a predominance of 26–45 year olds, employed, with secondary studies and income similar to the average in Spain.

The subsample of mobile telephone consumers was characterised by having long experience with the service, since 62 per cent had used it for more than five years. In total, 45 per cent had been with their operator for more than four years and almost 72 per cent

Characteristics	Utilitarian %	Hedonic %	The moderating role of service type
<i>Gender</i>			
Men	50.3	51.0	
Female	49.7	49.0	
<i>Completed studies</i>			
Primary	35.5	27.1	<b>65</b>
Secondary	41.8	47.6	
University	21.4	24.8	
<i>Age</i>			
Up to 25	15.6	15.5	
25–45	51.3	49.6	
45 and over	34.1	34.9	
<i>Job</i>			
Not working	25.2	21.8	
Self-employed	13.9	13.9	
Employed	56.9	60.5	
Retired	4.0	3.8	
<i>Household income (reference average €1,800)</i>			
Well below average	14.1	7.8	
Below average	25.3	19.7	
Average	39.3	41.1	
Above average	16.9	24.5	
Well above average	4.4	6.9	

**Table II.**  
Sociodemographic profile of the sample

for more than two years. Also, 67.3 per cent of interviewees had a contract with their provider, as against 31 per cent who had the prepaid service. As regards the subsample of consumers of holiday destinations, 85 per cent of the sample travel between one and three times a year for leisure, and only 15 per cent do so more frequently. The last holiday trips were mainly 5–14 days long (68 per cent) during the summer period (67.5 per cent). Holiday destinations were mainly urban and cultural (43.7 per cent), followed by sun-and-beach (39.7 per cent) and rural tourism (8.5 per cent). Finally, interviewees usually choose the same type of holiday, since 60 per cent said they went on the same type of holiday often, almost always or always.

### 3.3 Measurement scales

In the appendix is a description of the measurement scale for the variables in this study. The initial questionnaire was pretested before establishing its final form. In total, 25 users of mobile telephony and 25 users of holiday destinations were interviewed. This pretest helped to improve the wording of the questions and even reconsider the composition of some scales, which was important for refining the final measurement instrument. In this study, we followed the double translation protocol: the original scales (in English) were translated into Spanish, and then back into English to report the results. In Tables AI and AII, we detail the measurement scales selected for each variable for both services.

The review of the literature on consumer satisfaction highlights the absence of agreement over measurement of this construct (Giese and Cote, 2000; Oliver, 1997). Despite decades of research interest in this concept different methodological approaches co-exist: direct and indirect measurement (Yi, 1990); single-item or multi-item measures (Babin and Griffin, 1998; Oliver, 1997; Westbrook, 1987; Yi, 1990); and various scale intervals and response formats (Babin and Griffin, 1998; Yi, 1990).

When determining the scale to use in this study to measure overall satisfaction, it was ensured that there were no measures of regret of the type "My choice of X was correct" (Patterson and Smith, 2003), given that regret will be studied as a different concept, thereby avoiding problems of discriminant validity. Additionally, a scale used in a work focussing on provider switching behaviour has been used.

Thus, the scale finally used to measure global satisfaction is based on Burnham *et al.* (2003), and initially comprised five items that gathered information on: overall satisfaction with the provider; whether the provider meets the individual's needs; assessment of the relationship; fulfilment of expectations; and overall satisfaction with the service. The pretest confirmed that this scale was suitable because there were no difficulties with comprehension or assessment, but it also led to the elimination of one item, item 3.

The scale used to assess alternative attractiveness is based on Jones *et al.* (2000) and Ping (1993). Concerning regret, the scale developed by Brehaut *et al.* (2003) was used to measure post purchase regret, and also anticipated regret with the pertinent adaptation. Past switching behaviour was captured by means of an objective question that collected the number of different providers the consumer had used, following Niininen *et al.* (2004). In mobile phone services, interviewees were asked about the number of different companies they had been with since becoming users of this type of service because the number of providers is limited. However, for holiday destinations, the period of time was constrained to the last four years to facilitate the response.

Finally, to measure switching intention, a one-item scale option was selected, following other authors such as Garland (2002), Jones *et al.* (2003) and Mittal and Kamakura (2001). Due to the fact that one of the objectives of the present work is to analyse the effect of variety seeking on switching behaviour and variety seeking has been defined as the tendency of an individual to change the item acquired in the last purchase event (Kahn *et al.*, 1986), it is necessary to restrict the temporal period of reference. In the case of mobile phone services, respondents were asked about their intention to switch their mobile company in the next two months, following Bansal *et al.* (2005). In holiday destinations, interviewees were asked about their intention to go to a different destination in their next holiday trip.

#### 4. Findings and discussion

Before testing the proposed hypotheses, the psychometric properties of the measurement scales were evaluated. Measurement instrument validity and reliability were verified by confirmatory factor analysis (CFA) with EQS 6.1 (Bentler, 2005) and including all the latent variables in our theoretical model. Given that model estimation showed no evidence of multivariate normality (Mardia normalised coefficient is 21.81 and 57.74 for mobile services and holiday destinations, respectively), we report robust statistics (Satorra and Bentler, 1994) for model estimation using the maximum likelihood method.

Three items (atr1, preg2 and sat1) were eliminated in the holiday destinations measurement model because they were causing convergent validity problems. These items were also removed from the mobile services measurement model to ensure factor structural equivalence and configural invariance between groups (Hair *et al.*, 2006).

Results of the final CFAs confirmed that the measurement model provided a good fit to the two data sets on the basis of various fit statistics. CFA results (see Tables III and IV) provide evidence of reliability, convergent and discriminant validity according to the criteria proposed by Anderson and Gerbing (1988), Bagozzi and Yi (1988) and Fornell and Larcker (1981).

After refining the measurement scales and with the aim of testing the first five hypotheses, structural equation analysis was carried out using EQS 6.1 and the maximum likelihood estimation method, corrected with robust statistics. The main results obtained for

Factor	Item	Convergent validity				$\alpha$		Reliability CR		AVE	
		Factor loading (robust <i>t</i> -value)		Loading average		M	D	M	D	M	D
SATISFACTION (SAT)	sat2	0.86 (15.08)	0.83 (10.54)	0.90	0.85	0.92	0.89	0.92	0.89	0.80	0.72
	sat3	0.92 (18.27)	0.89 (12.19)								
	sat4	0.91 (18.29)	0.83 (9.94)								
ALTERNATIVE ATTRACTIVENESS (ATR)	atr2	0.77 (11.16)	0.76 (8.85)	0.82	0.74	0.80	0.70	0.81	0.71	0.67	0.55
	atr3	0.87 (12.51)	0.72 (8.90)								
POST PURCHASE REGRET (PREG)	preg1	0.90 (16.07)	0.88 (13.86)	0.86	0.83	0.91	0.89	0.92	0.90	0.74	0.70
	preg3	0.86 (15.84)	0.77 (13.70)								
	preg4	0.82 (19.30)	0.82 (17.04)								
	preg5	0.86 (17.14)	0.87 (14.24)								
ANTICIPATED REGRET (AREG)	areg1	0.90 (27.35)	0.76 (14.80)	0.92	0.83	0.96	0.91	0.96	0.92	0.84	0.69
	aref2	0.86 (25.22)	0.76 (12.82)								
	areg3	0.93 (30.59)	0.88 (15.10)								
	areg4	0.95 (31.57)	0.83 (13.71)								
	areg5	0.95 (32.39)	0.90 (13.05)								
Goodness of fit indexes											
		NFI	NNFI	CFI	IFI	RMSEA					
Mobile services	S-B $\chi^2$ (71df) = 138.04 ( $p = 0.00$ )	0.962	0.976	0.981	0.981	0.049					
Destinations	S-B $\chi^2$ (71df) = 137.61 ( $p = 0.00$ )	0.926	0.952	0.962	0.963	0.048					

**Table III.** Reliability and convergent validity of the measurement model

Notes:  $\alpha$ , Cronbach's alpha; CR, composite reliability; AVE, average variance extracted

	SAT	ATR	PREG	AREG
<i>Mobile services data set</i>				
SAT	0.80	0.02	0.66	0.12
ATR	[0.18;0.42]	0.67	0.07	0.13
PREG	[0.21;0.33]	[0.55;0.79]	0.74	0.16
AREG	[-0.12;0.04]	[-0.21;0.03]	[-0.18;-0.02]	0.84
<i>Holiday destinations data set</i>				
SAT	0.72	0.00	0.01	0.00
ATR	[-0.15;0.09]	0.55	0.00	0.11
PREG	[-0.04;0.16]	[-0.11;-0.17]	0.70	0.00
AREG	[-0.16;0.04]	[0.19;0.47]	[-0.06;0.14]	0.69

Notes: Diagonal represents average variance extracted; above the diagonal, the shared variance (squared correlations) are represented; below the diagonal, the 95% confidence interval for the estimated factors correlations is provided

**Table IV.** Discriminant validity of the measurement model

mobile services and holiday destinations are shown in Table V. In addition, the results are graphically represented in Figures 2 and 3 to facilitate comparison.

A first approach to the results showed several differences in the significant antecedents of mobile services and holiday destination switching intentions, finding agreement only regarding the effect of satisfaction and alternative attractiveness. Surprisingly, satisfaction was not a significant antecedent of switching intention (*HI*) in mobile services or in holiday destinations despite the fact that this relationship has been strongly supported by the

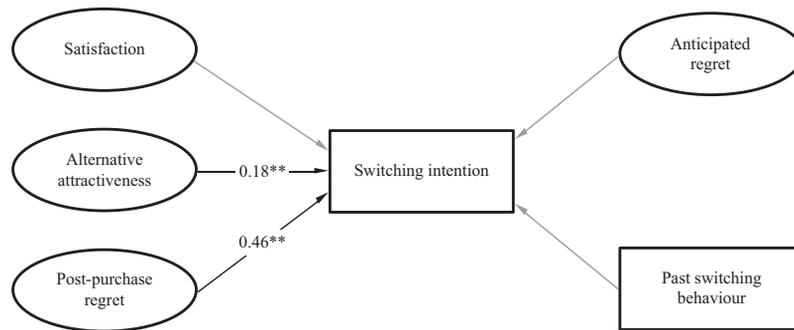
literature (Bansal *et al.*, 2005; Manrai and Manrai, 2007). These findings are in line with the researchers who argue that the relationship between satisfaction and behavioural intentions is more complex than it first appears (Patterson, 2004; Yi and La, 2004) and also offers support to the underlying idea of this work: factors other than satisfaction are needed to explain service provider switching propensity. In utilitarian services (e.g. mobile services), post-purchase regret could be the main driver of exiting decisions, while in hedonic services (e.g. holiday destinations), variety seeking could trigger switching behaviour.

**Table V.**  
Antecedents of service provider switching intention

H	Sign <sup>a</sup>	Structural relations	Mobile services			Destinations		
			$\beta$	Robust t	S/NS	$\beta$	Robust t	S/NS
H1	(-)	Satisfaction→Switch Int	-0.17	-1.66	Not supported	-0.06	-0.72	Not supported
H2	(+)	Alt. attractiveness→Switch Int	0.18	3.31**	Supported	0.14	2.36*	Supported
H3	(+)	Post purchase regret→Switch Int	0.43	3.99**	Supported	0.12	1.67	Not supported
H4	(-)	Anticipated regret→Switch Int	-0.03	-0.78	Not supported	-0.16	-3.48**	Supported
H5	(+)	Past switching→ Switch Int	0.02	0.49	Not supported	0.31	5.89**	Supported

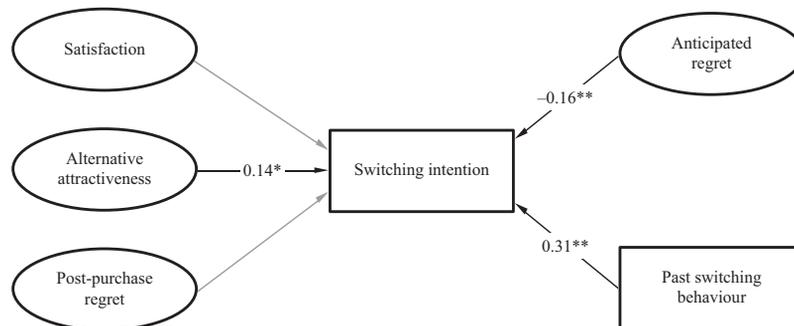
**Notes:** S/NS, hypotheses support or not support. <sup>a</sup>Hypothetical sign of the relation. \* $p < 0.05$ ; \*\* $p < 0.01$

**Figure 2.**  
Antecedents of switching intention in mobile services



**Notes:** Goodness-of-fit statistics: S-B  $\chi^2=184.322$ ; sig. 0.000; df=88; NFI=0.953; NNFI=0.965; CFI=0.974; IFI=0.975; RMSEA=0.052 (0.042–0.063). \*\* $p < 0.01$

**Figure 3.**  
Antecedents of switching intention in holiday destinations



**Notes:** Goodness-of-fit statistics: S-B  $\chi^2=165.772$ ; sig. 0.000; df=88; NFI=0.923; NNFI=0.948; CFI=0.962; IFI=0.962; RMSEA=0.047 (0.036–0.058). \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

Alternative attractiveness (*H2*) exerted a significant direct impact on switching intention in both services, corroborating the findings of previous studies (Bansal *et al.*, 2005; Jones *et al.*, 2000; Vázquez and Foxall, 2006). Therefore, when consumers perceive that there are more satisfactory viable options in the marketplace, the likelihood of switching their current service provider increases regardless of whether the service is utilitarian or hedonic.

Post-purchase regret (*H3*) was the main driver of switching intention in the utilitarian service. These results add new empirical support to the findings obtained by Tsiros and Mittal (2000) and Zeelenberg and Pieters (2004), reinforcing the idea that post purchase regret is a key concept to explain switching behaviour. However, this factor had no influence on switching intention in the hedonic service. These findings could be explained by the high propensity of consumers to seek variety in the purchase of hedonic products (Carroll and Ahuvia, 2006; Van Trijp *et al.*, 1996) and, especially, in tourism and leisure services (Barroso *et al.*, 2007; Jang and Feng, 2007). Consequently, tourists may decide to switch holiday destinations on their next trip, despite not regretting their last choice, for the sake of variety.

As far as the effect of anticipated regret is concerned (*H4*), results showed a non-significant influence on switching intention in the context of mobile services. In this particular case, it could be observed that whereas the regret that interviewees think they would feel if they switched mobile company is low because they consider there are other good companies to choose from, switching intention is not high. This could be due to switching costs perception or inertia, which are more relevant in this type of service. In contrast, in holiday destinations anticipated regret linked to switching significantly predicted switching intention. In this service, given that consumers thought they would not regret travelling to a different destination for their next holiday trip, switching intention was higher.

Finally, past switching behaviour (*H5*) was not a significant predictor of switching intention in the utilitarian service. This could be explained by the interviewees' low propensity to switch their mobile company due to the relational nature of this type of service. However, past switching behaviour positively affected intention to switch holiday destinations, and was even the most influential factor. Hence, consumers who had been to more different destinations in recent years were also the ones more prone to changing again for their next trip. Consequently, findings in the hedonic service setting agreed with those obtained by Bansal *et al.* (2005), whereas the results for the utilitarian service were consistent with Cheng *et al.* (2005). Further research is therefore needed to elucidate the effect of past switching behaviour on service provider switching intention.

A multigroup analysis was run to test whether the type of service (utilitarian *vs* hedonic) moderated the influence of satisfaction, alternative attractiveness, post-purchase and anticipated regret and past switching behaviour on switching intentions (*RQ6a–RQ6e*). The results are shown in Table VI.

The significance of the  $\chi^2$  difference showed that, as predicted, the effect of satisfaction on switching intention was weaker in the case of hedonic services (*RQ6a*). However, as discussed previously, satisfaction was not really an influential factor even in the case of mobile services because its effect was only significant at  $p < 0.10$ . Hence, other drivers of switching must be found. In this regard, post-purchase regret strongly affected switching intention in the utilitarian service. Nevertheless and, as expected, its effect was weaker and even non-significant for the hedonic service. Concerning alternative attractiveness and contrary to our hypothesis, if consumers perceive that there are other attractive options in the marketplace, this is going to increase their switching intention regardless of the type of service. Finally, and consistent with our predictions, anticipated regret and past switching behaviour had a stronger effect on holiday destination users' switching intention than in mobile users. The higher propensity to variety seeking associated with hedonic services in contrast to utilitarian services goes a long way to explaining the above results Table VI.

H	Structural relation	G1: mobile Loading ( <i>t</i> -value)	G2: destination Loading ( <i>t</i> -value)	$\chi^2$ Diff.	S/NS
<i>RQ6a</i>	Satisfaction→Switch Int (G1 > G2)	-0.17 (-1.66)	-0.06 (-0.72)	12.61**	Supported
<i>RQ6b</i>	Alt. attractiveness→Switch Int (G1 > G2)	0.18 (3.31**)	0.14 (2.36*)	1.50	Not supported
<i>RQ6c</i>	Post purchase regret→Switch Int (G1 > G2)	0.43 (3.99**)	0.12 (1.67)	16.84**	Supported
<i>RQ6d</i>	Anticipated regret→Switch Int (G1 < G2)	-0.03 (-0.78)	-0.16 (-3.48**)	4.14*	Supported
<i>RQ6e</i>	Past switching→Switch Int (G1 < G2)	0.02 (0.49)	0.31 (5.89**)	15.62**	Supported
S-B $\chi^2$ (176df) = 349.268 ( <i>p</i> = 0.00)	BBNFI 0.940	BENNFI 0.958	CFI 0.969	IFI 0.970	RMSEA 0.050

**Table VI.**  
Multigroup analysis:  
moderating effect of  
type of service

**Notes:** S/NS, RQ support or not support. \**p* < 0.05; \*\**p* < 0.01

## 5. Conclusions and implications

The main purpose of the present research was to gain new insights into the drivers of service provider switching intention beyond the ECT and, additionally, analyse the moderating role of the type of service (utilitarian vs hedonic) on the determinants of switching intention. Specifically, the effects of alternative attractiveness, post-purchase and anticipated regret and past switching behaviour have been studied. The findings contribute to revisit the debate in the literature regarding the relationship between satisfaction and behavioural intentions. In this regard, several researchers have pointed out that the relationship between both variables is more complex than it first appears (Hau and Thuy, 2012; Pan *et al.*, 2012).

In fact, the results show that satisfaction is not a significant antecedent of switching intention in the hedonic service and its effect is only significant at *p* < 0.10 in the utilitarian service. These findings are in line with previous studies that have shown that satisfaction only accounts for a small portion of the variance of consumer behaviour in the future (Kumar *et al.*, 2013; Szymanski and Henard, 2001). For instance, the meta-analysis by Szymanski and Henard (2001), although evidencing the influence of satisfaction on repurchase, highlighted that it only explained, generally, a quarter of the variance of the behavioural intentions. Likewise, Bodet (2008), in a sport service context (a fitness club), found that satisfaction did not predict customer repurchase behaviour.

There are several possible explanations for the non-significant effect of satisfaction on switching intentions. First, there is evidence that the effect of satisfaction on behavioural intentions is non-linear and asymmetric (Chuah, Marimuthu, Kandampully and Bilgihan, 2017; Liao *et al.*, 2017). Therefore, the antecedents and consequences of satisfaction and loyalty may differ from the determinants and outcomes of dissatisfaction and disloyalty (Bloemer *et al.*, 2002; Bloemer and Kasper, 1995). In other words, whereas dissatisfaction very often leads to switch the current provider, merely satisfying a customer frequently is not enough to avoid switching (Calvo-Porrall *et al.*, 2017; Liao *et al.*, 2017).

Second, the strength of the effect of satisfaction on loyalty depends on certain idiosyncratic factors (Kumar *et al.*, 2013) such as the considered industry, the market segment and the presence of switching barriers (i.e. switching costs) or switching triggers (e.g. alternative attractiveness or variety seeking). According to this reasoning, the lack of influence of satisfaction on switching intentions in holiday destinations could be due to tourists' desire for variety in their next holiday trip. In the case of mobile services, most

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likely, the existence of other attractive options (Calvo-Porrall *et al.*, 2017) diminishes the impact of satisfaction on changing providers but increases the thoughts of “what might have been if I had chosen B instead of A...” (i.e. post-purchase regret). Thus, the impact of satisfaction on switching or repurchase intentions may differ depending on the type of service and the findings of the present study cannot be generalised to other sectors without caution. For example, in a service with high switching costs like financial services, the relationship between satisfaction and retention is likely to be medium or even low but not because satisfied customers leave but because dissatisfied customers stay due to inertia or searching costs, among others.

Thus, results provide support for the theoretical argument proposed in this study: satisfaction is no longer a necessary or sufficient condition to avoid service switching behaviour and, so, further drivers must be found.

In the utilitarian service, the main predictor of switching intention is post-purchase regret, followed some way off by alternative attractiveness. Thus, if consumers regret their decision because they think that other alternatives could have been more satisfactory, they might decide to switch to another provider even if initially they were satisfied. In the hedonic service, although the perception of other attractive alternatives also has a significant effect on switching propensity, the principal determinant of switching intention is past switching behaviour and, to a lesser extent, anticipated regret. Therefore, results show important differences between the antecedents of switching in utilitarian and hedonic services that have been confirmed by means of a multigroup analysis. An important explanation for these discrepancies is the higher variety-seeking propensity associated to hedonic *vs* utilitarian services. Also, differences in the way consumers evaluate hedonic and utilitarian services, through an affective or cognitive approach respectively, may explain part of these divergences.

Another point that needs further discussion is if the previous arguments can be applied to any hedonic service or are specific to tourist destinations. Hedonic services have been associated with variety seeking propensity. However, in other hedonic services, the temporal pattern could be different. For example, in a restaurant, maybe in the short run, satisfaction could lead to return when the individual has not reached saturation point because there are still new dishes to taste but, after repeated visits, the marginal intention to return could decrease if the stimulation level provided by the restaurant falls below the optimum. Nevertheless, there are also consumers who do not like to repeat the restaurant in two consecutive purchases and prefer to alternate among different providers. Hence, there is an important gap in the literature regarding the temporal effect of satisfaction and variety seeking on hedonic services switching behaviour.

Concerning the managerial implications of this study, in utilitarian services, it is important to emphasise that in defensive marketing strategies, service managers should aim to reduce post purchase regret or increase rejoice in order to discourage customers from switching. In contrast, in offensive marketing strategies, service managers should increase post-purchase regret of competitors' customers, stressing that they could be more satisfied with other alternatives. In the mobile phone sector, these strategies are usually based on prices and the device offered but, depending on the type of service, other features could be highlighted. In hedonic services, however, companies should design offensive strategies based on reducing anticipated regret associated to switching by strengthening the perception that there are better alternatives in the marketplace. Also, in defensive strategies, since variety seeking is important, hedonic services providers should change the content of their services adding new stimuli quite often in order to satisfy consumer variety needs and induce positive affect and surprise, what may lead to repatronage behaviour (Jiang and Wang, 2006). For example, in the travel industry, destination managers could increase the stimulation level of the experience by designing new products or activities such as festivals

or events. Also, in offensive marketing strategies, destination managers should encourage tourists to share content in internet using eWom as a mean of reducing anticipated regret and capturing new visitors.

The main limitation of the present work consists of the consideration of only one utilitarian and one hedonic service in the empirical study. This makes it difficult to generalise the findings because the detected differences could be due not only to the utilitarian or hedonic nature of the services, but also to other idiosyncratic features such as the number of competitors, their communication effort, continuous vs sporadic consumptions of the service or the economic cost, among others. Specifically, the choice of holiday destinations as the hedonic service could bias the results because it is a very particular product where consumer switching behaviour is more salient than in other hedonic services such as paddle courts or golf courses. Thus, future research is encouraged that can offer new insights into the role played by anticipated and post purchase regret in other utilitarian and hedonic services.

A technical limitation of this work is that after testing for different types of invariance between groups (partial or complete), only the requirements of configural invariance were met. In the future, it would be necessary to replicate the estimation of the model in both types of services, ensuring compliance with other forms of invariance.

Another limitation is the different time horizon of the switching intention considered for mobile services (two months) and for holiday destinations (next holiday trip) and thus, an interesting research line to advance understanding of service switching behaviour is the analysis of such behaviour in different time periods. In this sense, the study could be repeated, considering not only short-term switching intention but also mid- and long-term intentions.

As a fourth limitation, it is important to note that despite broad agreement on the influence of switching costs on switching intentions (Chuah, Rauschnabel, Marimuthu, Thurasamy and Nguyen, 2017) the variable was not considered in this study because our focus was on consumers' switching behaviour in spite of being satisfied. Thus, future studies should analyse jointly the influence of ECT, external reference points (i.e. regret and alternative attractiveness), switching costs and variety seeking on consumers future behaviour considering that switching costs could affect as both a direct antecedent and as a moderator. A very similar concept that requires further insights is consumer inertia that could make customers stay with their current provider just out of habit. In addition, several personality traits could moderate the impact of the determinants of switching either by enhancing it or by attenuating it such as risk aversion proneness, consumer innovativeness or prudence, among others. In the case of utilitarian continuous services such as mobile services, customer seniority could also moderate the impact of the determinants of switching intentions, which is an interesting avenue to explore in future research.

### References

- An, M. and Noh, Y. (2009), "Airline customer satisfaction and loyalty: impact of in-flight service quality", *Service Business*, Vol. 3 No. 3, pp. 293-307.
- Anderson, E.W. and Mittal, V. (2000), "Strengthening the satisfaction-profit chain", *Journal of Service Research*, Vol. 3 No. 2, pp. 107-120.
- Anderson, E.W., Fornell, C. and Mazvancheryl, S.K. (2004), "Customer satisfaction and shareholder value", *Journal of Marketing*, Vol. 68 No. 4, pp. 172-185.
- Anderson, J.C. and Gerbing, D. (1988), "Structural modelling in practice: a review and recommended two-steps approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423.
- Anderson, J.C. and Narus, J.A. (1990), "A model of distributor firm and manufacturer firm working partnership", *Journal of Marketing*, Vol. 54 No. 1, pp. 42-58.

- Andreassen, T.W. and Lervik, L. (1999), "Perceived relative attractiveness today and tomorrow as predictors of future repurchase intention", *Journal of Service Research*, Vol. 2 No. 2, pp. 164-172.
- Antón, C., Camarero, C. and Carrero, M. (2007), "Analysing firms' failures as determinants of consumer switching intentions", *European Journal of Marketing*, Vol. 41 Nos 1/2, pp. 135-158.
- Athanassopoulos, A.D. (2000), "Customer satisfaction cues to support market segmentation and explain switching behaviour", *Journal of Business Research*, Vol. 47 No. 3, pp. 191-207.
- Athanassopoulos, A.D. (2001), "Behavioural responses to customer satisfaction: an empirical study", *European Journal of Marketing*, Vol. 35 Nos 5/6, pp. 687-707.
- Augusto de Matos, C., Luiz Henrique, J. and de Rosa, F. (2013), "Customer reactions to service failure and recovery in the banking industry: the influence of switching costs", *Journal of Services Marketing*, Vol. 27 No. 7, pp. 526-538.
- Babin, B.J. and Griffin, M. (1998), "The nature of satisfaction: an updated examination and analysis", *Journal of Business Research*, Vol. 41 No. 2, pp. 127-136.
- Babin, B.J., Darden, W.R. and Griffin, M. (1994), "Work and/or fun: measuring hedonic and utilitarian shopping value", *Journal of Consumer Research*, Vol. 20 No. 4, pp. 644-656.
- Babin, B.J., Lee, Y., Kim, E. and Griffin, M. (2005), "Modeling consumer satisfaction and word-of-mouth: restaurant patronage in Korea", *Journal of Service Research*, Vol. 19 No. 3, pp. 133-139.
- Baek, T.H. and King, K.W. (2011), "Exploring the consequences of brand credibility in services", *Journal of Services Marketing*, Vol. 25 No. 4, pp. 260-272.
- Bagozzi, R. and Yi, J. (1988), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16 No. 2, pp. 74-94.
- Balaji, M.S. (2015), "Investing in customer loyalty: the moderating role of relational characteristics", *Service Business*, Vol. 9 No. 1, pp. 17-40.
- Baltas, G., Kokkinaki, F. and Loukopoulou, A. (2017), "Does variety seeking vary between hedonic and utilitarian products? The role of attribute type", *Journal of Consumer Behaviour*, Vol. 16 No. 6, pp. 1-12.
- Bansal, H.S. and Taylor, S.F. (1999), "The service provider switching model (SPSM)", *Journal of Service Research*, Vol. 2 No. 2, pp. 200-218.
- Bansal, H.S. and Taylor, S.F. (2002), "Investigating interactive effects in the theory of planned behaviour in a service-provider switching context", *Psychology and Marketing*, Vol. 19 No. 5, pp. 407-425.
- Bansal, H.S., Irving, P.G. and Taylor, S.F. (2004), "A three-component model of customer commitment to service providers", *Journal of the Academy of Marketing Science*, Vol. 32 No. 3, pp. 234-250.
- Bansal, H.S., Taylor, S.F. and James, Y.S. (2005), "Migrating to new service providers: toward a unifying framework of consumers' switching behaviours", *Journal of the Academy of Marketing Science*, Vol. 33 No. 1, pp. 96-115.
- Barroso, C., Martín, E. and Martín, D. (2007), "The influence of market heterogeneity on the relationship between a destination's image and tourists' future behavior", *Tourism Management*, Vol. 28 No. 1, pp. 175-187.
- Baumann, C., Elliott, G. and Burton, S. (2012), "Modeling customer satisfaction and loyalty: survey data versus data mining", *Journal of Service Marketing*, Vol. 26 No. 3, pp. 148-157.
- Bentler, P. (2005), *EQS 6: Structural Equation Program Manual, Multivariate Software*, Multivariate Software, Encino, CA.
- Berné, C., Múgica, J.M. and Rivera, P. (2005), "The managerial ability to control the varied behaviour of regular customers in retailing: interformat differences", *Journal of Retailing and Consumer Services*, Vol. 12 No. 3, pp. 151-164.
- Berné, C., Múgica, J.M. and Yagüe, M.J. (2001), "The effect of variety-seeking on customer retention in services", *Journal of Retailing and Consumer Services*, Vol. 8 No. 6, pp. 335-345.

- Bigné, E., Mattila, A. and Andreu, L. (2008), "The impact of experiential consumption cognitions and emotions on behavioral intentions", *Journal of Services Marketing*, Vol. 22 No. 4, pp. 303-315.
- Bigné, E., Sánchez, I. and Andreu, L. (2009), "The role of variety seeking in short and long run revisit intentions in holiday destinations", *International Journal of Culture, Tourism and Hospitality Research*, Vol. 3 No. 2, pp. 103-115.
- Blackwell, S.A., Szeinbach, S.L., Barnes, J.H., Garner, D.W. and Bush, V. (1999), "The antecedents of customer loyalty: an empirical investigation of the role of personal and situational aspects on repurchase decisions", *Journal of Service Research*, Vol. 1 No. 4, pp. 362-375.
- Bloemer, J. and Kasper, H. (1995), "The complex relationship between customer satisfaction and brand loyalty", *Journal of Economic Psychology*, Vol. 16 No. 2, pp. 311-329.
- Bloemer, J., Brijs, T., Swinnen, G. and Vanhoof, K. (2002), "Identifying latently dissatisfied customers and measures for dissatisfaction management", *International Journal of Bank Marketing*, Vol. 20 No. 1, pp. 27-37.
- Bodet, G. (2008), "Customer satisfaction and loyalty in service: two concepts, four constructs, several relationships", *Journal of Retailing and Consumer Services*, Vol. 15 No. 3, pp. 156-162.
- Bolton, R.N. and Lemon, K.N. (1999), "A dynamic model of customers' usage of services: usage as an antecedent and consequence of satisfaction", *Journal of Marketing Research*, Vol. 36 No. 2, pp. 171-186.
- Bolton, R.N., Kannan, P.K. and Bramlett, M.D. (2000), "Implications of loyalty program membership and service experiences for customer retention and value", *Journal of the Academy of Marketing Science*, Vol. 28 No. 1, pp. 95-108.
- Brehaut, J.C., O'Connor, A.M., Wood, T.J., Hack, T.F., Siminoff, L., Gordon, E. and Feldman-Stewart, D. (2003), "Validation of a decision regret scale", *Medical Decision Making*, Vol. 23 No. 4, pp. 281-292.
- Buckinx, W. and Van den Poel, D. (2005), "Customer base analysis: partial defection of behaviourally loyal clients in a non-contractual FMCG retail setting", *European Journal of Operational Research*, Vol. 164 No. 1, pp. 252-268.
- Bui, M., Krishen, A.S. and Bates, K. (2011), "Modeling regret effects on consumer post-purchase decisions", *European Journal of Marketing*, Vol. 45 Nos 7/8, pp. 1068-1090.
- Burnham, T.A., Frels, J.K. and Mahajan, V. (2003), "Consumer switching costs: a typology, antecedents, and consequences", *Journal of the Academy of Marketing Science*, Vol. 31 No. 2, pp. 109-126.
- Calvo-Porral, C. and Lévy-Mangin, J.P. (2015a), "Switching behavior and customer satisfaction in mobile services: analyzing virtual and traditional operators", *Computers in Human Behavior*, Vol. 49, pp. 532-540.
- Calvo-Porral, C. and Lévy-Mangin, J.P. (2015b), "Smooth operators? Drivers of customer satisfaction and switching behavior in virtual and traditional mobile services", *Revista Española de Investigación en Marketing ESIC*, Vol. 19 No. 2, pp. 124-138.
- Calvo-Porral, C., Faiña-Medín, A. and Nieto-Mengotti, M. (2017), "Satisfaction and switching intention in mobile services: comparing lock-in and free contracts in the Spanish market", *Telematics and Informatics*, Vol. 34 No. 5, pp. 717-729.
- Carpenter, J.M. (2008), "Consumer shopping value, satisfaction and loyalty in discount retailing", *Journal of Retailing and Consumer Services*, Vol. 15 No. 5, pp. 358-363.
- Carroll, B.A. and Ahuvia, A.C. (2006), "Some antecedents and outcomes of brand love", *Marketing Letters*, Vol. 17 No. 2, pp. 79-89.
- Chakravarty, S., Feinberg, R. and Rhee, E.Y. (2004), "Relationships and individuals' bank switching behaviour", *Journal of Economic Psychology*, Vol. 25 No. 4, pp. 507-527.
- Chandon, P., Wansink, B. and Laurent, G. (2000), "A benefit congruency framework of sales promotion effectiveness", *Journal of Marketing*, Vol. 64 No. 4, pp. 65-81.
- Chaudhuri, A. and Holbrook, M.B. (2001), "The chain of effects from brand trust and brand affect to brand performance: the role of brand loyalty", *Journal of Marketing*, Vol. 65 No. 2, pp. 81-93.

- Chen, S.C. (2012), "The customer satisfaction-loyalty relation in an interactive e-service setting: the mediators", *Journal of Retailing and Consumer Services*, Vol. 19 No. 2, pp. 202-210.
- Cheng, S., Lam, T. and Hsu, C.H.C. (2005), "Testing the sufficiency of the theory of planned behavior: a case of customer dissatisfaction responses in restaurants", *International Journal of Hospitality Management*, Vol. 24 No. 4, pp. 475-492.
- Chernev, A. (2004), "Goal orientation and consumer preference for the status quo", *Journal of Consumer Research*, Vol. 31 No. 3, pp. 557-565.
- Chih, W.H., Wang, K.Y., Hsu, L.C. and Cheng, I.S. (2012), "From disconfirmation to switching: an empirical investigation of switching intentions after service failure and recovery", *The Service Industries Journal*, Vol. 32 No. 8, pp. 1305-1321.
- Childers, T.L., Carr, C.L., Peck, J. and Carson, S. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior", *Journal of Retailing*, Vol. 77 No. 4, pp. 511-535.
- Chintagunta, P.K. (1999), "Variety seeking, purchase timing, and the 'lightning bolt' brand choice model", *Management Science*, Vol. 45 No. 4, pp. 486-498.
- Chiu, H.C., Hsieh, Y.C., Li, Y.C. and Lee, M. (2005), "Relationship marketing and consumer switching behavior", *Journal of Business Research*, Vol. 58 No. 12, pp. 1681-1689.
- Choi, B. and Ahluwalia, R. (2013), "Determinants of brand switching: the role of consumer inferences, brand commitment, and perceived risk", *Journal of Applied Social Psychology*, Vol. 43 No. 5, pp. 981-991.
- Chuah, S.H.W., Marimuthu, M., Kandampully, J. and Bilgihan, A. (2017), "What drives Gen Y loyalty? Understanding the mediated moderating roles of switching costs and alternative attractiveness in the value-satisfaction-loyalty chain", *Journal of Retailing and Consumer Services*, Vol. 36, pp. 124-136.
- Chuah, S.H.W., Rauschnabel, P.A., Marimuthu, M., Thurasamy, R. and Nguyen, B. (2017), "Why do satisfied customers defect? A closer look at the simultaneous effects of switching barriers and inducements on customer loyalty", *Journal of Service Theory and Practice*, Vol. 27 No. 3, pp. 616-641.
- Colgate, M. and Hedge, R. (2001), "An investigation into the switching process in retail banking services", *International Journal of Bank Marketing*, Vol. 19 No. 5, pp. 201-212.
- Colgate, M. and Lang, B. (2001), "Switching barriers in consumer markets: an investigation of the financial services industry", *The Journal of Consumer Marketing*, Vol. 18 No. 4, pp. 332-347.
- Colgate, M. and Norris, M. (2001), "Developing a comprehensive picture of service failure", *International Journal of Service Industry Management*, Vol. 12 No. 3, pp. 215-233.
- Connolly, T. and Butler, D. (2006), "Regret in economic and psychological theories of choice", *Journal of Behavioral Decision Making*, Vol. 19 No. 2, pp. 139-154.
- Connolly, T., Ordóñez, L.D. and Coughlan, R. (1997), "Regret and responsibility in the evaluation of decision outcomes", *Organizational Behavior and Human Decision Processes*, Vol. 70 No. 1, pp. 73-85.
- Coulter, R.A. and Ligas, M. (2000), "The long good-bye: the dissolution of customer-service provider relationships", *Psychology and Marketing*, Vol. 17 No. 8, pp. 669-695.
- Cronin, J.J. and Taylor, S.A. (1992), "Measuring service quality: a re-examination and extension", *Journal of Marketing*, Vol. 56 No. 3, pp. 55-68.
- Cronin, J.J., Brady, M.K. and Hult, G.T.M. (2000), "Assessing the effects of quality, value and customer satisfaction on consumer behavioral intentions in service environments", *Journal of Retailing*, Vol. 76 No. 2, pp. 193-218.
- Dagger, T. and David, M.E. (2012), "Uncovering the real effect of switching costs on the satisfaction-loyalty association: the critical role of involvement and relationship benefits", *European Journal of Marketing*, Vol. 46 Nos 3/4, pp. 447-468.
- Decrop, A. and Snelders, B. (2005), "A grounded typology of vacation decision-making", *Tourism Management*, Vol. 26 No. 2, pp. 121-132.

- Dhar, R. and Wertenbroch, K. (2000), "Customer choice between hedonic and utilitarian goods", *Journal of Marketing Research*, Vol. 37 No. 1, pp. 60-71.
- East, R., Lomax, W. and Narain, R. (2001), "Customer tenure, recommendation and switching", *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behaviour*, Vol. 14, pp. 46-54.
- Falk, T., Hammerschmidt, M. and Schepers, J.J.L. (2010), "The service quality-satisfaction link revisited: exploring asymmetries and dynamics", *Journal of the Academy of Marketing Science*, Vol. 38 No. 3, pp. 288-302.
- Farah, M.F. (2017), "Application of the theory of planned behavior to customer switching intentions in the context of bank consolidations", *International Journal of Bank Marketing*, Vol. 35 No. 1, pp. 147-172.
- Fernandes, T. and Pedroso, R. (2017), "The effect of self-checkout quality on customer satisfaction and repatronage in a retail context", *Service Business*, Vol. 11 No. 1, pp. 69-92.
- Fornell, C. and Larcker, D. (1981), "Evaluating structural equations models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.
- Fraering, M. and Minor, M.S. (2013), "Beyond loyalty: customer satisfaction, loyalty, and fortitude", *Journal of Service Marketing*, Vol. 27 No. 4, pp. 334-344.
- Fullerton, G. (2003), "When does commitment lead to loyalty?", *Journal of Service Research*, Vol. 5 No. 4, pp. 333-344.
- Ganesh, J.M., Arnold, J. and Reynolds, K.E. (2000), "Understanding the customer base of service providers: an examination of the differences between switchers and stayers", *Journal of Marketing*, Vol. 64 No. 3, pp. 65-87.
- Garbarino, E. and Johnson, M.S. (1999), "The different roles of satisfaction, trust and commitment in customer relationships", *Journal of Marketing*, Vol. 63 No. 2, pp. 70-87.
- Garland, R. (2002), "Estimating customer defection in personal retail banking", *International Journal of Bank Marketing*, Vol. 20 No. 7, pp. 317-324.
- Gerrard, P. and Cunningham, J.B. (2004), "Consumer switching behaviour in the Asian banking market", *Journal of Service Marketing*, Vol. 18 No. 3, pp. 215-223.
- Giese, J.L. and Cote, J.A. (2000), "Defining consumer satisfaction", *Academy of Marketing Science Review*, Vol. 1 No. 1, pp. 1-22.
- Givon, M. (1984), "Variety seeking through brand switching", *Marketing Science*, Vol. 3 No. 1, pp. 1-22.
- Grace, D. and O'Cass, A. (2001), "Attributions of service switching: a study of consumers' and providers' perceptions of child-care service delivery", *Journal of Service Marketing*, Vol. 15 Nos 4/5, pp. 300-321.
- Gray, D.M., D'Alessandro, S., Johnson, L.W. and Carter, L. (2017), "Inertia in services: causes and consequences for switching", *Journal of Services Marketing*, Vol. 31 No. 6, pp. 485-498.
- Greenleaf, E.A. (2004), "Reserves, regret, and rejoicing in open English auctions", *Journal of Consumer Research*, Vol. 31, pp. 264-273.
- Gursoy, D., Spangenberg, E.R. and Rutheford, D.G. (2006), "The hedonic and utilitarian dimensions of attendees' attitudes toward festivals", *Journal of Hospitality and Tourism Research*, Vol. 30 No. 3, pp. 279-294.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), *Multivariate Data Analysis*, 6th ed., Pearson-Prentice Hall, New Jersey, NJ.
- Hau, L.N. and Thuy, P.N. (2012), "Impact of service personal values on service value and customer loyalty: a cross-service industry study", *Service Business*, Vol. 6 No. 2, pp. 137-155.
- Hellén, K. and Sääksjärvi, M. (2011), "Happiness as a predictor of service quality and commitment for utilitarian and hedonic services", *Psychology and Marketing*, Vol. 28 No. 9, pp. 934-957.
- Hellier, P., Geursen, G., Carr, R. and Rickard, J. (2003), "Customer repurchase intention: a general structural equation model", *European Journal of Marketing*, Vol. 37 Nos 11/12, pp. 1762-1800.

- Henning-Thurau, T., Gwinner, K.P. and Gremler, D.D. (2002), "Understanding relationship marketing outcomes", *Journal of Service Research*, Vol. 4 No. 3, pp. 230-247.
- Herrmann, A., Huber, F. and Braunstein, C. (1999), "A regret theory approach to assessing customer satisfaction when alternatives are considered", in Dubois, B., Lowrey, T.M., Shrum, L.J. and Vanhuele, M. (Eds), *E - European Advances in Consumer Research*, Vol. 4, Association for Consumer Research, Provo, UT, pp. 82-88.
- Homburg, C. and Giering, A. (2001), "Personal characteristics as moderators of the relationship between customer satisfaction and loyalty – an empirical analysis", *Psychology and Marketing*, Vol. 18 No. 1, pp. 43-66.
- Hsieh, J.K., Hsieh, Y.C., Chiu, H.C. and Feng, Y.C. (2012), "Post-adoption switching behavior for online service substitutes: a perspective of the push-pull-mooring framework", *Computers in Human Behavior*, Vol. 28 No. 5, pp. 1912-1920.
- Hu, A.W. and Hwang, I. (2006), "Measuring the effects of consumer switching costs on switching intention in Taiwan mobile telecommunication services", *Journal of American Academy of Business*, Vol. 9 No. 1, pp. 75-85.
- Hur, W.M., Kim, H.K. and Kim, H. (2013), "Investigation of the relationship between service values and loyalty behaviors under high commitment", *Service Business*, Vol. 7 No. 1, pp. 103-119.
- Hwang, I. and Kwon, H. (2016), "Effects of demotion in loyalty programs on brand-switching intentions", *Service Business*, Vol. 10 No. 3, pp. 489-505.
- Jang, S.S. and Feng, R. (2007), "Temporal destination revisit intention: the effects of novelty seeking and satisfaction", *Tourism Management*, Vol. 28 No. 2, pp. 580-590.
- Jiang, Y. and Wang, C.L. (2006), "The impact of affect on service quality and satisfaction: the moderation of service contexts", *Journal of Service Marketing*, Vol. 20 No. 4, pp. 211-218.
- Jones, M.A., Mothersbaugh, D.L. and Beatty, S.E. (2000), "Switching barriers and repurchase intentions in services", *Journal of Retailing*, Vol. 76 No. 2, pp. 259-274.
- Jones, M.A., Taylor, V.A., Becherer, R.C. and Halstead, D. (2003), "The impact of instruction understanding on satisfaction and switching intentions", *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behaviour*, Vol. 16, pp. 10-18.
- Jones, T.O. and Sasser, W.E. (1995), "Why satisfied customers defect", *Harvard Business Review*, Vol. 73 No. 6, pp. 88-99.
- Jung, J., Han, H. and Oh, M. (2017), "Travelers' switching behavior in the airline industry from the perspective of the push-pull-mooring framework", *Tourism Management*, Vol. 59, pp. 139-153.
- Kahn, B.E. (1995), "Consumer variety-seeking among goods and services", *Journal of Retailing and Consumer Services*, Vol. 2 No. 3, pp. 139-148.
- Kahn, B.E. and Lehmann, D.R. (1991), "Modeling choice among assortments", *Journal of Retailing*, Vol. 67 No. 3, pp. 274-299.
- Kahn, B.E., Kalwani, M.U. and Morrison, D.G. (1986), "Measuring variety-seeking and reinforcement behaviors using panel data", *Journal of Marketing Research*, Vol. 3 No. 2, pp. 89-100.
- Keaveney, S.M. and Parthasarathy, M. (2001), "Customer switching behaviour in online services: an exploratory study of the role of selected attitudinal, behavioral and demographic factors", *Journal of the Academy of Marketing Science*, Vol. 29 No. 4, pp. 374-390.
- Kumar, V., Dalla Pozza, I. and Ganesh, J. (2013), "Revisiting the satisfaction-loyalty relationship: empirical generalizations and directions for future research", *Journal of Retailing*, Vol. 89 No. 3, pp. 246-262.
- Kushwaha, T. and Shankar, V. (2013), "Are multichannel customers really more valuable? The moderating role of product category characteristics", *Journal of Marketing*, Vol. 77 No. 4, pp. 67-85.
- Lai, J.Y., Debbarma, S. and Ulhas, K.R. (2012), "An empirical study of consumer switching behaviour towards mobile shopping: a push-pull-mooring model", *International Journal of Mobile Communications*, Vol. 10 No. 4, pp. 386-404.

- Lam, S.Y., Shankar, V., Erramilli, M.K. and Murthy, B. (2004), "Customer value, satisfaction, loyalty and switching costs: an illustration from a business-to-business service context", *Journal of the Academy of Marketing Science*, Vol. 32 No. 3, pp. 293-311.
- Lee, A., Back, K.J. and Park, J. (2017), "Effects of customer personal characteristics on the satisfaction-loyalty link: a multi-method approach", *Service Business*, Vol. 11 No. 2, pp. 279-297.
- Lee, J., Lee, J. and Feick, L. (2001), "The impact of switching costs on the customer satisfaction-loyalty link: mobile phone service in France", *Journal of Service Marketing*, Vol. 15 No. 1, pp. 35-48.
- Lee, K.W., Tsai, M.T. and Lanting, M.C.L. (2011), "From marketplace to marketspace: Investigating the consumer switch to online banking", *Electronic Commerce Research and Applications*, Vol. 10 No. 1, pp. 115-125.
- Lee, M. and Cunningham, L.F. (2001), "A cost/benefit approach to understanding service loyalty", *Journal of Service Marketing*, Vol. 15 No. 2, pp. 113-130.
- Lemon, K.N., White, T.B. and Winer, R.S. (2002), "Dynamic customer relationship management: incorporating future consideration into the service retention decision", *Journal of Marketing*, Vol. 66 No. 1, pp. 1-14.
- Leone, L., Perugini, M. and Ercolani, A.P. (1999), "A comparison of three models of attitude-behavior relationships in the studying behavior domain", *European Journal of Social Psychology*, Vol. 29 Nos 2-3, pp. 161-189.
- Li, D., Browne, G.J. and Wetherbe, J.C. (2007), "Online consumers switching behavior: a buyer-seller relationship perspective", *Journal of Electronic Commerce in Organizations*, Vol. 5 No. 1, pp. 30-42.
- Liang, D., Ma, Z. and Qi, L. (2013), "Service quality and customer switching behavior in China's mobile phone service sector", *Journal of Business Research*, Vol. 66 No. 8, pp. 1161-1167.
- Liao, C., Lin, H.N., Luo, M.M. and Chea, S. (2017), "Factors influencing online shoppers' repurchase intentions: the roles of satisfaction and regret", *Information & Management*, Vol. 54 No. 5, pp. 651-668.
- Lien, N.H. and Kao, S.L. (2008), "The effects of service quality dimensions on customer satisfaction across different service types: alternative differentiation as a moderator", *Advances in Consumer Research*, Vol. 35, pp. 522-526.
- Lin, H.H. (2011), "Gender differences in the linkage of online patronage behavior with TV-and-online shopping values", *Service Business*, Vol. 5 No. 4, pp. 295-312.
- Lin, I.Y. and Mattila, A.S. (2006), "Understanding restaurant switching behavior from a cultural perspective", *Journal of Hospitality and Tourism Research*, Vol. 30 No. 1, pp. 3-15.
- Lin, J.S.C., Chou, E.Y. and Lin, C.Y. (2016), "What if I make the wrong decision? The role of anticipated regret in switching barrier based customer retention", in Groza, M.D. and Ragland, C.B. (Eds), *Marketing Challenges in a Turbulent Business Environment*, Springer, Cham, pp. 123-126.
- Liu, B.S., Furrer, O. and Sudharshan, D. (2001), "The relationships between culture and behavioral intentions toward services", *Journal of Service Research*, Vol. 4 No. 2, pp. 118-129.
- Liu, Y., Li, H., Xu, X., Kostakos, V. and Heikkilä, J. (2016), "Modeling consumer switching behavior in social network games by exploring consumer cognitive dissonance and change experience", *Industrial Management & Data Systems*, Vol. 116 No. 4, pp. 801-820.
- Low, B. and Johnston, W.J. (2006), "Relationship equity and switching behaviour in the adoption of new telecommunication services", *Industrial Marketing Management*, Vol. 35 No. 6, pp. 676-689.
- Lucia-Palacios, L., Pérez-López, R. and Polo-Redondo, Y. (2016), "Enemies of cloud services usage: inertia and switching costs", *Service Business*, Vol. 10 No. 2, pp. 447-467.
- McDougall, G.H.G. and Levesque, T. (2000), "Customer satisfaction with services: putting perceived value into the equation", *Journal of Service Marketing*, Vol. 14 No. 5, pp. 392-410.
- McConnell, A.R., Niedermeier, K.E., Leibold, J.M., Eil-Alayli, A.G., Chin, P.P. and Kuiper, N.M. (2000), "What if I find it cheaper someplace else? Role of prefactual thinking and anticipated regret in consumer behavior", *Psychology and Marketing*, Vol. 17 No. 4, pp. 281-298.

- Maicas, J.P., Polo, Y. and Sese, F.J. (2006), "The impact of customer relationship characteristics on customer switching behavior", *Managing Service Quality*, Vol. 16 No. 6, pp. 556-574.
- Malhotra, A. and Malhotra, C.K. (2013), "Exploring switching behavior of US mobile service customers", *Journal of Services Marketing*, Vol. 27 No. 1, pp. 13-24.
- Manrai, L.A. and Manrai, A.K. (2007), "A field study of customers' switching behavior for bank services", *Journal of Retailing and Consumer Services*, Vol. 14 No. 3, pp. 208-215.
- Menon, S. and Kahn, B.E. (1995), "The impact of context on variety seeking in product choices", *Journal of Consumer Research*, Vol. 22 No. 3, pp. 285-295.
- Miranda-Gumucio, L., Gil-Pechuán, I. and Palacios-Marqués, D. (2013), "An exploratory study of the determinants of switching and loyalty in prepaid cell phone users: an application of concept mapping", *Service Business*, Vol. 7 No. 4, pp. 603-622.
- Mittal, B. (2016), "Retrospective: why do customers switch? The dynamics of satisfaction versus loyalty", *Journal of Services Marketing*, Vol. 30 No. 6, pp. 569-575.
- Mittal, B. and Lassar, W.M. (1998), "Why do customers switch? The dynamics of satisfaction versus loyalty", *Journal of Service Marketing*, Vol. 12 No. 3, pp. 177-194.
- Mittal, B., Ross, W.T. and Baldasare, P.M. (1998), "The asymmetric impact of negative and positive attribute-level performance of overall satisfaction and repurchase intentions", *Journal of Marketing*, Vol. 62 No. 1, pp. 33-47.
- Mittal, V. and Kamakura, W.A. (2001), "Satisfaction, repurchase intent and repurchase behavior: investigating the moderating effect of customer characteristics", *Journal of Marketing Research*, Vol. 38 No. 1, pp. 131-142.
- Mittal, V., Kumar, P. and Tsiros, M. (1999), "Attribute-level performance, satisfaction and behavioral intentions over time: a consumption-system approach", *Journal of Marketing*, Vol. 63 No. 2, pp. 88-101.
- Ng, S., Russell-Bennett, R. and Dager, T. (2007), "A typology of mass services: the role of service delivery and consumption purpose in classifying service experiences", *Journal of Service Marketing*, Vol. 21 No. 7, pp. 471-480.
- Niininen, O., Szivas, E. and Riley, M. (2004), "Destination loyalty and repeat behaviour: an application of optimum stimulation measurement", *International Journal of Tourism Research*, Vol. 6 No. 6, pp. 439-447.
- Oliver, R.L. (1993), "Cognitive, affective and attribute bases of the satisfaction response", *Journal of Consumer Research*, Vol. 20 No. 3, pp. 418-430.
- Oliver, R.L. (1997), *Satisfaction: A Behavioural Perspective on the Consumer*, McGraw-Hill, New York, NY.
- Oliver, R.L. (1999), "Whence consumer loyalty?", *Journal of Marketing*, Vol. 63 No. 4, pp. 33-44.
- Oliver, R.L. (2010), *Satisfaction: A Behavioral Perspective on the Consumer*, Routledge, New York, NY.
- Olsen, L.L. and Johnson, M.D. (2003), "Service equity, satisfaction, and loyalty: from transaction-specific to cumulative evaluations", *Journal of Service Research*, Vol. 5 No. 3, pp. 184-195.
- Pan, Y., Sheng, S. and Xie, F.T. (2012), "Antecedents of customer loyalty: an empirical synthesis and re-examination", *Journal of Retailing and Consumer Services*, Vol. 19 No. 1, pp. 150-158.
- Panther, T. and Farquhar, J.D. (2004), "Consumer responses to dissatisfaction with financial service providers: an exploration of why some stay while others switch", *Journal of Financial Services Marketing*, Vol. 8 No. 4, pp. 343-353.
- Park, J.Y. and Jang, S.S. (2014), "Why do customers switch? More satiated or less satisfied", *International Journal of Hospitality Management*, Vol. 37, pp. 159-170.
- Patterson, P.G. (2004), "A contingency model of behavioural intentions in a services context", *European Journal of Marketing*, Vol. 38 Nos 9/10, pp. 1304-1315.
- Patterson, P.G. and Smith, T. (2003), "A cross-cultural study of switching barriers and propensity to stay with service providers", *Journal of Retailing*, Vol. 79 No. 2, pp. 107-120.

- Piha, L.P. and Avlonitis, G.J. (2015), "Customer defection in retail banking: attitudinal and behavioural consequences of failed service quality", *Journal of Service Theory and Practice*, Vol. 25 No. 3, pp. 304-326.
- Ping, R.A. (1993), "The effects of satisfaction and structural constraints on retailer exiting, voice, loyalty, opportunism and neglect", *Journal of Retailing*, Vol. 69 No. 3, pp. 320-352.
- Pollack, B.L. (2015), "Are moderators of the customer satisfaction–repurchase intention relationship contingent on the service category? An exploratory investigation", *Service Marketing Quarterly*, Vol. 36 No. 4, pp. 335-351.
- Ratner, R.K., Kahn, B.E. and Kahneman, D. (1999), "Choosing less-preferred experiences for the sake of variety", *Journal of Consumer Research*, Vol. 26 No. 1, pp. 1-15.
- Rego, L.L., Morgan, N.A. and Fornell, C. (2013), "Reexamining the market share- customer satisfaction relationship", *Journal of Marketing*, Vol. 77 No. 5, pp. 1-20.
- Reichheld, F. (1996), *The Loyalty Effects*, Harvard Business School Press, Boston, MA.
- Roos, I. (1999), "Switching processes in customer relationships", *Journal of Service Research*, Vol. 2 No. 1, pp. 68-85.
- Roos, I., Edvardsson, B. and Gustafsson, A. (2004), "Customer switching patterns in competitive and noncompetitive service industries", *Journal of Service Research*, Vol. 6 No. 3, pp. 256-271.
- Ryals, L. and Knox, S. (2006), "Measuring and managing customer relationship risk in business markets", *Industrial Marketing Management*, Vol. 36 No. 6, pp. 823-833.
- Ryu, K., Han, H. and Jang, S. (2010), "Relationships among hedonic and utilitarian values, satisfaction and behavioral intentions in the fast-casual restaurant industry", *International Journal of Contemporary Hospitality Management*, Vol. 22 No. 3, pp. 416-432.
- Sánchez-García, I. and Currás-Pérez, R. (2011), "Effects of dissatisfaction in tourist services: the role of anger and regret", *Tourism Management*, Vol. 32 No. 6, pp. 1397-1406.
- Sánchez-García, I., Pieters, R., Zeelenberg, M. and Bigné, E. (2012), "When satisfied consumers do not return: variety seeking's effect on short and long term intentions", *Psychology & Marketing*, Vol. 29 No. 1, pp. 15-24.
- Satorra, A. and Bentler, P. (1994), "Corrections to test statistics and standard errors in covariance structure analysis", in von Eye, A. and Clogg, C. (Eds), *Latent Variable Analysis: Applications for Developmental Research*, Sage Publications, Thousand Oaks, CA, pp. 399-419.
- Sharma, P. (2011), "Demystifying cultural differences in country-of-origin effects: exploring the moderating roles of product type, consumption context, and involvement", *Journal of International Consumer Marketing*, Vol. 23 No. 5, pp. 344-364.
- Sheth, J.N., Newman, B.I. and Gross, B.L. (1991), "Why we buy what we buy: a theory of consumption values", *Journal of Business Research*, Vol. 22 No. 2, pp. 159-170.
- Shukla, P. and Babin, B.J. (2013), "Effects of consumer psychographics and store characteristics in influencing shopping value and store switching", *Journal of Consumer Behavior*, Vol. 12 No. 3, pp. 194-203.
- Sloot, L.M., Verhoef, P.C. and Franses, P.H. (2005), "The impact of brand equity and the hedonic level of products on consumer stock-out reactions", *Journal of Retailing*, Vol. 81 No. 1, pp. 15-34.
- Srivastava, K. and Sharma, N.K. (2013), "Service quality, corporate brand image, and switching behavior: the mediating role of customer satisfaction and repurchase intention", *Services Marketing Quarterly*, Vol. 34 No. 4, pp. 274-291.
- Stewart, K. (1998), "An exploration of customer exit in retail banking", *International Journal of Bank Marketing*, Vol. 16 No. 1, pp. 6-14.
- Sweeney, J.C. and Soutar, G.N. (2001), "Consumer perceived value: the development of a multiple item scale", *Journal of Retailing*, Vol. 77 No. 2, pp. 203-220.
- Szymanski, D.M. and Henard, D.H. (2001), "Customer satisfaction: a meta-analysis of the empirical evidence", *Journal of the Academy of Marketing Science*, Vol. 29 No. 1, pp. 16-35.

- Tam, J.L.M. (2011), "The moderating effects of purchase importance in customer satisfaction process: an empirical investigation", *Journal of Consumer Behavior*, Vol. 10 No. 4, pp. 205-215.
- Thomas, J.S., Blattberg, R.C. and Fox, E.J. (2004), "Recapturing lost customers", *Journal of Marketing Research*, Vol. 41 No. 1, pp. 31-45.
- Trivedi, M. (1999), "Using variety-seeking-based segmentation to study promotional response", *Journal of the Academy of Marketing Science*, Vol. 27 No. 1, pp. 37-49.
- Tsiros, M. (1998), "Effect of regret on post-choice valuation: the case of more than two alternatives", *Organizational Behavior and Human Decision Processes*, Vol. 76 No. 1, pp. 48-69.
- Tsiros, M. and Mittal, V. (2000), "Regret: a model of its antecedents and consequences in consumer decision making", *Journal of Consumer Research*, Vol. 26 No. 4, pp. 401-417.
- Tuu, H.H. and Olsen, S.O. (2010), "Nonlinear effects between satisfaction and loyalty: an empirical study of different conceptual relationships", *Journal of Targeting, Measurement and Analysis for Marketing*, Vol. 18 Nos 3/4, pp. 239-251.
- Van Trijp, H.C.M., Hoyer, W.D. and Inman, J.J. (1996), "Why switch? Product-category level explanations for true variety-seeking behavior", *Journal of Marketing Research*, Vol. 33 No. 3, pp. 281-292.
- Vázquez, R. and Foxall, G.R. (2006), "Positive vs. negative switching barriers: the influence of service consumers' need for variety", *Journal of Consumer Behaviour*, Vol. 5 No. 4, pp. 367-379.
- Wangenheim, F. and Bayón, T. (2004a), "Satisfaction, loyalty and word of mouth within the customer base of a utility provider: differences between stayers, switchers and referral switchers", *Journal of Consumer Behaviour*, Vol. 3 No. 3, pp. 211-220.
- Wangenheim, F. and Bayón, T. (2004b), "The effects of word of mouth on services switching. Measurement and moderating variables", *European Journal of Marketing*, Vol. 38 Nos 9/10, pp. 1173-1185.
- Westbrook, R.A. (1987), "Product/consumption-based affective responses and postpurchase processes", *Journal of Marketing Research*, Vol. 24 No. 3, pp. 258-270.
- Wilkins, S., Beckenueyte, C. and Butt, M.M. (2016), "Consumers' behavioural intentions after experiencing deception or cognitive dissonance caused by deceptive packaging, package downsizing or slack filling", *European Journal of Marketing*, Vol. 50 Nos 1/2, pp. 213-235.
- Wu, K., Vassileva, J. and Zhao, Y. (2017), "Understanding users' intention to switch personal cloud storage services: evidence from the Chinese market", *Computers in Human Behavior*, Vol. 68, pp. 300-314.
- Xu, X., Li, H., Heikkilä, J. and Liu, Y. (2013), "Exploring individuals' switching behaviour: an empirical investigation in social network games in China", *BLED 2013 Proceedings*, p. 34.
- Yang, Z. and Peterson, R.T. (2004), "Customer perceived value, satisfaction, and loyalty: the role of switching costs", *Psychology and Marketing*, Vol. 21 No. 10, pp. 799-822.
- Yi, Y. (1990), "A critical review of consumer satisfaction", in Zeithaml, V.A. (Ed.), *Review of Marketing*, American Marketing Association, Chicago, IL, pp. 68-123.
- Yi, Y. and La, S. (2004), "What influences the relationship between customer satisfaction and repurchase intention? Investigating the effects of adjusted expectations and customer loyalty", *Psychology and Marketing*, Vol. 21 No. 5, pp. 351-373.
- Yoon, S. and Kim, J. (2000), "An empirical validation of a loyalty model based on expectation disconfirmation", *Journal of Consumer Marketing*, Vol. 17 No. 2, pp. 120-136.
- Zeelenberg, M. and Pieters, R. (1999), "Comparing service delivery to what might have been: behavioral responses to regret and disappointment", *Journal of Service Research*, Vol. 2 No. 1, pp. 86-97.
- Zeelenberg, M. and Pieters, R. (2004), "Beyond valence in customer dissatisfaction: a review and new findings on behavioral responses to regret and disappointment in failed services", *Journal of Business Research*, Vol. 57 No. 4, pp. 445-455.
- Zeelenberg, M. and Pieters, R. (2007), "A theory of regret regulation 1.0", *Journal of Consumer Psychology*, Vol. 17 No. 1, pp. 3-18.
- Zeithaml, V.A. (2000), "Service quality, profitability, and the economic worth of customers: what we know and what we need to learn", *Journal of the Academy of Marketing Science*, Vol. 28 No. 1, pp. 67-85.

**Further reading**

Keaveney, S.M. (1995), "Customer switching behaviour in service industries: an exploratory study", *Journal of Marketing*, Vol. 59 No. 2l, pp. 71-82.

**Appendix. Set of questions used in the questionnaire**

*Please show from 1 (totally disagree) to 7 (totally agree) your level of agreement with the following statements*

Satisfaction

sat1	I am satisfied with my mobile company (MC)	1	2	3	4	5	6	7
sat2	My MC meets my needs extremely well	1	2	3	4	5	6	7
sat3	What I get from my MC is what I expect for this service	1	2	3	4	5	6	7
sat4	Globally, I am satisfied with the service provided by my MC	1	2	3	4	5	6	7

Alternative attractiveness

atr1	I would probably be happy with another MC	1	2	3	4	5	6	7
atr2	If I needed to switch there are other good MC to choose from	1	2	3	4	5	6	7
atr3	Compared to my MC, there are other MC with which I would be equally satisfied	1	2	3	4	5	6	7

Post-purchase regret

preg1 <sup>a</sup>	It was a wise decision	1	2	3	4	5	6	7
preg2	I regret the choice	1	2	3	4	5	6	7
preg3 <sup>a</sup>	If I had to do it over again I would make the same choice	1	2	3	4	5	6	7
preg4 <sup>a</sup>	The choice has been beneficial for me	1	2	3	4	5	6	7
preg5 <sup>a</sup>	I consider it a right decision	1	2	3	4	5	6	7

*Show from 1 (totally disagree) to 7 (totally agree) your level of agreement with the following statements regarding how you think you would feel about switching to another mobile company*

Anticipated regret

areg1 <sup>a</sup>	I would think it is a wise decision	1	2	3	4	5	6	7
areg2 <sup>a</sup>	I would not regret leaving my company	1	2	3	4	5	6	7
areg3 <sup>a</sup>	I would feel that if I had to do it over again I would go for the same choice	1	2	3	4	5	6	7
areg4 <sup>a</sup>	I would think that the decision is beneficial for me	1	2	3	4	5	6	7
areg5 <sup>a</sup>	I would consider it a right decision	1	2	3	4	5	6	7

Past switching behaviour

psb	How many mobile companies have you been with since you started using this kind of service?	-						
-----	--	---	--	--	--	--	--	--

Switching intention

si	Rate the probability of switching to another MC within the next two months from 1 (definitely not) to 7 (yes, definitely)	1	2	3	4	5	6	7
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**Table A1.**  
Mobile services

**Note:** <sup>a</sup>Reverse coded

Please show from 1 (totally disagree) to 7 (totally agree) your level of agreement with the following statements

Satisfaction		
sat1	I am satisfied with my experience in X	1 2 3 4 5 6 7
sat2	My trip to X meets my needs extremely well	1 2 3 4 5 6 7
sat3	What I get from my trip to X is what I expected for this trip	1 2 3 4 5 6 7
sat4	Globally, I am satisfied with my experience in X	1 2 3 4 5 6 7
Alternative attractiveness		
atr1	I would probably be happy with another HD	1 2 3 4 5 6 7
atr2	If I needed to switch there are other good HD to choose from	1 2 3 4 5 6 7
atr3	Compared to X, there are other HD with which I would be equally satisfied	1 2 3 4 5 6 7
Post-purchase regret		
preg1 <sup>a</sup>	It was a wise decision	1 2 3 4 5 6 7
preg2	I regret the choice	1 2 3 4 5 6 7
preg3 <sup>a</sup>	If I had to do it over again I would make the same choice	1 2 3 4 5 6 7
preg4 <sup>a</sup>	The choice has been beneficial for me	1 2 3 4 5 6 7
preg5 <sup>a</sup>	I consider it a right decision	1 2 3 4 5 6 7

Show from 1 (totally disagree) to 7 (totally agree) your level of agreement with the following statements regarding how you think you would feel about switching to another mobile company

Anticipated regret		
areg1 <sup>a</sup>	I would think it is a wise decision	1 2 3 4 5 6 7
areg2 <sup>a</sup>	I would not regret switching to a different HD	1 2 3 4 5 6 7
areg3 <sup>a</sup>	I would feel that if I had to do it over again I would go for the same choice	1 2 3 4 5 6 7
areg4 <sup>a</sup>	I would think that the decision is beneficial for me	1 2 3 4 5 6 7
areg5 <sup>a</sup>	I would consider it a right decision	1 2 3 4 5 6 7
Past switching behaviour		
psb	How many different tourist destinations have you gone on your main holidays in the last 4 years?	–
Switching intention		
si	Rate the probability that on your next main vacation trip you will go again to X from 1 (definitely not) to 7 (yes, definitely)	1 2 3 4 5 6 7

Notes: <sup>a</sup>Reverse coded. The questions refer to the last main holiday destination: X

**Table AII.**  
Holiday destinations (HD)

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# The path to sustainability

## Understanding organisations' environmental initiatives and climate change in an emerging economy

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### Abstract

**Purpose** – Climate change has become an increasingly important issue globally, and organisations are being urged to be more carbon friendly by taking initiatives to reduce carbon emissions in their business operations. The purpose of this paper is to examine the extent to which climate change has been addressed and the influence of financial strength and corporate governance structure on the disclosure of carbon information.

**Design/methodology/approach** – The research process consists of an investigation via content analysis of the annual and sustainability reports of the top 100 public-listed companies in Malaysia for the year 2017.

**Findings** – The results of the study revealed that carbon information on carbon emissions accounting had the highest disclosure and that climate change risks and opportunities had the lowest disclosure. The results of the multiple regression analysis revealed that profitability is positively significant with carbon disclosure while leverage is negatively significant. However, the governance structure does not seem to have any influence on the disclosure of carbon information.

**Research limitations/implications** – The conclusions drawn from the study must be interpreted with caution as the sample companies only comprise of the top 100 public-listed companies in Malaysia to provide an initial insight into the situation in Malaysia. Furthermore, the interpretations and conclusions drawn from this study are based solely on a cross-sectional analysis of the data for only one year.

**Practical implications** – This finding is a significant contribution to regulatory bodies and policymakers regarding the drivers of climate change initiatives in an emerging economy such as Malaysia. This finding suggests that in the Malaysian setting, financial structure influence decisions on climate change initiatives.

**Social implications** – The commitment by business leaders of the impact on climate from the production processes would contribute towards a low carbon economy and subsequently improve the quality of life of the community.

**Originality/value** – The findings of the study provide insight of the business attitude towards climate change in an emerging economy such as Malaysia.

**Keywords** Corporate governance, Carbon disclosure, Financial strength

**Paper type** Research paper

### 1. Introduction

The issue of climate change has already transgressed the planetary boundaries and has become prominent in politics and media (Rockstrom *et al.*, 2009). Initiatives involving preservation of the environment are crucial, as, globally, companies are dependent on the foreign economic networks



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that require companies to be more environmentally friendly. The launching of the Sustainable Development Goals on 1 January 2016 provides a platform that allows a more concerted effort in directing sustainability globally. Malaysia, as one of the most attractive emerging economies in the South-East Asian region, is also committed to the sustainability agenda that, potentially, would contribute significantly to achieving Malaysia's aspiration to be a high income developed nation. Malaysia also aspires to position itself as the home for Sustainable Responsible Investment (SRI) as part of its ambition to make Malaysia a green technology hub by 2030. Various initiatives have been undertaken by the Malaysian government to push this agenda forward. The introduction of the Environmental, Social and Governance Index by the Malaysian Stock Exchange (Bursa Malaysia) in 2014, and the introduction of the world's first green Islamic bond (sukuk) in 2018 to provide an innovative channel to address global funding gaps in green financing are examples of such initiatives. Such commendable actions are to encourage the Malaysian organisations, especially the public-listed companies, to pursue efforts to preserve the environment and the natural resources of the country, to conserve the use of energy, to promote the use of renewable energy and to reduce greenhouse gas emissions.

In line with the Malaysian government's aspiration, the top management of organisations in Malaysia are slowly embarking on sustainability initiatives in their organisations' practices to ensure that sustainable initiatives are embedded in their products and services (González-Benito and González-Benito, 2006). The implementation of these initiatives is normally disclosed through various media, such as the companies' websites, media releases, sustainability and annual reports. Regarding environmental preservation, the issue of business practices that affects climate change around the world has implications beyond the typical environmental dimensions. Such practices are being linked to energy security and efficiency, and the fate of the planet as a whole. The issue of climate change has been brought to the fore as an urgent and harmful condition that requires a concerted policy approach, and, thus, has become a topic of societal, regulatory and corporate attention (Pinkse *et al.*, 2008). This study focuses on the issue of climate change and the initiatives taken by Malaysian public-listed companies to reduce greenhouse gas emissions in the production of goods and services. Therefore, the main aim of this research is to examine to what extent environmental initiatives relating to climate change have been incorporated into organisations' practices in producing products and services and the influence of financial strength and corporate governance structure on the disclosure of information relating to climate change initiatives among Malaysian public-listed companies. Specifically, the study is interested in finding the answers to the following questions:

- RQ1. To what extent are climate change initiatives being incorporated by Malaysian public-listed companies in the production of their goods and services?
- RQ2. Do financial strength and corporate governance structure influence the decisions of management to incorporate climate change initiatives in the production of their goods and services?

In this study, it is argued that financial strength affects management decisions concerning such initiatives as they require substantial resources (Luo *et al.*, 2013). The governing features of organisations, such as CEO duality and board composition, are also expected to influence such initiatives. Over the years, the monitoring of business activities has been increased by stakeholders (Ahmad and Hossain, 2015; Rockstrom *et al.*, 2009). Therefore, stakeholder theory is used to underpin the arguments for the study. The research process consists in an investigation via content analysis of the annual and sustainability reports of the top 100 public-listed companies for the year 2017 to provide an overview of the climate change initiatives that have been adopted by these companies to produce their products and services, specifically, those relating to greenhouse gas emissions. The information disclosed by these organisations forms the basis of the data collection to gauge their initiatives in the context of climate change.

First, a review of the existing literature and hypotheses development is provided. Then the method applied in the current study is outlined, followed by the findings of the research. Lastly, the results are discussed, and the paper is concluded by explaining the study's limitations and suggestions for future researchers.

## 2. Literature review and hypotheses development

### 2.1 Stakeholder theory

Stakeholder theory has been widely used in empirical research on environmental studies. Stakeholders are individuals or groups that have a direct influence on the organisation's welfare (Freeman, 1994). Therefore, stakeholder theory argues that the management of an organisation should take into account the interests of their stakeholders in making business decisions.

In this study, it is argued that the organisations will be influenced by the demands of their stakeholders in developing policies on climate change, as, currently, stakeholders globally view climate change as a critical environmental problem.

This is consistent with Jensen (2001) who argued that organisations that merely focus on maximising profit will produce short-term financial performance, which could destroy the value of the firm. Therefore, organisations should initiate stakeholder engagement in a formal process to align the interests of the organisation with those of the stakeholders (Lingenfelder and Thomas, 2011). Such actions will reduce the relevant risk and will allow the organisation to improve its financial, social and environmental performance.

Even though stakeholder theory is frequently used to underpin studies on CSR, including issues concerning the environment, there are arguments that the stakeholder theory only serves certain stakeholder groups that are of interest to the organisation, thereby resulting in organisations' prioritising certain stakeholder groups based on the power, legitimacy and urgency of the issues affecting the organisation (Altman and Cooper, 2004). Haque and Islam (2015), for example, found that some stakeholder groups may have little power to exert pressure to produce climate change-related practices, such as accounting professionals and suppliers, unlike other stakeholders groups – government bodies, institutional investors and the media – that can exert pressure and are powerful in influencing disclosure of climate change information. Such findings may result in organisations only focusing on engaging with certain stakeholder groups according to the issues at hand.

### 2.2 Climate change and carbon disclosure

Developed and developing countries are both looking at the issues of climate change and carbon disclosure, and many proactive measures are being employed by countries around the world. Some examples of these measures are carbon disclosure by companies, international agreement on carbon reduction target, and climate change conferences. Climate is the average or typical weather of a region or a city (NASA, 2011). Therefore, climate change is basically the change in the average or typical weather of a region or a city. This could mean a change in average temperature or average annual rainfall. Climate change is being debated intensely by politicians, economists, activists, and other stakeholders, and actions condemning the ignorance about climate change are noteworthy and numerous. Global warming has been found to be a specific consequence of greenhouse gas emissions (UNEP & UNFCCC, 2002). Human activities have caused the release of GHG into the atmosphere, with the biggest blame for global warming being attributed to companies, as their operations are on a much bigger scale compared to those of individuals.

### 2.3 Profitability

Profitable companies have more resources and are more likely to invest in a voluntary initiative, such as carbon disclosure, compared to companies that are less profitable

(Luo *et al.*, 2013). Highly profitable companies need to be seen as being more responsive towards the environment (Magnan *et al.*, 2005). It is also found that profitable companies can afford the potential damage from the information disclosed as the damage will be covered by the transparency-induced increment in share valuation. Saka and Oshika (2014) also found a positive association between carbon management disclosure and share valuation. Therefore, profitable companies dare to be more transparent about their business activities compared to less profitable companies (Magnan *et al.*, 2005). Less profitable companies may not be able to cope with the damage done by the information disclosed, and, thus, disclose less environmental information as a precautionary step. Less profitable companies are more focused on their financial commitments and operational needs, and have less resources for managing and reporting their carbon emissions (Prado-Lorenzo *et al.*, 2009).

In this study, it is argued that profitable companies will disclose more information on climate change initiatives:

*H1.* Profitability is positively and significantly related to carbon disclosure.

#### 2.4 Growth

Previous literature found a significant negative relationship between growth and carbon disclosure (Luo *et al.*, 2013). Companies in the growing stage focus more on reinvestment for expansion than environmental strategies such as carbon disclosure (Waldman *et al.*, 2006). According to Prado-Lorenzo *et al.* (2009), companies with high growth opportunity will prioritise economic objectives more than environmental considerations. The argument being that companies undergoing high growth will allocate more resources to growth or expansion strategies rather than carbon disclosure. Although disclosing more information may be considered to be transparent, being too transparent can cause unnecessary exposure to competitors, which is the fear of companies with a high growth rate (Prencipe, 2004).

On the other hand, companies with a high growth rate provide investment opportunities, and, to attract investment, these companies take initiatives to disclose valuable information to allow stock analysts and institutional investors to have a positive perception about their companies (Brammer and Pavelin, 2008). Al-Khater and Naser (2003) also found that CSR disclosure helps users to make informed decisions regarding the companies. However, this study expects that companies with a high growth rate in developing countries would disclose less carbon information as they would focus more on reinvestment for expansion rather than on emerging issues relating to the environment.

Kallapur and Trombley (1999) pointed out that several proxies have been used in the accounting and finance literature to capture the growth opportunities of firms. This is because the concept of growth opportunities is not directly observable as it is contingent on discretionary expenditures and firm specific factors. In this study, the growth rate of revenue is used to measure the growth opportunities of the companies (Luo *et al.*, 2013).

Therefore, the second hypothesis developed for this study is as follows:

*H2.* Growth is negatively and significantly related to carbon disclosure.

#### 2.5 Leverage

Past literature found a significant negative relationship between leverage and carbon disclosure (Chithambo and Tauringana, 2014; Luo *et al.*, 2013), with companies with higher leverage focusing more on fulfilling their financial commitments over voluntary strategies. Highly leveraged companies would have to commit larger resources in servicing the debts and financial commitments compared to lowly leveraged companies. A contrasting argument is that companies with high leverage would disclose more voluntary information (Prencipe, 2004). If the companies with a high leverage rate are making an effort to attract investors, they

would disclose more voluntary information. Valuable information allows stock analysts and institutional investors to have positive perceptions about the companies and helps users to make informed decisions (Al-Khater and Naser, 2003; Brammer and Pavelin, 2008).

However, in this study, it is expected that leverage and carbon disclosure will have a negative relationship because highly leveraged companies in developing countries, such as Malaysia, will be more focused on generating profits and increasing productivity due to their financial position rather than embarking on voluntary carbon initiatives (Mohamed Zain, 2009). Therefore, the third hypothesis developed for this study is as follows:

*H3.* Leverage is negatively and significantly related to carbon disclosure.

#### *2.6 CEO duality*

CEO duality causes a concentration in the decision-making authority, which, subsequently, affects the board independence in carrying out its oversight and governance roles (Gul and Leung, 2004). CEO duality can affect decision-making pertaining to the voluntary disclosure of information, particularly carbon information, which requires large resources (Luo *et al.*, 2013). Furthermore, the disclosure of carbon information comes with a potential cost in that outside stakeholders can use the information negatively. The potential costs include damage to reputation, litigation risks and loss of competitive advantage (Guo, 2014). The perception of the stakeholders concerning the information disclosed can adversely affect the market for the company. Therefore, when the CEO is also the chairman, they would restrict the voluntary disclosure of information that would affect the reputation of the company. Thus, the fourth hypothesis for this study is as follows:

*H4.* CEO duality is negatively and significantly related to carbon disclosure.

#### *2.7 Board composition*

Carroll (2015) found that the board of directors plays an important role in voluntary information disclosure. Therefore, it is critical that the board of directors remains independent in carrying out its oversight and governance roles. Independent directors allow the board of a company to be more independent in its oversight and governance roles (Gul and Leung, 2004). A study conducted by Matolcsy *et al.* (2007) on 181 companies listed on the Australian Stock Exchange in 2001 discovered that the presence of independent directors on the board increases corporate voluntary disclosure. The presence of independent directors on the board is to gain the public perception that there are experts on the board that can monitor the performance of the company and can help to push companies into disclosing more voluntary information (Patelli and Prencipe, 2007; Samaha *et al.*, 2015). Moreover, García-Meca and Sánchez-Ballesta (2010) argued that independent directors pressure other directors to improve corporate reporting policy by increasing the disclosure of voluntary information.

Thus, the fifth hypothesis for this study is as follows:

*H5.* The presence of Independent directors is positively and significantly related to carbon disclosure.

#### *2.8 Size*

Much of the previous literature found a significant positive relationship between company size and the quality of disclosure (Chithambo and Tauringana, 2014; Choi *et al.*, 2013; Sulaiman *et al.*, 2014). In this study, size is proxied by the availability of the total assets to the firm (Brammer and Pavelin, 2006; Zeng *et al.*, 2012). Basically, larger companies operate on a larger scale, thus having a bigger impact on the environment (Burgwal and Vieira, 2014). According to Huang and Kung (2010), bigger companies rely on political and social support, and they

have higher political cost as they receive pressure from the government, unions and consumers. However, their large operations across the globe make them more visible than other companies, and, thus, they face more intense pressure to disclose information voluntarily to remain legitimate (Shamil *et al.*, 2014). Burgwal and Vieira (2014) also found that bigger companies safeguard their public image by disclosing environmental information.

Thus, in this study, the size of the company is included as the control variable.

### 3. Research methodology

#### 3.1 The sample

A content analysis of the annual and sustainability reports of the top 100 public-listed companies in Malaysia for the year 2017 was performed. Table I presents the distribution of the sample size of the companies selected according to industry. These industries were considered as environmentally sensitive by previous literature (Buniamin, 2012; He and Loftus, 2014) due to the nature of their operations. Specifically, these industries represent the environmentally sensitive industries listed on the Malaysian stock-exchange. The choice of the top 100 companies is because carbon disclosure is a relatively new phenomenon in Malaysia, and it is expected that only the top 100 companies listed on the Malaysian stock-exchange will take the voluntary initiatives to provide carbon information initiatives in their annual and sustainability reports. These companies are deemed financially capable and have the necessary expertise to engage in such voluntary initiatives.

#### 3.2 Carbon disclosure

A carbon disclosure index from Choi *et al.* (2013), Luo *et al.* (2013), Peng *et al.* (2014) and Saka and Oshika (2014) with modifications to suit the Malaysian context was used in this study to measure the quality of carbon information disclosed. A scoring of 0–4 was used to evaluate the quality of information disclosed. Such a measurement is in accordance with prior literature (Yusoff *et al.*, 2015). A score of “4” was given to carbon information disclosed quantitatively with monetary values. A score of “3” was given to carbon information disclosed quantitatively with no monetary values. A score of “2” indicated specific information on carbon disclosure but non-quantitative. General information disclosed was awarded a score of “1”. If there was no carbon information, a score of “0” was given.

The dimension and measurement for each item of carbon information disclosed are listed in Table II.

The disclosure of the carbon information was assessed using an equal-weighted index, where a point is awarded for each item disclosed. The index indicates the score for the disclosure of carbon information for company  $j$ , where  $N$  is the maximum number of relevant items a company may disclose and  $d_j$  is ranked from a score of 0 to 4:

$$\sum_{i=1}^{m_j} \frac{d_j}{N}$$

No.	Industry	No.	%
1.	Industrial Products	20	20
2.	Consumer Products	13	13
3.	Construction	3	3
4.	Plantation	11	11
5.	Properties	13	13
6.	Infrastructure Project Companies (IPCs)	4	4
7.	Trading/Services	36	36
	Total	100	100

**Table I.**  
Distribution of companies based on industry classification

**Table II.**  
Dimension and  
measurement of  
carbon disclosure  
index

No.	Dimension	Measurement
1.	Climate change risks and opportunities (CC)	CC1 – Description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks CC2 – Description of current (and future) financial implications, business implications, and opportunities of climate change
2.	Carbon emissions accounting (GHG)	GHG1 – Description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO) GHG2 – Existence of external verification on quantity of GHG emissions – if so by whom and on what basis GHG3 – Evidence of total GHG emissions – metric tonnes of CO <sub>2</sub> -e emitted, cost associated GHG4 – Evidence of disclosure by Scopes 1 and 2, or Scope 3 direct GHG emissions. GHG5 – Evidence of disclosure of GHG emissions by source (e.g. coal, electricity, etc.) GHG6 – Evidence of GHG emissions in comparison with previous years GHG7 – Description of reasons for the changes in level of emissions from year to year
3.	Energy consumption accounting (EC)	EC1 – Evidence of total energy consumed in business operations (e.g. tera-joules or peta-joules) EC2 – Evidence of energy used from renewable sources EC3 – Description of disclosure by type, facility or segment
4.	Carbon reduction and costs (RC)	RC1 – Evidence of detailed plans or strategies to reduce GHG emissions RC2 – Specification of GHG emissions reduction target level and target year RC3 – Description of emissions reduction and associated costs or savings to date as a result of the reduction plan RC4 – Description of future emissions factored into capital expenditure planning
5.	Carbon emissions accountability (ACC)	ACC1 – Evidence of specific board committee (or other executive body) that has the overall responsibility for actions related to climate change ACC2 – Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change

The total maximum score for a company  $m_j$  is 72, comprising each dimension; climate change risks and opportunities (8), carbon emissions accounting (28), Energy consumption accounting (12), carbon reduction and costs (16), carbon emissions accountability (8). A pilot test on a sample of ten annual reports was undertaken to ensure the suitability of the items.

Table III presents the measurement of the independent and control variables used in this study.

**Table III.**  
Measurement of  
independent and  
control variables

Variables	Measurement
Profitability (ROA)	Net income divided by the average of total assets for the year (Chithambo and Tauringana, 2014; Choi <i>et al.</i> , 2013; Luo <i>et al.</i> , 2013)
Growth (GRW)	Current year's revenues divided by the revenues from the previous four years (Luo <i>et al.</i> , 2013)
Leverage (LEV)	Total debt divided by total assets (Clarkson <i>et al.</i> , 2011; Luo <i>et al.</i> , 2013)
CEO duality (CEOD)	A dichotomous scale of 1 or 0. A score of 1 when the CEO and chairman are the same person, and a score of 0 for companies with separation of power (Donnelly and Mulcahy, 2008; Qu <i>et al.</i> , 2013)
Board composition (BCOM)	Number of independent directors divided by the total number of directors on the board (Matolcsy <i>et al.</i> , 2007)
Size (LnSIZE)	Natural logarithm of total assets (Brammer and Pavelin, 2006; Zeng <i>et al.</i> , 2012)

#### 4. Findings and discussion

##### 4.1 Descriptive analysis

The descriptive statistics for the continuous and the categorical variables were performed separately to ensure the suitability of the mean and standard deviation for each category (Pallant, 2011). Table IV presents the descriptive analysis of the variables in this study.

The mean profitability for the sample companies is 5.34 per cent. The range of profitability of sample companies is -4.451 to 16.143 per cent. The results indicated that the majority of the sample companies are profitable. An ROA of more than 5 per cent is considered to be satisfactory (McClure, 2016). The variable growth indicates that the growth rate is within the range of -20.07 to 25.96 per cent, with a mean of 4.62 per cent. The leverage of the sample companies indicated that the companies are all leveraged through some form of debt financing with a maximum at 61.20 per cent, and a mean of 24.74 per cent. The minimum score for the variable board composition is 12.50 per cent with a maximum of 75.00 per cent. The mean of 46.70 per cent indicates that, on average, the board composition of these companies comprises more executive directors than independent directors. The log of total assets to measure the size of companies ranges from 12.39 to 18.79. The carbon disclosure quality for 2017 is within the range of 0.00-47 with a mean score of 15.70. The full score for the carbon disclosure index that a company can achieve is 72. This shows that the carbon disclosure quality in 2017 was still poor, as the highest score obtained in 2017 was only 47.

The results also revealed that 46 out of 84 companies have a separate CEO and chairman of the board. This represents 54.8 per cent with CEO separation. On the other hand, 38 companies have the same person acting as both CEO and chairman of the board. This represents 45.2 per cent of the sample size and indicates that quite a number of companies still have CEO duality roles that can cause a concentration in the decision-making authority, and, as suggested by Gul and Leung (2004), can subsequently affect the board independence in carrying out its oversight and governance roles.

Table V presents the descriptive statistics for the carbon disclosure by the dimensions. The results revealed that the highest mean score for disclosure on carbon information

Variables	<i>n</i>	Min.	Max.	Mean	SD
Profitability	84	-4.45	16.14	5.34	4.28
Growth	84	-20.07	25.96	4.62	9.37
Leverage	84	0.00	61.20	24.74	16.32
Board Composition	84	12.50	75.00	46.70	13.04
Size	84	12.39	18.79	15.70	1.30
Carbon Disclosure (CD)	84	0	47	22.81	14.18
Variable	CEO duality	CEO separation		Total	
	Frequency	%	Frequency	%	Frequency
CEO duality	38	45.2	46	54.8	84

**Table IV.** Descriptive statistics for independent, control and dependent variables

No.	Dimensions	<i>n</i>	Min.	Max.	Mean	SD
1.	Climate change risks and opportunities	84	0.00	8.00	1.98	2.14
2.	Carbon emissions accounting	84	0.00	24.00	7.96	9.00
3.	Energy consumption accounting	84	0.00	11.00	4.82	4.35
4.	Carbon reduction and costs	84	0.00	16.00	4.72	4.63
5.	Carbon emission accountability	84	0.00	6.00	3.34	1.47
	All dimensions			22.82		

**Table V.** Descriptive statistics of carbon disclosure (CD) 2017 by the dimensions

relates to carbon emissions accounting (mean score 7.96). This is a positive development as it indicates that the companies are disclosing the methods that they use to account for GHG emissions that result from the production of goods and services, including the methodology used to calculate the GHG emissions. The lowest disclosure is for the dimension climate change risks and opportunities (mean score 1.98). This suggests that Malaysian public-listed companies have yet to use a proper framework to assess the risks and opportunities relating to climate change including the description of the current (and future) financial implications, business implications and opportunities arising from climate change.

Table VI presents the results of the Pearson correlations between the independent variables and carbon disclosure. The results show that profit, growth, leverage and CEO duality are negatively correlated with carbon disclosure quality. However, only CEO duality has a significant weak negative relationship with carbon disclosure (-0.298). This implies that companies with CEO duality will disclose low levels of carbon information. The variables board composition and size are positively correlated with carbon disclosure. However, size, with a Pearson correlation of 0.398, is significant suggesting that larger companies will disclose more carbon information. The bi-variate correlations among the independent variables are less than 0.7, indicating that there is no multicollinearity among the independent variables (Tabachnick and Fidell, 2001).

#### 4.2 Multiple regression analysis

In this study, linear multiple regression is used as the basis of analysis for testing *H1-H5*. The hypothesised relationships are modelled as follows:

$$CD = \beta_0 + \beta_1(ROA) + \beta_2(GRW) + \beta_3(LEV) + \beta_4(CEOD) + \beta_5(BCOM) + \beta_6(LnSize) + \epsilon.$$

In the above regression model, the presence of multicollinearity was further tested using the variance inflation factor (VIF) and tolerance values. The results from Table VII reveal that the VIF for all the independent variables is below 10 and the tolerance statistics is above 0.2, thus indicating that multicollinearity is non-existent in this study. The *F*-statistic for the model is 4.34 and is significant, while the adjusted *R*<sup>2</sup> coefficient is 0.20. The results indicate that two of the variables – profitability and leverage – are significant predictors for carbon disclosure, therefore, supporting *H1* and *H3*.

The results from Table VII confirm the findings from prior studies that profitable companies have more resources and are more likely to invest in initiatives to monitor the effect of their business operations on the environment (Luo *et al.*, 2013; Magnan *et al.*, 2005). These companies have more resources that can be used to plan, manage and account for the

	Profit	Growth	Leverage	CEO duality	Board composition	Size	Carbon disclosure
Profit	1	0.289**	-0.251*	0.032	-0.029	-0.263*	-0.014
Growth		1	-0.029	0.249*	0.003	-0.153	-0.197
Leverage			1	-0.186	-0.096	0.269*	-0.029
CEO duality				1	-0.050	-0.187	-0.298**
Board composition					1	0.167	0.059
Size						1	0.398**
Carbon disclosure quality							1

**Table VI.**  
Pearson correlations between variables – carbon disclosure and its determinants

**Notes:** \*,\*\*Correlation is significant at the 0.05 and 0.01 levels, respectively

	Coefficients	<i>t</i> -statistics	<i>p</i> -value	VIF	Tolerance
(Constant)	-40.169	-2.109	0.038		
Profitability	0.271	0.736	0.035*	1.238	0.807
Growth	-0.164	-1.007	0.685	1.179	0.848
Leverage	-0.151	-1.562	0.000**	1.228	0.814
CEO duality	-6.430	-2.144	0.464	1.128	0.887
Board composition	-0.048	-0.407	0.317	1.084	0.922
Size	4.536	3.809	0.122	1.201	0.833
<i>R</i> <sup>2</sup>	0.26				
Adjusted <i>R</i> <sup>2</sup>	0.20				
<i>F</i> -value	4.34				
<i>p</i> -value	0.001				

**Notes:** Coefficient for each variable is shown with *t*-statistics in parentheses. \*Significant at 5 per cent level (one-tailed test); \*\*significant at 1 per cent level (one-tailed test)

**Table VII.**  
Regression results for carbon disclosure and its determinants

effect on their actions on the environment, which, in turn, fulfil the demand of stakeholders for a more comprehensive and transparent business reporting. Therefore, *H1* is accepted. *H3* expects that leverage is negatively and significantly related to carbon disclosure. The results of the study found a significant negative relationship between leverage and carbon disclosure. The results are consistent with the arguments made by Chithambo and Tauringana (2014), and Luo *et al.* (2013) who found similar results in their studies. The results suggest that companies with higher leverage would focus more on fulfilling their financial commitments over undertaking initiatives to mitigate climate change issues in their work environment. This could be because such initiatives would require financial resources and highly leveraged companies would prefer to commit their financial resources in servicing their debts and other financial commitments. Hence, *H3* is accepted.

All the other variables are insignificant. Therefore, *H2*, *H4* and *H5* are rejected.

## 5. Conclusion

Managing and communicating climate change approaches are critical, as such decisions can distinguish an organisation from others, and, in turn, result in a competitive advantage. Therefore, this study aims to examine the extent to which climate change issues have been incorporated into an organisation and the influence of financial strength and corporate governance structure on such initiatives. The research process consists in an investigation via content analysis of the annual and sustainability reports of the top 100 public-listed companies for the year 2017 to provide an overview of the climate change initiatives that have been adopted by these companies to produce their products and services.

Regarding the extent to which climate change initiatives are being incorporated by Malaysian public-listed companies in the production of their goods and services, the results revealed that carbon information on carbon emissions accounting had the highest disclosure. Such initiatives suggest that the companies are disclosing the methods that they used to account for GHG emissions including the methodology used to calculate GHG emissions. However, a structured framework relating to climate change risks and opportunities issues is still at a preliminary stage. As for the influence of financial strength and corporate governance structure on management decisions to incorporate climate change initiatives in the production of their goods and services, the results of the study revealed that financial strength influences the decisions on climate change initiatives. Profitability is positively significant while leverage is negatively significant with carbon disclosure. It is surprising that governance structures and the size of the companies did not influence carbon disclosure. The empirical findings suggest that CEO duality and board

composition, including the size of the companies, did not have the propensity to drive carbon emissions disclosures in Malaysia. This factor could be because the specific focus on mitigating climate change through the control of carbon emissions is a new phenomenon in an emerging market such as Malaysia.

This study contributes to the growing body of knowledge on carbon disclosure and factors affecting the disclosures in developing nations. Most previous research was carried out in the setting of a developed country, such as Australia, the UK, the USA and others (Chithambo and Tauringana, 2014; Choi *et al.*, 2013; Saka and Oshika, 2014). The study also revealed that financial strength rather than governance structure influences the decisions on climate change initiatives. This finding is a significant contribution to regulatory bodies and policymakers regarding the drivers of climate change initiatives in an emerging economy such as Malaysia.

The conclusions drawn from the study must be interpreted with caution as the sample companies only comprise the top 100 public-listed companies in Malaysia to provide an initial insight into the situation in Malaysia. Furthermore, the interpretations and conclusions drawn from this study are based solely on a cross-sectional analysis of the data for only one year. Future studies may focus on examining the influence of financial strength and governance over an extended period. Additionally, this paper can be expanded to examine further the reasons behind the non-influence of growth, CEO duality and the presence of independent directors on carbon disclosures amongst companies in Malaysia.

#### References

- Ahmad, N.N.N. and Hossain, D.M. (2015), "Climate change and global warming discourses and disclosures in the corporate annual reports: a study on the Malaysian companies", *Procedia – Social and Behavioral Sciences*, Vol. 172, pp. 246-253.
- Al-Khater, K. and Naser, K. (2003), "Users' perceptions of corporate social responsibility and accountability: evidence from an emerging economy", *Managerial Auditing Journal*, Vol. 18 Nos 6/7, pp. 538-548.
- Altman, W. and Cooper, C. (2004), "Integrating enterprise-wide risk management", *Engineering Management*, Vol. 14 No. 5, pp. 12-13.
- Brammer, S. and Pavelin, S. (2006), "Voluntary environmental disclosures by large UK companies", *Journal of Business Finance and Accounting*, Vol. 33 No. 7, pp. 1168-1188.
- Brammer, S. and Pavelin, S. (2008), "Factors influencing the quality of corporate environmental disclosure", *Business Strategy and the Environment*, Vol. 17 No. 2, pp. 120-136.
- Buniamin, S. (2012), "The quantity and quality of environmental reporting in annual report of public listed companies in Malaysia", *Issues in Social and Environmental Reporting*, Vol. 4 No. 2, pp. 115-135.
- Burgwal, D.V.D. and Vieira, R.J.O. (2014), "Environmental disclosure determinants in Dutch listed companies", *Revista Contabilidade & Finanças*, Vol. 25 No. 64, pp. 60-78.
- Carroll, A.B. (2015), "Corporate social responsibility", *Organizational Dynamics*, Vol. 44 No. 2, pp. 87-96.
- Chithambo, L. and Tauringana, V. (2014), "Company specific determinants of greenhouse gases disclosures", *Journal of Applied Accounting Research*, Vol. 15 No. 3, pp. 323-338.
- Choi, B.B., Lee, D. and Psaros, J. (2013), "An analysis of Australian company carbon emission disclosures", *Pacific Accounting Review*, Vol. 25 No. 1, pp. 58-79.
- Clarkson, P.M., Li, Y., Richardson, G.D. and Vasvari, F.P. (2011), "Does it really pay to be green? Determinants and consequences of proactive environmental strategies", *Journal of Accounting and Public Policy*, Vol. 30 No. 2, pp. 122-144.
- Donnelly, R. and Mulcahy, M. (2008), "Board structure, ownership, and voluntary disclosure in Ireland", *Corporate Governance: An International Review*, Vol. 16 No. 5, pp. 416-429.

- Freeman, R.E. (1994), "The politics of stakeholder theory: some future directions", *Business Ethics Quarterly*, Vol. 4 No. 4, pp. 409-421.
- García-Meca, E. and Sánchez-Ballesta, J.P. (2010), "The association of board independence and ownership concentration with voluntary disclosure: a meta-analysis", *European Accounting Review*, Vol. 19 No. 3, pp. 603-627.
- González-Benito, J. and González-Benito, Ó. (2006), "A review of determinant factors of environmental proactivity", *Business Strategy and the Environment*, Vol. 15 No. 2, pp. 87-102.
- Gul, F.A. and Leung, S. (2004), "Board leadership, outside directors expertise and voluntary corporate disclosures", *Journal of Accounting & Public Policy*, Vol. 23 No. 5, pp. 351-379.
- Guo, Y. (2014), "2010 SEC climate change disclosure: determinants and impacts", University of Hawai'i at Manoa, Ann Arbor, MI (3648542 PhD), available at: <http://search.proquest.com.ezaccess.library.uitm.edu.my/docview/1651539007?accountid=42518,ProQuestDissertations&ThesesGlobal> database (accessed 1 December 2018).
- Haque, S. and Islam, M.A. (2015), "Stakeholder pressures on corporate climate change-related accountability and disclosure: Australian evidence", *Business and Politics*, Vol. 17 No. 2, pp. 355-390.
- He, C. and Loftus, J. (2014), "Does environmental reporting reflect environmental performance?: evidence from China", *Pacific Accounting Review*, Vol. 26 Nos 1/2, pp. 134-154.
- Huang, C.L. and Kung, F.H. (2010), "Drivers of environmental disclosure and stakeholder expectation: evidence from Taiwan", *Journal of Business Ethics*, Vol. 96 No. 3, pp. 435-451.
- Jensen, M.C. (2001), "Value maximisation, stakeholder theory, and the corporate objective function", *European Financial Management*, Vol. 7 No. 3, pp. 297-317.
- Kallapur, S. and Trombley, M.A. (1999), "The association between investment opportunity set proxies and realized growth", *Journal of Business Finance and Accounting*, Vol. 23 No. 3, pp. 505-519.
- Lingenfelder, D. and Thomas, A. (2011), "Stakeholder inclusiveness in sustainability reporting by mining companies listed on the Johannesburg securities exchange", *African Journal of Business Ethics*, Vol. 5 No. 1, pp. 1-13, available at: <http://dx.doi.org/10.4103/1817-7417.86024>
- Luo, L., Tang, Q. and Lan, Y.C. (2013), "Comparison of propensity for carbon disclosure between developing and developed countries: a resource constraint perspective", *Accounting Research Journal*, Vol. 26 No. 1, pp. 6-34.
- McClure, B. (2016), "Use ROA to gauge a company's profits", available at: [www.investopedia.com/articles/fundamental/04/012804.asp](http://www.investopedia.com/articles/fundamental/04/012804.asp) (accessed 7 December 2018).
- Magnan, M., Cormier, D. and Van Velthoven, B. (2005), "Environmental disclosure quality in large German companies: economic incentives, public pressures or institutional conditions?", *The European Accounting Review*, Vol. 14 No. 1, pp. 3-39.
- Matolcsy, Z., Chow, D. and Lim, S. (2007), "The association between board composition and different types of voluntary disclosure", *The European Accounting Review*, Vol. 16 No. 3, pp. 555-583.
- Mohamed Zain, M. (2009), "Corporate social responsibility in Malaysia", Mustaffa Mohamed Zain, Professorial Lecture, UPENA, Shah Alam (ISBN 978-967-305-362-9).
- NASA (2011), "What are climate and climate change?", available at: [www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-climate-change-58.html](http://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-climate-change-58.html) (accessed 7 December 2018).
- Pallant, J. (2011), *SPSS Survival Manual. A Step by Step Guide to Data Analysis Using SPSS Program* 4th ed., Open University Press, Milton Keynes.
- Patelli, L. and Prencipe, A. (2007), "The relationship between voluntary disclosure and independent directors in the presence of a dominant shareholder", *European Accounting Review*, Vol. 16 No. 1, pp. 5-33.
- Peng, J., Li, Y. and Xiong, D. (2014), "An empirical research on the impact of carbon information disclosure on investment recommendation", *Management & Engineering*, Vol. 16, pp. 101-110.

- Pinkse, J., Kolk, A. and Levy, D. (2008), "Corporate responses in an emerging climate regime: the institutionalization and commensuration of carbon disclosure", *The European Accounting Review*, Vol. 17 No. 4, pp. 719-745.
- Prado-Lorenzo, J.M., Rodríguez-Domínguez, L., Gallego-Álvarez, I. and García-Sánchez, I.M. (2009), "Factors influencing the disclosure of greenhouse gas emissions in companies world-wide", *Management Decision*, Vol. 47 No. 7, pp. 1133-1157.
- Prencipe, A. (2004), "Proprietary costs and determinants of voluntary segment disclosure: evidence from Italian listed companies", *The European Accounting Review*, Vol. 13 No. 2, pp. 319-340.
- Qu, W., Leung, P. and Cooper, B. (2013), "A study of voluntary disclosure of listed Chinese firms a stakeholder perspective", *Managerial Auditing Journal*, Vol. 28 No. 3, pp. 261-294.
- Rockstrom, J., Steffen, W., Noone, K. and Persson, A. (2009), "A safe operating space for humanity", *Nature*, Vol. 461, pp. 472-475.
- Saka, C. and Oshika, T. (2014), "Disclosure effects, carbon emissions and corporate value", *Sustainability Accounting, Management and Policy Journal*, Vol. 5 No. 1, pp. 22-45.
- Samaha, K., Khlif, H. and Hussainey, K. (2015), "The impact of board and audit committee characteristics on voluntary disclosure: a meta-analysis", *Journal of International Accounting, Auditing & Taxation*, Vol. 24, pp. 13-28.
- Shamil, M.M., Shaikh, J.M., Ho, P.L. and Krishnan, A. (2014), "The influence of board characteristics on sustainability reporting: empirical evidence from Sri Lankan firms", *Asian Review of Accounting*, Vol. 22 No. 2, pp. 78-97.
- Sulaiman, M., Abdullah, N. and Fatimaa, A.H. (2014), "Determinants of environmental reporting quality in Malaysia", *International Journal of Economics, Management and Accounting*, Vol. 22 No. 1, pp. 63-90.
- Tabachnick, B.G. and Fidell, L.S. (2001), *Using Multivariate Statistics*, 4th ed., Allyn and Bacon, Boston.
- UNEP & UNFCCC (2002), *Climate Change Information Kit*, UNEP and UNFCCC, Bonn.
- Waldman, D.A., de Luque, M.S., Washburn, N., House, R.J., Adetoun, B., Barrasa, A. and Wilderom, C.P.M. (2006), "Cultural and leadership predictors of corporate social responsibility values of top management: a GLOBE study of 15 countries", *Journal of International Business Studies*, Vol. 37 No. 6, pp. 823-837.
- Yusoff, H., Darus, F. and Rahman, S.A.A. (2015), "Do corporate governance mechanism influence environment reporting practices? Evidence from an emerging country", *International Journal of Business Governance and Ethics*, Vol. 10 No. 1, pp. 76-96.
- Zeng, S.X., Xu, X.D., Yin, H.T. and Tam, C.M. (2012), "Factors that drive Chinese listed companies in voluntary disclosure of environmental information", *Journal of Business Ethics*, Vol. 109 No. 3, pp. 309-321.

#### Further reading

CDP (2015), "CDP global climate change report 2015", available at: [www.cdp.net/en-US/Results/Pages/reports.aspx](http://www.cdp.net/en-US/Results/Pages/reports.aspx) (accessed 22 May 2016).

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# Local Development Platforms (LDP): an operational framework for business development

Local  
Development  
Platforms

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## Abstract

**Purpose** – The purpose of this paper is to present a conceptual model of business development that provides operational ways to increase the competitive presence of more micro and small ventures (both actual and new) in enlarged markets, including international ones.

**Design/methodology/approach** – The paper develops a conceptual model starting from the identification of the most usual constraints limiting the SMEs and entrepreneurship development and success. After this stage, the model was built with the help of selected concepts, which represent a theoretical framework of support.

**Findings** – Regarding the universe of SME and entrepreneurship, the authors usually find some weaknesses: markets mainly local/regional, absence of growth, cooperative networks and/or international operations, because of several usual constraints: limited competences and resources, absence of critical mass on buying/selling and difficulty to cooperate. These shortcomings represent an economic waste when there are competitive offers and/or endogenous resources.

**Research limitations/implications** – The model will be applied in a Portuguese county, in this way the authors expect to make an empirical research in the near future.

**Practical implications** – The model surpasses the, usual, limited skills of people and organisations betting in their competitive specialisation, with the assumptions that few people can be successful entrepreneurs/managers, but quite everyone can perform something competitively. The organisation/structure – Local Development Platform (LDP) – has the responsibility to assure the competitiveness of value chains built over networks of these agents. Additionally, the LDP should provide collective resources to lower the investments and operational needs of the agents involved, provide the added value services necessary for offers and agents' competitiveness, achieve critical mass on buying and selling and enlarge/open new markets. These resources are organised in up to five specialised platforms, to service a strategy structured along five axes of development.

**Social implications** – With this model, it is possible to increase the levels of employment and welfare.

**Originality/value** – A practical/operational integrated model able to be applied in different contexts will help private and public agents to define and implement strategies of development to enable the growth and success of SMEs and entrepreneurial initiatives in the international markets context.

**Keywords** Business development, Strategy, Networks, Resources, Value chains

**Paper type** Conceptual paper

## 1. Introduction

Micro and small businesses, in general, are usually confronted with several constraints: limited capabilities in terms of scale, resources and management skills; weak or non-existent cooperation in products, services and processes development, in buying and/or selling as well as in other operational processes; weak or non-existent use of endogenous resources and potentialities, among other situations. As a result of these constraints, these businesses usually focus on local/regional markets, making it difficult for them to grow and achieve greater output volumes, income, profits, employment and/or enter national and international

**JEL Classification** — M, M1, M19

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markets (Hessels and Parker, 2013). This is an unfortunate reality, because they represent at least 98 per cent of all businesses, with the main consequence being that the economy is not as strong as it could be.

In the face of the opportunities generated by globalisation, the spread of solutions for the virtualisation of processes and markets and the growing emergence of new needs and aspirations, a solution for that unfortunate reality would be welcomed especially but not only by underdeveloped villages, cities, counties, regions and/or countries.

With this challenge in mind, a path was held to find solutions for the above-mentioned constraints, enabling the development of a new model called Local Development Platforms (LDP), because development initiatives ultimately should emerge at a local level and build cooperative and sharing platforms in order to be successful.

In this way, the LDP framework aims to provide effective ways to take advantage of the potentialities and possibilities in presence with the support of specialised platforms addressing the above-mentioned constraints and enabling innovative initiatives and businesses, both on the part of existing agents and new ventures.

The paper is organised as follows: the theoretical framework includes the concepts of micro and small organisations, cooperation, networks and value chains, value creation and strategy. Although it is a theoretical model, the applied methodological guidelines are explained in the Methodology section. In the following section, the strategic integrated development model for LDP is presented. The paper ends with its conclusion and the references used.

## 2. Theoretical framework

Organisations like SMEs, cooperatives, handcrafters, local producers, designers and artists usually have a common characteristic: nearly all are micro (less than 10 persons) or small organisations (between 10 and 49 persons). Despite their size, they have to perform, almost, the same jobs the bigger ones have to. This situation implies the need for versatile and polyvalent people to perform the myriad tasks economic organisations require, i.e. development of products and services, provisioning, logistics, production, commercialisation, after-sales services, financing, human resources management, general and/or functional management, etc. Together with their size, micro and small organisations usually have limited resources and limited management/technical skills, at least in some areas and, as a result of these key constraints, it is normal for these entities to operate solely in local/regional (limited) markets, with a limited number and type of distribution channels, reflecting scarce incoming financial resources restraining their growth (Hessels and Parker, 2013).

A path to growth, analysed by these authors, combines internationalisation strategies with (international) networks, with subtle findings both in imports and exports activities, involving cooperative strategies and initiatives.

In fact, in the context of economic globalisation, the growing use of different kinds of cooperation is evident: cooperation between firms (Edwards-Schachter *et al.*, 2011; Xia *et al.*, 2011) and even between direct competitors with co-competition (Gnyawali *et al.*, 2016; Leick, 2011; Rusco, 2014). Cooperation is also evident between firms and other types of actors, like scientific and technological entities (Röigas *et al.*, 2014) or local authorities (Malmborg, 2007), for instance.

The main objective underlying these cooperative efforts is the search for increased competitiveness through operating synergies and complementarities on resources (tangible and intangible) through various forms, ranging from strategic alliances and joint ventures to subcontracting and outsourcing.

Accordingly, the importance of specialisation arises in the context of networks (Emiliano *et al.*, 2014), or rather, how firms and other actors focus on core competencies (Edgar and Lockwood, 2008, 2012; Prahalad and Hamel, 1990) and core businesses, in addition to the

competitiveness of activities performed by external entities, through cooperative agreements built over networks (Leick, 2011; Patel *et al.*, 2014; Porter, 1990). The main guideline for building the network is the sectorial value chain in which the business operates, i.e. the network created amongst different firms supplying, producing, handling and/or distributing a specific offering, with the support of supply chain management strategies (Kim, 2009).

Businesses employ supply chain management strategies to enhance their competitiveness through effective integration between internal and external operations, contributing to lower costs, faster operations, better quality, flexibility and/or other advantages. In this way, the author argues that their competitive strategies should pursue a high level of consistency with their supply chain management strategies. Farahani *et al.* (2014) go further, concluding that whole supply chains compete (or will compete) against each other.

When businesses focus on core competences and core business in the context of networks, they are specialising in the value they can create/provide competitively in the marketplace. In regard to value creation there is the concept of the business model, perhaps the most popular being the CANVAS model conceptualised by Osterwalder (2008), which describes the concept as the logic of creation, delivery and capture of value by an organisation. Some concepts enlarge the perspective of value creation, namely, integrated value creation (a methodology), which combines sustainability, corporate social responsibility and creating shared value (Visser and Kymal, 2015).

These concerns about value creation within networks built over the sectorial value chain lead the top management to the field of strategy, where the firm's objectives and the paths to achieve them are drawn.

In his 5Ps for strategy, Mintzberg (1995) shows, in a glance, the strategic concept's richness: perspective, plan, position, pattern and ploy. This richness remains concerning strategic theories, which arises from different perspectives. For Chandler (cited by Mintzberg, 1978), organisations and individuals use strategy to define orientation by means of setting objectives and the path and the resources to attain them, in a process where strategic implementation is regularly scrutinised to deal with environmental changes and challenges, frequently involving strategic changes or the outbreak of emergent strategies (Mintzberg, 1978). From another perspective, strategy has been defined as "the match an organisation makes between its internal resources and skills [...] and the opportunities and risks created by its external environment" (Grant, 1991, p. 114).

In the resource-based approach (Barney, 1991, 2001; Barney *et al.*, 2001; Grant, 1991; Hoopes *et al.*, 2003; Wernerfelt, 1984), there are two main concepts: resources and capabilities, intending to achieve efficient activities (capabilities) towards performance, i.e. competitiveness, accordingly with available resources. In this context, the critical question is how effectively a business uses and combines resources to achieve competitive advantages, where heterogeneous and immobile resources play a central role.

In this regard, the CANVAS model (Osterwalder, 2008) can help to configure and refine an efficient integration of resources to achieve competitive capabilities because this model considers the interdependency and consistency between different factors: key partners, key activities, key resources, value propositions, customer relationships, customer segments, channels, cost structure and revenue streams, with some of them being external to the firm. To enable the building of strengths and the overcoming of weaknesses, Harrison (2009) advises this perspective of an interdependent system of resources available internally and externally through cooperative processes intentionally built by firms.

In the context of local/regional or sectorial networks, it can be fruitful to integrate the resource-based strategic view with the management of supply chains, as noted by Narasimhan and Carter (1998) and Hunt and Davis (2012) for businesses, through cooperative networks to take advantage of potential territorial or sectorial synergies and complementarities. Concretely,

the heterogeneity of resources available in different territories or sectors, and the immobility of, at minimum, most of them, can enable different competitive activities (capabilities, as pointed by Barney, 1991), organised and implemented under the prescriptions of supply chain management strategies in order to achieve market differentiation.

In this way, the ones able to sustain competitive advantage have to meet the following requirements: valuable in exploiting opportunities and/or neutralising threats, rare in between the competitors, both as stand alone or in bundles, imperfectly imitable (if so), have no equivalent substitutes (Barney, 1991), and under the control of the firm's strategic management, in order to achieve a competitive advantage.

Alberto and Ferreira (2008), after a literature review, concluded, among other considerations, that territorial/regional competitiveness is linked to the presence of regional resources, qualified people, support services for businesses, cooperative networks between regional actors and innovative dynamics. These requirements can be implemented with the help of the CANVAS model presented above.

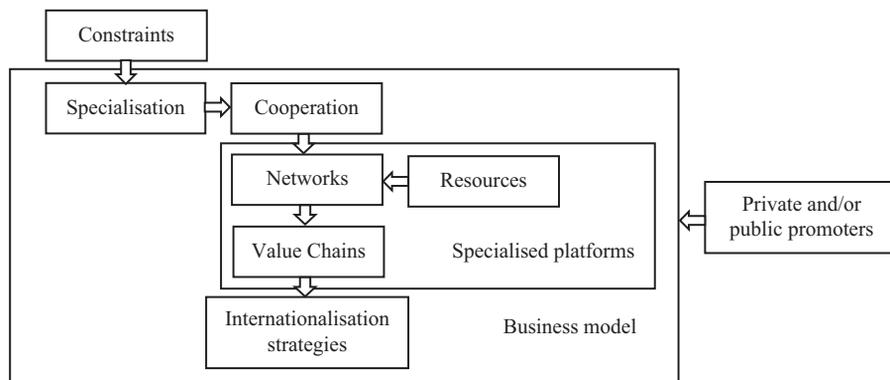
Accordingly, with the concepts listed above, it is possible to draw the main guidelines selected to build the intended model.

To overcome the lack of resources and other constraints, micro and small businesses can focus their activity (specialise) in the areas where they have competitive core competencies in the markets. To access the other necessary resources and activities, they can rely on networks built on the basis of value chain management strategies. These networks and the value chain strategy would be organised and oriented to international markets to assure adequate efforts towards high levels of competitiveness. Because difficulties are usually posed by cooperation, especially by smaller organisations, the advised perspective is the sharing of resources and capabilities through specialised platforms, promoted by the businesses themselves and/or other public and private entities (as well as the overall strategy in question). The resource-based strategic approach and the CANVAS model can be suitable to frame these initiatives. This framework is shown in Figure 1.

### 3. Methodology

This theoretical methodology's aim is to create a model primarily to develop micro and small businesses, albeit devised under the prescriptions of certain qualitative methodologies. In this way, a review of literature was undertaken with the two main objectives of identifying: the main constraints faced by micro and small businesses, and which solutions seem to be more suitable for these constraints.

With the first review of literature, a table of constraints was created. The second review involved a search for suitable solutions. The third step was to search for consistency



**Figure 1.**  
Concepts selected  
for building the  
LDP model

between the solutions listed, i.e. to determine if they could work well together by means of operating complementarities and synergies. Some of the listed solutions were discarded within this step. The final step was to define and refine the LDP model in the context of the findings of the previous phases.

This process of building a new model took advantage of the first three steps advised by Soft Systems Methodology (Checkland and Scholes, 1990): rich pictures, root definitions and conceptual models.

#### 4. Local development platforms

The LDP model intends to promote integrated conditions for the successful development and growth of micro and small businesses in order to achieve a diversified set of benefits: at the micro level: competitiveness, sustainability and growth, including in international markets; at the macro level: economic development and employment.

Bearing in mind the considerations made in Section 2, the LDP framework was built considering the following questions:

- (1) How to take relevant advantage of micro- and small-sized agents considering their limitations of resources and skills?

Betting in their specialisation and qualifications in terms of what they “do well”: we mean differentiated and/or quality core competencies and activities, with the support of other (specialised) agents in the remaining phases of the value chain (exploring complementarities and synergies). In other words, looking more strategically to value chains and less to individual agents in order to achieve/increase the competitiveness of value chains, enabling, consequently, the success and growth of individual agents. When it is not possible to have local/regional agents performing competitively in any phase of the value chain, it is necessary to arrange for someone from outside the territory or sector to perform the needed phase(s) so as to assure the competitiveness of the entire value chain. When a cooperative agreement cannot be obtained from any agent, the transaction way (buying) remains to get or access to the product or service intended.

State point no. 1.1: in this way, we promote the businesses’ specialisation framed and supported by networks built on value chain strategies, which provide the resources necessary for the overall success of the strategy to be implemented.

Aligning competitiveness by international markets references, we mean considering internationalisation strategies both in the beginning and/or in subsequent phase(s) of the development process, in order to compel actualised and/or innovative solutions in structures, processes and offerings.

Relying on added value services to achieve/increase the competitiveness of value chains, agents involved (participants and partners) and internationalisation strategies, which may involve consultancy, engineering, IT, quality control, design, accounting, auditing, law, arts, training, etc. These added value services can be provided by businesses, independent professionals, scientific and academic institutions or new ventures (including the ones launched to leverage the opportunities created with the LDP model, e.g. with the development of value chains and internationalisation initiatives). The access to these services can (should) be provided jointly.

State point no. 1.2: in this way, the necessary qualified and differentiated resources enabling competitiveness are provided and framed by the requirements that international markets impose.

Lowering the involved agent’s investments and operational financing needs and reinforcing efficiency: the LDP model considers five main ways to achieve these goals: creation of common infrastructures (platforms), intangible assets and inputs, and the promotion of joint initiatives and applications to support programmes.

The common infrastructures can be organised in five specialised platforms corresponding to spaces: business incubators, coworking spaces, land banks, industrial parks and the like; logistics: storage, freezing, transportation, loading and unloading, etc.; production: kitchens, stove ovens, production lines, assembling lines, packing and bottling lines, workshops, etc.; commercial: shops (fixed and/or itinerant), markets, vending machines, advertising, promotional events, etc.; and value-added services: fab labs, artistic/creative residences, labs, offices, ateliers, etc., using available (in use, inactive and underused) installations, structures, equipment, furniture and tools under different conditions: free lending, renting, leasing, buying or sharing and making new investments when necessary.

The common intangible assets can be brands, distinctive labels, patents, studies, projects, etc., in terms of the competitiveness of agents, value chains and territories or sectors (in the context of international markets).

The common inputs can be raw materials, subsidiary materials, packages, advertising materials, fuels and other items, purchased jointly (see joint initiatives) or produced by the participants, partners or the LDP itself, especially when consisting of endogenous resources.

The joint initiatives intend to create critical mass (both on buying and selling) to create/increase competitiveness by means of lower prices, better conditions and quality (on buying) and larger volumes, diversity and lower costs (on selling).

The application to support programmes is intended both for common initiatives and investments (through LDP) and agents' ones (with LDP support).

State point no. 1.3: in this way, a wide range of resources (both tangible and intangible) is provided for the agents involved and for the LDP structure as well. The strategic development of value chains (actual and intended) and the requirements of the internationalisation component should be the driving orientations for the measures listed above.

In the context of building supply chains and efficiency, Kim (2009) states "[...] alliance partners must have a shared vision. Infrastructure across these networks, including computer systems, distribution centres, factories and support organisations, might have to be built or reconfigured" (p. 328). Norman and Ramirez point to the shift/evolution from former value chains processes (unidirectional sequential actions adding costs) to value constellations (considering discontinuities like synchronisations, parallel, concurrent, distributed, co-processed and co-produced), which constitute some of the LDP roles, as can be understood by the analysis of this issue.

To promote and manage these initiatives (and the others presented below), it is necessary to create an LDP with an adequate organisational structure and an IT-dedicated coordination platform. These measures are presented in Figure 2:

- (2) How to take relevant advantage of endogenous resources (both leveraged and unleveraged)?

Committing to the leveraged and unleveraged endogenous resources available, with the support of added value services to create/increase their competitive leverage, increases volumes, helps agents' competitiveness (working with these resources) and enables new ventures leveraging them, considering resources as diverse as raw materials (geological, agricultural, forestry and livestock), events, patrimony, culture, nature, qualified people, territorial/sectorial economic specialisations, infrastructures (mobility, urban, scientific/technological, productive, logistic, commercial, etc.), etc.

State point no. 2: in this way, the specialisation of agents in the framework of building networks with the help of specialised value-added resources is promoted. This strategy of leveraging endogenous resources should be built in the framework of the development of value chains and internationalisation strategies, as analysed in Question No. 1, and provide

LDP and agent's investments where necessary, with applications (if possible) to support programmes (Figure 3):

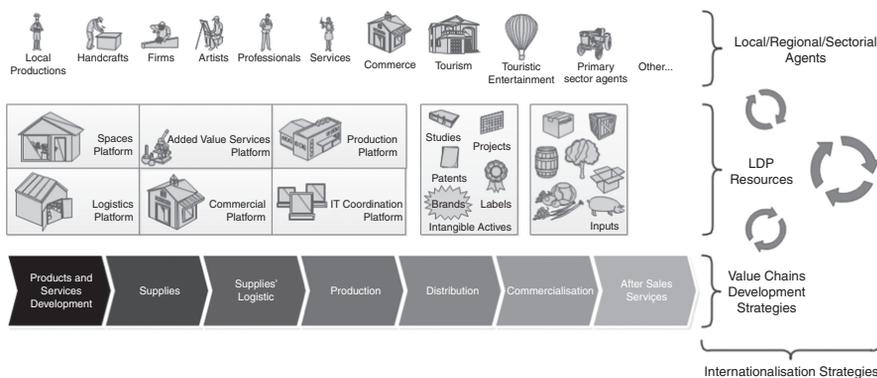
- (3) How to enhance the possibilities of success for LDP and their participants and partners?

Building an ecosystem facilitating different issues normally faced by businesses, e.g. investors, financing, support programmes, sectorial public bodies, sectorial and professional associations, specialised services, promoters, etc., increases, also, the lobbying capabilities towards regional and national governmental entities in favour of LDP and their respective participants' and partners' development and competitiveness.

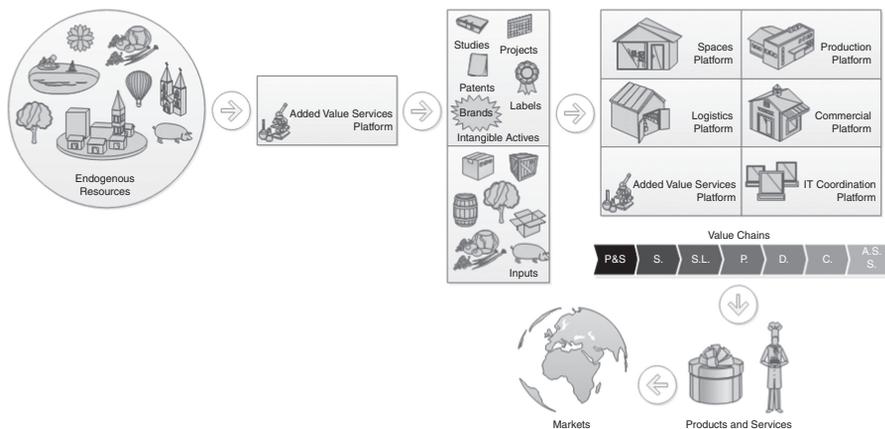
State point no. 3: in this way, relevant resources are provided involving other entities, both public and private, and considered necessary to contribute to the intended development and improve the likelihood of success. Also, the attraction of LDP promoters is addressed (Figure 4):

- (4) Which developmental components can be implemented by LDP?

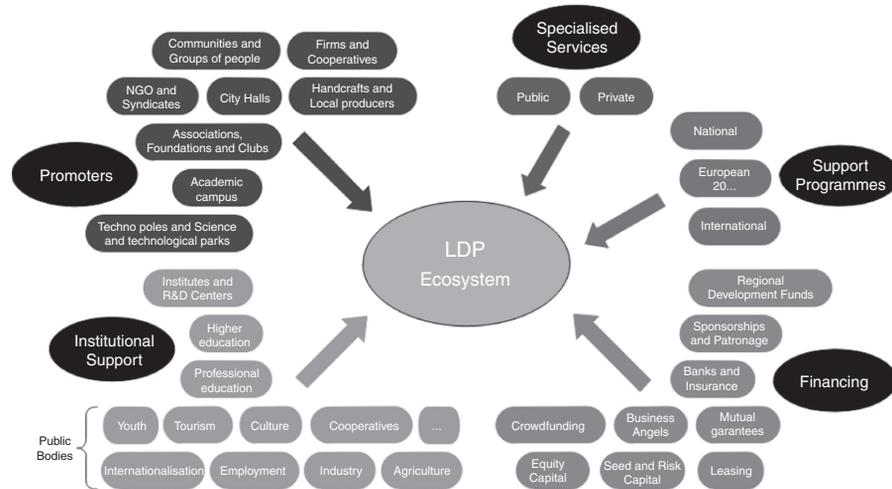
The concrete industries, phases of value chains, markets and the like depend entirely on each location or sector. However, the LDP model calls for five main components of



**Figure 2.** LDP as competitive resource for local/regional or sectorial agents' development and growth in the frame of value chains and internationalisation strategies



**Figure 3.** Leverage of endogenous resources



**Figure 4.**  
LDP's ecosystems

development: products and services; tourism, patrimony, culture and nature; real estate; social; and entrepreneurship.

The products and services component enables the leverage of physical and valuable endogenous resources, exports and the substitution of imports and the development of new offerings, aiding in the development of primary and secondary sectors and most tertiary sectors.

The tourism, patrimony, culture and natural component takes advantage of several endogenous resources usually not leveraged or insufficiently leveraged (at least during certain months of the year), contributing to the competitiveness of tourism ventures and to commercial, transportation and other complementary industries.

The real estate component intends to take advantage of the remaining components (agents' growth, new ventures, employment, qualification of touristic and cultural equipment, etc.) to contribute to the given property's dynamism (through rebuilding, expansions, adaptations, new buildings, etc.), and the global development with its own offers and initiatives.

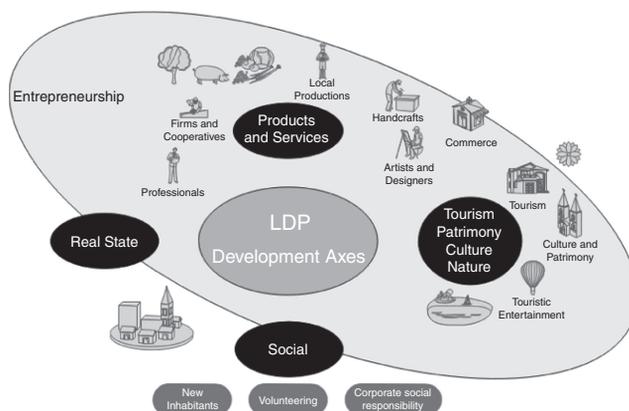
The social component intends to develop initiatives like volunteering (from people) and corporate social responsibility (from organisations) to help in any kind of situation (new ventures, agent's competitiveness, events, etc.).

The entrepreneurship component intends to help new ventures to take advantage of endogenous resources, opportunities created with LDP's dynamics and develop new ideas and initiatives. In all these components, the LDP (jointly with their participants, partners and ecosystem's entities) has the responsibility to apply the measures presented in this section according to with each existing concrete situation.

State point no. 4: in this way, the value chains and international markets considered worth value can be adequately selected, helping the LDP to adequately and systematically frame this analysis and selection process (Figure 5):

(5) How can LDP be structured?

Within the context (territory and local/regional or sectorial networks) in question, the LDP may have all or only some of the platforms presented above and the coordination structure may differ from LDP to LDP based on this reality. In turn, the number and "quality" of participants and partners involved implies a bigger or smaller and more or less diversified structure, e.g.



**Figure 5.**  
LDP's  
developmental axes

functions, departments, services and sections to deal with logistic centres, factories, shops, labs, fab labs, artistic/creative residences, value-added services, suppliers, logistic operators, distribution channels, costumers, and several other types of entities. Independently of these variables and concerns, any LDP should have a manager and a team dedicated to the design, creation, launching and development of the LDP (see also Question No. 6).

State point no. 5.1: in this way, some of the LDP resources are addressed in order to provide some of the necessary conditions for the overall success of the initiative in question.

Beyond the support of national and international programmes, sponsorships and patronages, LDP activities should be supported by the services provided and, eventually, by the selling of its own products. The payment by participants and partners can range from free of charge (in some fragile situations) to market prices and take the form of a percentage of profits or income, fixed or variable values and payment in kind, both with respect to products and services (to be sold or used).

It is strongly advised to contract with the entities aided by LDP a percentage of their profits to build a fund with several objectives: funding/financing of new ventures, LDP investments, corporate social responsibility and other objectives considered worth value.

State point no. 5.2: in these ways, financial resources are provided to assure the sustainable development of LDP and, consequently, their current and future participants and partners.

Figure 6 shows the “big economic picture” of LDP, summarising the themes discussed in this section:

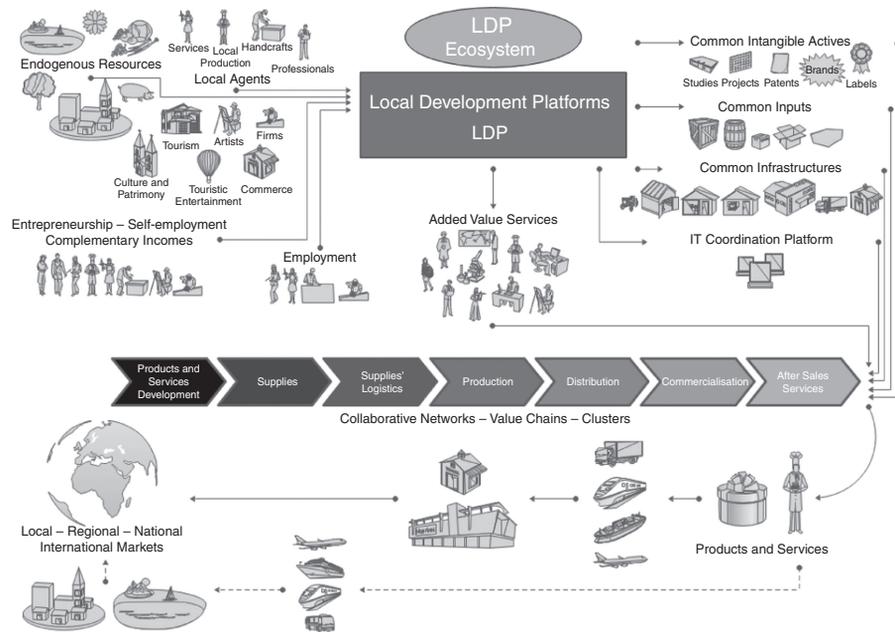
- (6) How to involve social organisations and the overall regional society in its own development?

There is a wide range of possibilities to be leveraged by social institutions: registration of tacit knowledge (especially among retired) to enable new economic initiatives, training, sharing and free renting of inactive or underused infrastructures, sharing of skilled collaborators, creation of brands and labels of a social nature, volunteering and corporate social responsibility, etc., to help LDP, their participants and partners.

Generally, these entities have a good social reputation, which can be used to promote LDP and convince unemployed people and agents to affiliate with or contribute to them (see also Question No. 7).

State point no. 6: in this way, some resources are provided as well as interesting promoters:

- (7) What kind of entities can promote LDP?



**Figure 6.**  
Global economic  
framework of LDP

LDP can be promoted by a wide range of entities: public ones such as city halls and other public bodies, as well as sectorial ones (specialised in industry, agriculture, employment, youth, etc.); local/regional development associations; academic and scientific institutions; private for-profit firms, cooperatives, handcrafters, local producers, designers, artists and respective entrepreneurial and professional associations; private entities operated as social and cultural institutions, associations and foundations, NGO, syndicates and other similar entities; and communities or groups of persons.

Any one of these entities can promote LDP on a stand-alone basis or through cooperation among several entities and/or institutions, which is advised in order to obtain a greater diversity of resources, explore complementarities and synergies among them and achieve a greater lobbying power.

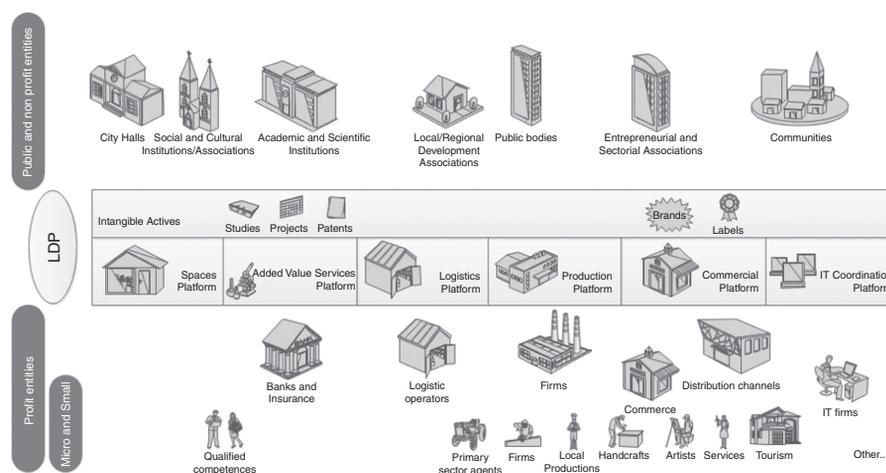
State point no. 7.1: in this way, the subject of raising LDP promoters is addressed.

The LDP promoters can contribute to its creation in several ways: free renting, renting, selling and sharing resources such as installations, structures, equipment, furniture and tools, dispense collaborators (on a temporary or punctual basis), provide services, supplies and networks' contacts, financing, managing LDP, among other possibilities.

State point no. 7.2: in this way, the access to diversified resources is addressed (Figure 7).

## 5. Conclusion

This paper focusses on conceptualising concrete ways to implement conditions to improve, in particular, the growth and competitive development of micro and small businesses. Several constraints common to most contexts were taken into account, as well as the dynamics inherent to the actual globalisation of different markets. In this way, a framework model was built and called LDP because of the conviction that each place/local or sector needs to define and implement its own strategy of development – even when some factors apply to the context of a wider territory or industry – to assure the best possible fit between local resources, needs and ambitions.



**Figure 7.**  
LDP's potential promoters

As a conceptual model, not yet applied and, consequently, not having undergone empirical research, it is intended to provide a new framework useful to help facilitate the necessary conditions to enhance the economic development of a relevant set of businesses, regardless of whether they are promoted by private and/or public entities.

In this way, a holistic approach was undertaken, trying to do not let anything, considered necessary, forgot taking in attention the objectives pursued. From this perspective, the LDP model may be considered complex, but in a turbulent, complex and fast-changing world, we do not believe in simple and easy solutions. This conviction was reinforced with the reviews conducted with respect to the research, because we found various situations to consider as well as possible solutions, reflecting the complexity of this challenge.

We recently received an order from a county with a diversified economy (rural, industrial and services based) to study the definition and implementation of an LDP. With this opportunity, we expect to conduct empirical research on the LDP model's definition and operations in the near future to help to identify and understand potential virtualities and weaknesses.

## References

- Alberto, D. and Ferreira, J. (2008), "Competitividade Regional: Conceito, Instrumentos e Modelos de Avaliação", Actas do 14º Congresso da Associação Portuguesa para o Desenvolvimento Regional, Tomar.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.
- Barney, J. (2001), "Resource-based theories of competitive advantage: a ten-year retrospective on the resource-based view", *Journal of Management*, Vol. 27 No. 6, pp. 643-650.
- Barney, J., Wright, M. and Kelchen, J. Jr (2001), "The resource-based view of the firm: ten years after 1991", *Journal of Management*, Vol. 27 No. 6, pp. 625-641.
- Checkland, P. and Scholes, J. (1990), *Soft Systems Methodology in Action*, Wiley, Chichester.
- Edgar, W. and Lockwood, C. (2008), "Organizational competencies: clarifying the construct", *Journal of Business Inquiry: Research, Education, and Application*, Vol. 7 No. 1, pp. 21-32.
- Edgar, W. and Lockwood, C. (2012), "Understanding, finding, and conceptualizing core competence depth: a framework, guide, and generalization for corporate managers and research professionals", *Academy of Strategic Management Journal*, Vol. 11 No. 2, pp. 63-92.

- Edwards-Schachter, M., Castro-Martínez, I. and Fernández-de-Lucio, I. (2011), "International co-operation between firms on innovation and R&D: empirical evidence from Argentina and Spain", *Journal of Technology Management & Innovation*, Vol. 6 No. 3, pp. 126-146.
- Emiliano, C., Antonella, P. and Iacopo, O. (2014), "From industrial districts to firms networks: The Italian case", *Annals of the University of Oradea, Economic Science Series*, Vol. 23 No. 2, pp. 187-194.
- Farahani, Z., Rezapour, S., Drezner, T. and Fallah, S. (2014), "Competitive supply chain network design: an overview of classifications, models, solution techniques and applications", *Omega*, Vol. 45, pp. 92-118.
- Gnyawali, D., Madhavan, R., He, J. and Bengtsson, M. (2016), "The competition-cooperation paradox in inter-firm relationships: a conceptual framework", *Industrial Marketing Management*, Vol. 53, pp. 7-18.
- Grant, M. (1991), "The resource-based theory of competitive advantage: implications for strategy formulation", *California Management Review*, Vol. 33 No. 3, pp. 114-135.
- Harrison, J. (2009), "The resource creation system and competitive advantage", available at: [www.naplesforumonservice.it/uploads/files/HARRISON\\_THE%20RESOURCE%20CREATION%20SYSTEM%20AND%20COMPETITIVE%20ADVANTAGE.pdf](http://www.naplesforumonservice.it/uploads/files/HARRISON_THE%20RESOURCE%20CREATION%20SYSTEM%20AND%20COMPETITIVE%20ADVANTAGE.pdf) (accessed 16 April 2016).
- Hessels, J. and Parker, S. (2013), "Constraints, internationalization and growth: a cross-country analysis of European SMEs", *Journal of World Business*, Vol. 48 No. 1, pp. 137-148.
- Hoopes, G., Madsen, L. and Walker, G. (2003), "Guest editors' introduction to the special issue: why is there a resource-based view? Toward a theory of competitive heterogeneity", *Strategic Management Journal*, Vol. 24 No. 10, pp. 889-902.
- Hunt, S. and Davis, D. (2012), "Grounding supply chain management in resource-advantage theory: in defense of a resource-based view of the firm", *Journal of Supply Chain Management*, Vol. 48 No. 2, pp. 15-20.
- Kim, S. (2009), "An investigation on the direct and indirect effect of supply chain integration on firm performance", *International Journal of Production Economics*, Vol. 119 No. 2, pp. 328-346.
- Leick, B. (2011), "Barriers to co-operation and competitive advantage: crossborder business networks of Saxon and Northern Bohemian firms", *Journal for East European Management Studies*, Vol. 16 No. 2, pp. 162-184.
- Malmborg, F. (2007), "Stimulating learning and innovation in networks for regional sustainable development: the role of local authorities", *Journal of Cleaner Production*, Vol. 15, pp. 1730-1741.
- Mintzberg, H. (1978), "Patterns in strategy formation", *Management Science*, Vol. 24 No. 9, pp. 934-948.
- Mintzberg, H. (1995), "Five Ps for strategy", in Mintzberg, H., Quinn, J.B. and Ghoshal, S. (Eds), *The Strategy Process – European Edition*, Prentice Hall International Editions, Englewood Cliffs, NJ, pp. 12-19.
- Narasimhan, R. and Carter, R. (1998), "Linking business unit and material sourcing strategies", *Journal of Business Logistics*, Vol. 19 No. 2, pp. 155-171.
- Osterwalder, A. (2008), "The business model canvas", 5 July, available at: <http://nonlinearthinking.typepad.com> (accessed 15 March 2016).
- Patel, P., Fernhaber, S., McDougall-Covin, P. and Van Der Have, R. (2014), "Besting competitors to international markets: the value of geographically balanced networks for innovation", *Strategic Management Journal*, Vol. 35, pp. 691-711.
- Porter, M. (1990), *A Vantagem Competitiva das Nações*, 14ª edição, Editora Campus, Rio de Janeiro.
- Prahalad, C. and Hamel, G. (1990), "The core competence of the corporation", *Harvard Business Review*, Vol. 68 No. 3, pp. 79-92.
- Rõigas, K., Seppo, M., Varblane, U. and Mõhnen, P. (2014), "Which firms use universities as cooperation partners? – The comparative view in Europe", Working Paper Series No. 93, Faculty of Economics & Business Administration, University of Tartu, pp. 3-28.

- 
- Rusco, R. (2014), "Mapping the perspectives of co-competition and technology-based strategic networks: a case of smartphones", *Industrial Marketing Management*, Vol. 43 No. 5, pp. 801-812.
- Visser, W. and Kymal, C. (2015), "Integrated value creation (IVC): beyond corporate social responsibility (CSR) and creating shared value (CSV)", *Journal of International Business Ethics*, Vol. 8 No. 1, pp. 29-43.
- Wernerfelt, B. (1984), "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5 No. 2, pp. 171-180.
- Xia, M., Zhao, K. and Mahoney, J. (2011), "Enhancing value via cooperation: firms' process benefits from participation in a standard consortium", *Industrial and Corporate Change*, Vol. 21 No. 3, pp. 699-729.

#### Further reading

- Ferreira, J., Leitão, J. and Raposo, M. (2006), "Avaliação multidimensional da competitividade regional: o caso da Beira Interior", 12º Congresso da Associação Portuguesa de Desenvolvimento Regional, Viseu.
- Leandro de Borba, M., Hoeltgebaum, M. and Silveira, A. (2011), "A produção científica em empreendedorismo: análise do academy of management meeting: 1954-2005", *Revista de Administração Mackenzie*, Vol. 12 No. 2, pp. 169-206.
- Norman, R. and Ramirez, R. (1998), *Designing Interactive Strategy: From Value Chain to Value Constellation*, John Wiley & Sons, Chichester.
- Ribeiro-Soriano, D. and Galindo-Martín, M.-A. (2012), "Government policies to support entrepreneurship", *Entrepreneurship & Regional Development*, Vol. 24 Nos 9-10, pp. 861-864.
- Roig-Tierno, N., Alcázar, J. and Ribeiro-Navarrete, S. (2015), "Use of infrastructures to support innovative entrepreneurship and business growth", *Journal of Business Research*, Vol. 68 No. 11, pp. 2290-2294.

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# Is the rest of the EU missing out on REITs?

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## Abstract

**Purpose** – The purpose of this paper is to investigate whether real estate investment trusts (REITs) have any significant cost-efficiency advantages over real estate operating companies (REOCs).

**Design/methodology/approach** – The data for listed companies were extracted from the Bloomberg terminal. The authors analyzed financial ratios and conducted a non-parametric data envelope analysis (DEA) for 534 firms in the USA, Canada and some EU member states.

**Findings** – The results suggest that REITs were much more cost-efficient than REOCs by all the parameters in the DEA model during the entire three-year period under consideration. Although the debt-to-equity levels were similar, REOCs were more relying on short-term than long-term maturities, which made them more vulnerable against market corrections or shocks. Being larger in asset size did not necessarily guarantee greater economies of scale. Both – the cases of increasing economies of scale and diseconomies – were detected. The time period 2015–2017 showed the general trend of decreasing efficiency.

**Originality/value** – Very few papers on the topic of REITs have attempted to find out whether a different firm structure displays any differences in efficiency. Because the question of REITs and sustainable growth of the real estate market has become a prominent issue, this research can help EU countries to consider the option of adopting a REIT system. If this system were successfully implemented, the EU member states could benefit from a more sustainable and more rapid growth of their real estate markets.

**Keywords** Efficiency, DEA, REITs, Real estate, REOCs

**Paper type** Research paper

## 1. Introduction

Because real estate investment trusts (REITs) were introduced in the real estate market by President Eisenhower back in the 1960s, nowadays they can hardly be called an innovation. Nevertheless, according to the European Property Research Association (EPR), in 2018 only 13 out of 28 EU member states had a REIT system implemented in their stock exchange. Although most of Central-Eastern European Countries evidently relied upon a universally accepted firm structure called a real estate operating company (REOC), it should not be overlooked that there exist some significant functional and strategic differences between the two firm types mentioned above. Though both are listed real estate firms, REITs are required to distribute their income to the shareholders, while REOCs can reinvest their earnings. The distribution rates may vary depending on a country. For instance, in 2017 the USA and the UK had the distribution rates amounting to 90 percent of taxable income, while the distribution rate in France amounted to 95 percent (PWC, 2017). In addition, because REITs are required to earn most of their profits from rental activities, their rental income is considered business income and can be deductible. Other intrinsic differences are related to asset formation, listing requirements, investing rules, restrictions imposed on investors and legal provisions imposed on non-residents.



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All of these distinctive qualities have made REITs to be the biggest real estate investment vehicle in the USA. According to EPRA (2017) REITs market share by market capitalization amounted to 99.41 percent, while non-REITs (REOCs and other mutual funds that invest in real estate) had only 0.59 percent of the market share. Yet in Europe, REITs market share by market capitalization accounted for only 57.16 percent, while non-REITs occupied 42.84 percent of the market. Strangely enough, even such developed countries as Germany, Spain, Italy and the UK introduced their legislation on REITs not earlier than in 2007, 2009, 2007 and 2007, respectively, whereas Belgian and Luxembourg's parliaments had approved similar legislative acts long before – in 1995 and 1965, respectively.

Despite the fact that REITs development in Europe remains slow, the profound benefits of such systems cannot be denied; they were recognized by researchers decades ago. The first study, carried out by Bers and Springer (1997), argued that REITs displayed economies of scale with regard to assets and revenue, consequentially leading to the bigger housing and commercial supply of usable square feet. Other researchers, like Anderson *et al.* (2002), Linneman and Ambrose (1997), Ambrose *et al.* (2005), Sham *et al.* (2009), Tahir *et al.* (2012), Cotter and Richard (2014) and Topuz and Isik (2017), found that REITs were moderately efficient, but most of them demonstrated economies of scale; larger REITs displayed less systematic risk; upon their entry, new modern REITs outperformed incumbents in their operational efficiency, were more capable in finding the capital necessary to fund their operations, and pursued new opportunities while retaining robust liquidity levels.

At the same time, some contrary evidence on the benefits of REITs can be found. Kawaguchi *et al.* (2012) explained that the high yield on REIT shares endured a high degree of risk, which can make the real estate market unstable. Three different studies, conducted by Miller *et al.* (2007), Vogel (1997) and Ambrose *et al.* (2000), argued that contrary to popular belief, REITs did not exhibit economies of scale (the results were obtained by analyzing different sample sizes for different years). By using a proxy method for interest rates, Brounen *et al.* (2016) stated that REITs were quite sensitive to interest changes because of their extensive leverage. Miller *et al.* (2007) postulated that the fear that national REITs can distort competition when they multiply and merge might be one of the reasons why some European countries have still been resilient to the idea of REITs.

Unfortunately, most of the above-mentioned studies analyzed REITs in standalone, which means that no direct comparison between REITs and other types of firms, like REOCs, can be drawn. This leaves some unanswered questions on whether REITs are performing better than REOCs, whether they have an edge in particular areas, such as efficiency or debt management, or how they affect the stability in the real estate market. Therefore, the purpose of this paper is to conduct the cost-efficiency analysis of REITs and REOCs in order to find out whether any significant differences between the divergent firm structures can be observed.

This paper is structured as follows: Section 2 focuses on existing theoretical and empirical literature addressing REITs; Section 3 provides a thorough guide of the methodological approach, followed to ensure the efficiency of the model; Section 4 presents and discusses the results obtained through application of the data envelope analysis (DEA) model; Section 5 concludes the study, considers its limitations and policy implications, and provides the directions for further research.

## 2. Literature review

Scientific literature on REITs came about mostly in the 1990s, when Scherer (1995) investigated the consolidations and mergers in the USA. The author then stated that because interest rates were increasing and capital availability was decreasing, REITs were unable to expand. This led to creation of mergers and acquisitions, consequently providing economies of scale. Bers and Springer (1997) tested this hypothesis in their empirical study by employing a stochastic frontier model with a translog function for the period 1992–1994.

Having less than 114 USA companies in their model, the authors found that REITs did exhibit economies of scale, but when the companies grew larger, scaling effects disappeared, i.e. the companies had an optimal size to grow. Depending on the complexity of the model, 71–98 percent of the companies had scaling effects. Soon afterwards, Ambrose *et al.* (2000) with a different sample size for the period 1990 to 1997 replicated the same characteristics, concluding that US REITs did have economies of scale, but those economies were mainly observed in smaller companies, while larger companies experienced diseconomies. The methodology used by Ambrose *et al.* (2000) was a comparison of net operating income growth in a shadow portfolio against the selected sample portfolio. Similarly, while analyzing the period 1995 to 1997, Anderson *et al.* (2002) found that US REITs were relatively cost-efficient; most of them faced increasing returns to scale, but this performance was largely attributed to a company's management style and the use of debt. Leaning on their earlier study and employing regression analysis and capital pricing models for the period 1995–2000, Ambrose *et al.* (2005) again discovered that REITs were succeeding at increasing growth prospects by lowering cost, but unlike in the earlier work, scaling efficiencies were observed only for larger REITs. A study of Asian REITs over the period 2001 to 2007, conducted by Sham *et al.* (2009), suggested that in such countries as Japan, Singapore, Hong Kong and Malaysia, scaling characteristics were inherent to all expense categories, except for management fees.

The evidence, contradicting to the positive findings mentioned before, was discovered by McIntosh *et al.* (1991) and McIntosh *et al.* (1995). In their former study, the authors discovered that larger REITs were actually earning poorer returns and were as risky as the firms with a smaller asset size, while the latter study revealed no positive wealth effects for REITs after announcement of a transaction. By employing the method of regression analysis, Ambrose *et al.* (2000) found that economies of scale were driven only by the mergers in the 1990s, but not by superior efficiency parameters. Due to big consolidations, companies were able to buy properties at distressed prices, thus making their after-merger performance excellent. Most of the economies of scale were found to be circumstantial. A study, conducted by Anderson *et al.* (2002), who followed a data envelope approach with a sample size of 157 companies, revealed that REITs had low technical efficiency and failed to operate at a constant return to scale; what is more, many of them experienced diseconomies and poorly used input utilization. Lastly, while researching the period 1997–2003, Miller *et al.* (2007) found little evidence of REITs' economies of scale, but observed some indication of diseconomies. Contrary to previous studies, Miller *et al.*'s (2007) study linked higher leverage to higher efficiency. Similarly, Li (2012) proposed that higher leverage, inflation shocks and the use of short-term debt increased REITs' volatility.

Unfortunately, the above-mentioned studies were mainly focused on US REITs, while the literature addressing European REITs and REOCs, and comparing these two types of structures is still scarce. Ambrose *et al.* (2016) were the first authors who researched European firms in collaboration with the EPRA. By applying the method of stochastic frontier analysis (SFA) with the translog function for 236 companies, the authors found that many listed real estate companies exhibited economies of scale, although diseconomies were also observed. When firms grew larger in their asset size, they tended to incur lower cost. Although the authors analyzed both REITs and REOCs, they did not confirm that a firm's structure might make any difference on its efficiency results. Brounen *et al.* (2013) examined how transition to the REIT regime might affect a firm's performance. They concluded that firms, in general, experienced a decrease in their leverage, a slight jump in their stock turnover level, and faced larger dividend pay-outs. The latest study, conducted by Ascherl and Schaefer (2018), also suggests that REITs, compared to REOCs, provide a significantly lower underpricing at an initial public offering, which means that REITs are more favorably valued by investors. Regrettably, the other studies, which analyzed European listed real estate firms, did not compare REITs to REOCs. Nevertheless, some studies that covered

solely European REITs, for instance, Schacht and Wimschulte's (2008) study on German REITs, Newell *et al.*'s (2013) study on French REITs, Marzuki and Newell's (2018) study on Spanish REITs, and the studies carried out by Brounen *et al.* (2016), Falkenbach and Niskanen (2012), Sin *et al.* (2008) and Connors and Jackman (2000), are worth mentioning. Researchers suggest that REITs, in general, have great opportunities to accumulate capital and facilitate a more integrated development of real estate property (as it was found in the case of Germany); they also give superior risk-adjusted return to bonds, have a  $\beta$  of 0.38, meaning that they are less vulnerable to systemic risk, serve as a great portfolio diversification tool and are less sensitive to interest changes than private firms.

Summarizing the results of previous studies, a lack of theoretical and empirical understanding of how REITs structure compares to REOCs can be observed. In previous works, the efficiencies were either calculated for a single firm structure or as an aggregate value, which left the discrepancies unexplained. The second problem arises from the fact that most studies regarding economies of scale were conducted in the period of the rise of mergers, which might have distorted the data in terms of the intense acquisition of property at distressed prices. In parallel, many researchers admit that the data of the early 1990s might have many inconsistencies with the data reported. At the moment, the existing literature does not provide the answer to the question whether acceptance of a REIT structure for some European countries would lead to obvious benefits brought by the development of the real estate market. This indicates a niche for empirical research.

In this context, this paper aims to contribute to the existing literature by trying to identify cost-efficiency differences observed in the two firm structures. Thus, a proposed hypothesis is formed:

*H1.* On average, a REIT firm structure display significantly better cost-efficiency results than a REOC firm structure.

### 3. Methodology

Data reliability always comes as a first priority, and many authors admit that their data samples are inaccurate because of reporting inconsistencies; this is especially true of the early research pursued in the 1990s. To ensure high data reliability, the Bloomberg terminal database was selected for this research. The total number of observations in the sample size was 531; the research covered the period from 2015 to 2017 and included the following countries: the USA, Canada, the UK, Germany, France, Spain, Italy, the Netherlands, Greece, Finland, Austria and Switzerland. All of the countries under consideration have both REOCs and REITs on their stock exchange; in all of the countries, the priority was given to the largest companies in terms of their market capitalization or assets size. The latter choice was made in order to avoid the sample biases.

If any data were missing, the securities and exchange commission's database or a company's website was visited to extract the missing values from balance sheets or profit statements. Descriptive statistics for the main variables are displayed in Table I.

While reviewing earlier research, two prominent efficiency methodologies – DEA and SFA – were detected. Both of them are considered golden standards for measuring production functions and calculating efficiency frontiers. According to Battese and Coelli (1992) and Henningsen (2014), the main difference between DEA and SFA is that the latter can separate noise in the data and better align with randomness. At the same time, separation might distort the real values because the data are sensitive to changes. Therefore, to represent the values as close to the original values as possible, the DEA method was chosen.

The main concept of the DEA is to calculate how much inputs can be diminished for a given value of outputs so that the production capabilities are technically efficient. The DEA model was formerly created by Charnes *et al.* (1978). Following this method, a firm's technical efficiency is

Descriptive statistics	Output Assets	L_Debt	S_Debt	G_A	Inputs Deprec	Int_Exp	Employees
<i>2017</i>							
Mean	23,940	22,467	22,999	19,199	20,191	18,975	83,943
SD	25,709	23,635	25,378	20,030	21,773	20,211	98,193
Max.	17,617	17,332	15,891	91,182	13,508	10,108	21,972
Min.	28,242	25,934	27,967	22,067	24,193	22,660	12,083
<i>2016</i>							
Mean	23,451	22,266	21,407	19,112	19,667	19,029	83,943
SD	24,745	23,241	22,936	19,874	21,096	20,198	98,193
Max.	17,476	15,529	14,690	91,182	13,437	11,850	23,978
Min.	26,977	25,550	25,202	22,067	23,478	22,660	12,083
<i>2015</i>							
Mean	23,325	22,158	21,117	19,004	19,521	18,842	83,942
SD	24,677	23,060	22,594	19,499	21,006	19,608	98,193
Max.	17,657	15,529	14,396	86,482	12,476	10,150	13,862
Min.	26,963	25,304	24,865	21,381	23,497	21,891	12,083

**Table I.**  
Descriptive statistic  
for main variables

**Note:** All variables are converted to natural logarithms with base of  $e$

defined as the ratio of the sum of its weighted outputs to the sum of its weighted inputs. The DEA creates decision-making units (DMUs) which are benchmarked against the most efficient ones, and by using linear programming equations, it shows how different firm efficiencies are. Companies' technical efficiency scores are represented on the efficiency frontier and expressed in percentage values from 1 to 100 percent, the latter being the most efficient (no firm can be located above the frontier). The formula for technical efficiency calculation is as follows:

$$TE_k = \frac{\sum_{r=1}^s u_r y_{rk}}{\sum_{i=1}^m v_i x_{ik}}, \quad (1)$$

where,  $TE_k$  is the technical efficiency of firm  $k$  using  $m$  inputs to produce  $s$  outputs;  $y_{rk}$  the quantity of output  $r$  produced by firm  $k$ ;  $x_{ik}$  the quantity of input  $i$  consumed by firm  $k$ ;  $u_r$  the weight of output  $r$ ;  $v_i$  the weight of input  $i$ ;  $s$  the number of outputs;  $m$  the number of inputs.

The other parameters relating to the model are constant return to scale technical efficiency (CRSTE), variable return to scale (VRSTE) and scale efficiency (SE). The first parameter assumes that most firms operate at an optimal scale and are in a perfectly competitive environment. The second parameter assumes that firms do not operate at an optimal scale and face imperfect competition. Depending on the chosen technical efficiency, mathematical equations have different constraints. The formula for the CRSTE efficiency with input orientation takes the following form:

$$\text{Maximize } \sum_{r=1}^s u_r y_{rk}, \quad (2)$$

subject to:

$$\sum_{i=1}^m v_i x_{ij} - \sum_{r=1}^s u_r y_{rj} \geq 0 \quad j = 1, \dots, n, \quad (3)$$

$$\sum_{i=1}^m v_i x_{ik} = 1, \tag{4}$$

$$u_r, v_i > 0 \forall r = 1, \dots, s; i = 1, \dots, m. \tag{5}$$

Under the VRSTE assumption, the additional measure of returns to scale on the variable axis is included as follows:

$$\text{Maximize } \sum_{r=1}^s u_r y_{rk} + c_k, \tag{6}$$

subject to:

$$\sum_{i=1}^m v_i x_{ij} - \sum_{r=1}^s u_r y_{rj} - c_k \geq 0 \quad j = 1, \dots, n, \tag{7}$$

$$\sum_{i=1}^m v_i x_{ik} = 1, \tag{8}$$

$$u_r, v_i > 0 \forall r = 1, \dots, s; i = 1, \dots, m. \tag{9}$$

For the VRSTE parameter, two scale efficiencies emerge: increasing returns to scale (IRS) and decreasing returns to scale (DRS). The first one means that the firms are below the optimum size, and a 1 percent increase in the input will lead to an increase in the output of more than 1 percent, while in the case of diseconomies, a 1 percent increase in the input would lead to an increase in the output of less than 1 percent. Under both the CRSTE and VRSTE parameters, there exists an optimal scale position which is called the most productive scale size (MPSS). The firms that are experiencing diseconomies should reduce their inputs to return to the MPSS point, while the firms that have increasing economies of scale should expand their inputs to the MPSS size.

Because the second parameter has a variable production of scale, the SE parameter can be calculated to show if there exist any economies of scale. In order to find SE, the following equation form is used:

$$SE_k = \frac{TE_{k,CRS}}{TE_{k,VRST}}. \tag{10}$$

SE shows the ratio between VRSTE and CRSTE, meaning that the larger is the ratio, the closer to the MPSS point is the DMU's operation. Also, while conducting research of this type, an input-output orientation has to be assumed. For this particular paper, an input orientation was assumed. This orientation minimizes input for any given level of output. In other words, it indicates to which extent companies are able to decrease their input for any given level of output. Researchers Coelli (1996), Coelli and Perelman (1999) noted that, in many instances, the choice of an input or output orientation has only a minor impact on the technical efficiency scores estimated in the model.

The last important step in the methodology is to determine the correct inputs and outputs for the model. While examining the previous research in which a DEA cost function was constructed, a clear pattern of output selection was found. For estimation of the output variable,

some authors, like Bers and Springer (1997), Anderson *et al.* (2002, 2003), Ambrose *et al.* (2005, 2016), Miller *et al.* (2006, 2007) and Ahmed and Mohamed (2017), employed assets. Many scientists believe that total assets are a reliable choice for the output because it strongly correlates with market capitalization; second, it displays low variance, thus making research results more consistent; lastly, with employment of assets, the outcome shows fewer biases. For the input side, some differences in choices can be observed, although most authors employed a combination of operating expenses, depreciation, general and administrative expenses, and interest expenses. Based on the previous research, the following model was developed:

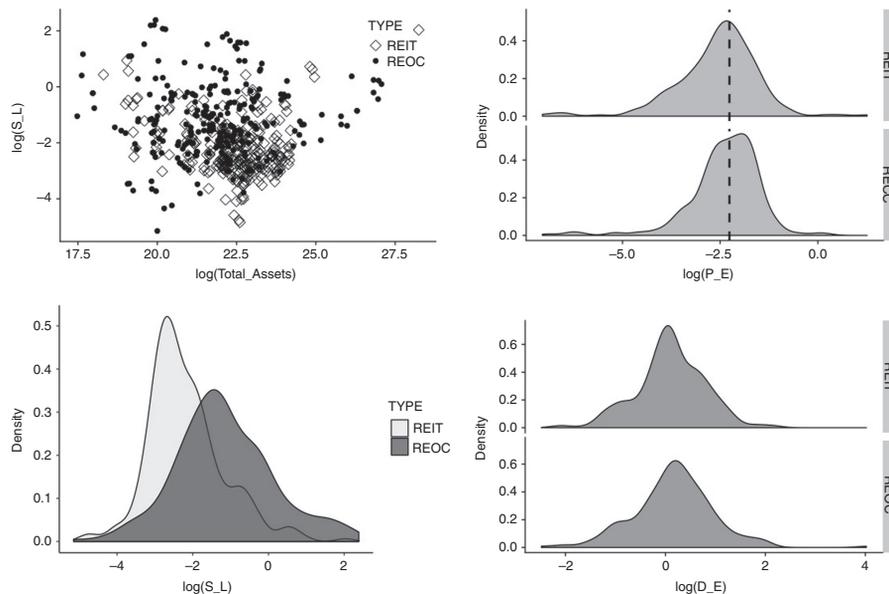
$$TE_k = \frac{\sum_{r=1}^s u_r Assets_{rk}}{\sum_{i=1}^m v_i G_{A_{ik}} + v_i Int_{Exp} + v_i Emp + v_i Depr} \quad (11)$$

After performing the calculations of the model, REITs and REOCs results were split for comparison, and the additional metrics of descriptive statistics were displayed.

#### 4. Results

In Figure 1, a quick reference of the main indicators, which provide an insight into a firm's efficiency from many different angles, is displayed. At first glance, the debt-to-equity ratio indicates that both structures – REITs and REOCs – were financed at a similar ratio, and the numbers confirm the density plots. In 2017, REITs had their equity-to-debt ratios 3 percent higher than REOCs, while in 2016 and 2015, the latter firms had 14 and 15 percent higher debt-to-equity ratios. It would seem that the amount of financing from debt was similar, but the comparison of the types of maturities disclosed some differences. REOCs were financing themselves with a significantly larger portion of short-term maturities. Compared to REITs, REOCs had 34, 25 and 25 percent larger financing coming from short term maturities for the years 2017, 2016 and 2015, respectively.

The differences in financing had always been apparent when comparing private and listed companies. Huynh *et al.* (2018) argued that private companies had higher risk profiles, shorter



**Figure 1.** Density plots of debt-to-equity, short-term-to-long-term-debt, profit-to-equity ratios and scatter plot of assets-to-short-term-to-long-term-debt ratios between REITs and REOCs for all years combined

life cycles and asymmetric information, and a large part of the data for these companies were unavailable or unreliable. For this reason, banks were less eager to offer long-term financing options. However, because both REITs and REOCs are listed companies, the theory of private companies can only be partially applied in this case.

Perhaps the differences emerge due to the fact that REOCs do not have a mandatory income requirement for particular business activity, while REITs have a strict obligation to make 70–90 percent of their income from rental activities. Even in the case of construction, REITs are required to own a newly constructed building for five or more years, which leaves them the only possibility to earn their return on investment from rental activities. In the meantime, because of less strict regulatory provisions, REOCs can operate in a more speculative environment, for instance, make buying and selling transactions in a very short period of time, thus exploiting bubble deviations in the real estate market and having quick financing solutions at hand. This may explain why banks often find it easier to assess the risk and offer better financing options for REITs, and why REOCs have the need for short-term maturities.

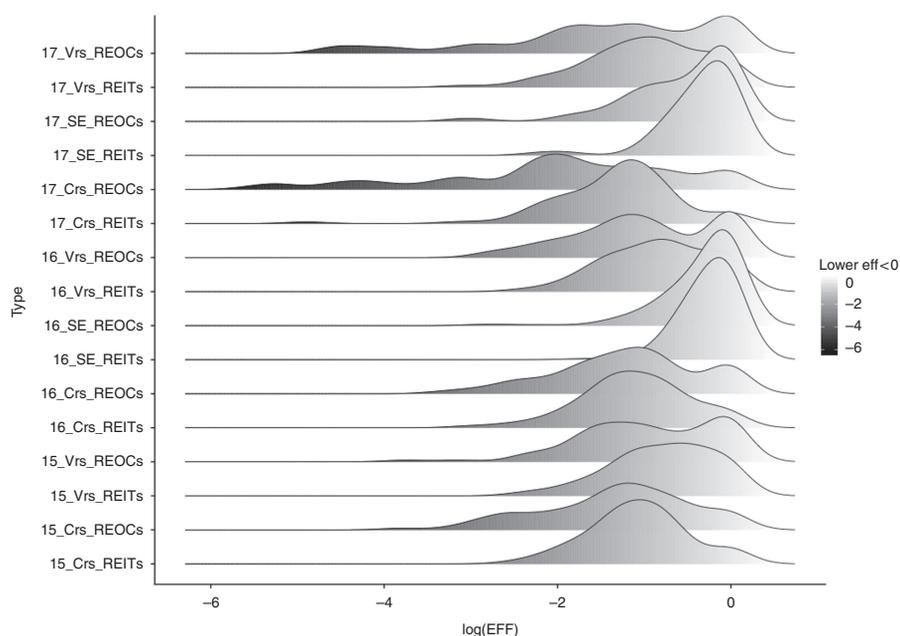
Another observation, depicted in Figure 1, corresponds to Bers and Springer’s (1997) and Ambrose *et al.*’s (2016) findings, which proposed that there exists an optimal size, having which REITs and REOCs can operate at their best performance. The optimal asset size, estimated for both REITs and REOCs in this paper, is between \$15 and 22bn. Any size above or below this threshold generates an upsurge in short-debt maturities. REITs are also more similar in size with regard to their assets, and this phenomenon can be explained by the limitations and nature of their activities.

The differences in price-to-earnings ratio were negligible. In 2015 and 2017, REITs managed to surpass REOCs with the profits higher by 12 and 5.5 percent, respectively, while in 2016, REOCs’ profits were by 5 percent higher than REITs’. One could argue that due to the sampling size selection biases, debt-to-equity and profit-to-equity ratios may not reflect any significant differences in the firm structures under consideration; nonetheless, the discrepancies for short-term to long-term maturities that were found to be consistent through the entire period may imply that a firm structure does determine contrasting results.

The results, obtained from the DEA models, are displayed in Table II, and the visuals of the density graphs for better comparison are displayed in Figure 2. Evidently, in all four technical efficiency models, REITs managed to surpass REOCs in efficiency by a slight margin. On a three-year average basis, REITs’ technical efficiency within constant return to

Desc. statistics	REITs			REOCs			IRS	DRS	MPSS
	TE <sub>CRS</sub>	TE <sub>VRS</sub>	SE	TE <sub>CRS</sub>	TE <sub>VRS</sub>	SE			
<i>2017</i>									
Mean	0.33	0.46	0.75	0.28	0.420	0.667	83	80	15
SD	0.22	0.27	0.22	0.306	0.358	0.292			
Max.	1	1	1	1	1	1			
Min.	0.0074	0.041	0.10	0.0038	0.009	0.044			
<i>2016</i>									
Mean	0.40	0.51	0.82	0.398	0.50	0.81	69	89	20
SD	0.23	0.28	0.18	0.307	0.34	0.23			
Max.	1	1	1	1	1	1			
Min.	0.08	0.088	0.30	0.035	0.06	0.053			
<i>2015</i>									
Mean	0.40	0.53	0.78	0.363	0.50	0.742	77	88	13
SD	0.23	0.27	0.19	0.273	0.33	0.244			
Max.	1	1	1	1	1	1			
Min.	0.080	0.087	0.17	0.022	0.023	0.072			

**Table II.**  
DEA efficiency results  
for CRS, VRS, IRS,  
DRS and SE models



**Figure 2.**  
Density plots of DEA  
model efficiencies for  
REITs and REOCs for  
time period of  
2017-2015

scale amounted to 16 percent, their technical efficiency under variable return to scale amounted to 15 percent, and scale efficiencies were 29 percent higher. Hypothesis *H1*, proposing that REIT firm structure on average does have an edge in cost efficiency area, can certainly be accepted.

Although both firm structures have their origin of inefficiency coming from poor management, as it was indicated by the variable return to scale results, it should not be overlooked that scale efficiencies also play a significant role. Regarding the CRS model at the mean value of 0.33 for 2017, REITs were able to become more efficient by expanding their output by up to 67 percent and keeping their input unchanged, while REOCs had an opportunity of a 72 percent expansion. The following expansion logic that applies to all CRS results for the years 2015 and 2016, is depicted in Table II.

The VRS model indicated that the expansion was only a partial solution because many companies were operating above the optimum scale and were experiencing diseconomies. 49, 50 and 44 percent of the firms were operating at diseconomies in 2015, 2016 and 2017, respectively. These firms could increase their efficiency by reducing their size and improving their management. 43, 38 and 46 percent of the firms were experiencing IRS in 2015, 2016 and 2017, respectively. These firms needed an increase in the scale to the MPSS point; they also had to implement better management methods. For the three-year average, only 8.9 percent of the firms were at the MPSS point. Furthermore, the efficiency was steadily declining for both firm structures over the period under consideration, and no obvious trends for scaling effects were detected.

Benchmark frontier locations were detected for both firm structures, which means that both of them can achieve maximum efficiency on the frontier line, yet REOCs have more companies on the frontier and below the lower bound of the frontier, which proposes that REOCs, as a general rule, are less predictable.

Although these findings could not be directly and properly compared with the findings of other authors due to the differences in sample size, input selection, methodological

approach, time period and continental regions, it should be noted that the similar results were presented in the newest Ambrose *et al.*'s (2016) study, where the efficiencies for the period from 2001 to 2015 were found to be declining. In Ambrose *et al.*'s (2016) DEA model, the latest data for 2015 indicated that the average efficiency for REITs and REOCs inclusive amounted to 40 percent, and scaling efficiency amounted to 77 percent, while this paper models the SE of 78 percent, and mean efficiency of 40–50 percent. Despite the differences in the time period, Topuz and Isik (2006) found the efficiencies to be from 11 percent to 55 percent, and scale efficiencies to amount to around 36–86 percent, while Anderson *et al.* (2002) found scale efficiencies to be at around 80 percent, and technical efficiencies to amount to approximately 50 percent. Harris (2012) stated that the efficiencies were at about 33 percent for the CRS, 51 percent for the VRS, and 66 percent for the SE. The prior research also confirmed economies of scale. Anderson *et al.* (2002) claimed that on average 59.8 percent of companies were experiencing an increasing return to scale, Topuz and Isik (2006) discovered that around 33 percent of companies were demonstrating IRS, while Ambrose *et al.* (2016) found that around 36 percent of companies were operating with IRS. Although many factors influence the results of the model, the comparison of the models developed in this paper with the results of previous studies proposes that the constructed DEA values are in a similar value ballpark.

## 5. Conclusions

The European Union member states have always been looking for the ways to innovate and accelerate growth in their real estate markets while keeping the sustainability idea at the forefront. For the last four decades, a promising firm structure named REIT has been overlooked by most CEE members, although a significant amount of research, starting from the early 1990s up to 2016, discovered many positive effects that such firm structure might have on the stock exchange. The positive effects, acknowledged by previous authors, were economies of scale, a considerably smaller amount of leverage, greater opportunities to accumulate capital and less vulnerability to economic shocks. Although some studies provide negative results of REITs' performance, the general literature consensus is positive. It should be noted that no previous study has thus far provided a direct comparison of the REIT structure to another type of firm structure, named REOC. This paper has developed a DEA model to compare the discrepancies in the different structures with different parameters for the period 2015–2017.

The findings in the DEA model indicate that REITs and REOCs have similar debt-to-equity ratios, but their maturity types for debt financing are different. On a three-year average, REOCs had a 28 percent larger short-term debt maturity financing, which indicates that banks are observing REOCs for having a higher risk profile than REITs. During the period under consideration, both firm structures had similar profit-to-equity ratios, and an optimal firm size in terms of assets was estimated to be between \$15 and 22bn. Any deviation from this size resolved in an unnecessary growth of additional debt. Only 8.9 percent of firms managed to remain on the MPSS point of the optimal size; in general, the efficiencies were decreasing for both REITs and REOCs. The number of the companies operating below the optimum scales was also increasing. By the CRSTE, VSRTE and SE parameters, REITs managed to remain by, respectively, 16, 15 and 29 percent more efficient than REOCs. Although a direct comparison with the results of previous research was not plausible, a similar value range has been detected.

The results obtained from the models propose that some EU member states are indeed missing out on REITs capabilities. The policy implications from this research suggest that the EU member states which do not have an existent REIT structure on their stock exchange should facilitate a thorough discussion on whether such system can be beneficial to the development of their real estate markets. If benefits from a REIT system can be achieved, the further discussion should be on what legislation, tax provisions and operational activity

regulations are optimal for particular countries so that REITs could perform at their maximum capability. There exists a cumulative research database that could help find solutions to particular problems related to the topic of REITs. With a successful implementation of REITs, the rest of the EU member states could experience faster, but at the same time more sustainable growth of their real estate markets. Due to greater competition, supply-determined prices for households or companies might grow less rapidly.

Further research should focus on the multilevel, principal component or factor analysis to show how the differences in European countries can affect proper functionality of REIT systems. A deeper analysis with a careful firm profile selection can be carried out to measure efficiencies more accurately, and an inter-continental analysis could preferably become a topic of interest. A wider discussion should be held on whether REIT structures are applicable in all EU member state markets; it should also be discussed what factors could possibly limit the success of REIT implementation.

### References

- Ahmed, A. and Mohamed, A. (2017), "Data envelopment analysis of efficiency of real estate investment trusts in Singapore", *International Journal of Law and Management*, Vol. 59 No. 2, pp. 826-836.
- Ambrose, B., Highfield, M. and Linneman, P. (2005), "Real estate and economies of scale: the case of REITs", *Real Estate Economics*, Vol. 33 No. 2, pp. 323-350.
- Ambrose, B., Ehrlich, R., Hughes, W. and Wachter, M. (2000), "REIT economies of scale: fact or fiction?", *Journal of Real Estate Finance and Economics*, Vol. 20 No. 2, pp. 211-224.
- Ambrose, B., Fuerst, F., Mansley, N. and Wang, Z. (2016), "Assessing size effects and economies of scale in European real estate companies", available at: [www.epra.com/research/academic-research](http://www.epra.com/research/academic-research) (accessed November 14, 2018).
- Anderson, I., Springer, M. and Lewis, D. (2003), "The cost efficiency of real estate investment trusts: an analysis with Bayesian Stochastic frontier model", *Journal of Real Estate Finance and Economics*, Vol. 26 No. 1, pp. 65-80.
- Anderson, I., Springer, W., Webb, J. and Fok, R. (2002), "Technical efficiency and economies of scale: a non-parametric analysis of REIT operating efficiency", *European Journal of Operational Research*, Vol. 139 No. 3, pp. 598-612.
- Ascherl, C. and Schaefer, W. (2018), "REITs and REOCs and their initial stock market performance: a European perspective", *Journal of European Real Estate Research*, Vol. 11 No. 1, pp. 4-27.
- Battese, G.E. and Coelli, T.J. (1992), "Frontier production functions, technical efficiency and panel data: with applications to paddy farmers in India", *The Journal of Productivity Analysis*, Vol. 3 No. 1, pp. 153-169.
- Bers, M. and Springer, M. (1997), "Economies-of-scale for real estate investment trusts", *Journal of Real Estate Research*, Vol. 14 No. 3, pp. 275-291.
- Brounen, D., Ling, D. and Vaessen, H. (2016), "The interest rate sensitivity of public real estate", available at: [www.epra.com/research/academic-research](http://www.epra.com/research/academic-research) (accessed November 9, 2018).
- Brounen, D., Mahieu, R. and Veld, H. (2013), "The effects of shifting tax regimes an international examination of the REIT effects", paper presented at the 2013 Maastricht EPRI REIT Conference, Maastricht, July 20, available at: [www.tias.edu/docs/default-source/Kennisartikelen/the-effects-of-shifting-tax-regimes.pdf?sfvrsn=6](http://www.tias.edu/docs/default-source/Kennisartikelen/the-effects-of-shifting-tax-regimes.pdf?sfvrsn=6)
- Charnes, A.W., Cooper, E. and Rhodes, D. (1978), "Measuring the inefficiency of decision-making units", *European Journal of Operational Research*, Vol. 2 No. 6, pp. 429-444.
- Coelli, T.J. (1996), "A guide to DEAP version 2.1: a data envelopment analysis (Computer) program", working paper, University of Queensland, Brisbane: Centre for Efficiency and Productivity Analysis, Brisbane, August.

- Coelli, T.J. and Perelman, S. (1999), "A comparison of parametric and non-parametric distance functions: with application to European railways", *European Journal of Operational Research*, Vol. 117 No. 2, pp. 326-339.
- Connors, D.N. and Jackman, M.L. (2000), "The cost of equity capital for REITs: an examination of three asset-pricing models", available at: <https://dspace.mit.edu/bitstream/handle/1721.1/32204/48528695-MIT.pdf;sequence=2> (accessed December 12, 2018).
- Cotter, J. and Richard, R. (2014), "A comparative anatomy of residential REITs and private real estate markets: returns, risks and distributional characteristics", *Real Estate Economics*, Vol. 43 No. 3, pp. 209-240.
- EPREA (2017), "Ftse-epre-nareit monthly statistical bulletin September 2017", available at: [http://prodapp.epra.com/media/Monthly\\_Statistical\\_Bulletin\\_September\\_2017\\_1506861911465\\_\(1\)\\_1506952902758.pdf](http://prodapp.epra.com/media/Monthly_Statistical_Bulletin_September_2017_1506861911465_(1)_1506952902758.pdf) (accessed December 18, 2018).
- Falkenbach, H. and Niskanen, J. (2012), "Liquidity of European real estate equities: REITs and REOCs", *International Journal of Strategic Property Management*, Vol. 16 No. 2, pp. 173-187.
- Harris, J.A. (2012), "Real estate investment trust performance, efficiency and internationalization", available at: <http://stars.library.ucf.edu/cgi/viewcontent.cgi?article=3363&context=etd> (accessed November 18).
- Henningsen, A. (2014), "Introduction to Econometric production analysis with R", available at: <https://leanpub.com/ProdEconR> (accessed November 13, 2017).
- Huynh, K.P., Paligorova, T. and Petrunia, R. (2018), "Debt financing in private and public firms", *Ann Finance*, Vol. 14 No. 1, pp. 465-487.
- Kawaguchi, Y., Schilling, J. and Sa-Aady, J. (2012), "REIT stock price volatility during the financial crisis", *European Financial Management*, Vol. 17 No. 1, pp. 1-33.
- Li, L. (2012), "The determinants of REIT volatility", available at: [www.reri.org/research/articlepdf/wp184.pdf](http://www.reri.org/research/articlepdf/wp184.pdf) (accessed October 10, 2018).
- Linneman, P. and Ambrose, B. (1997), "REIT organizational structure and operating characteristics", *Journal of Real Estate Research*, Vol. 21 No. 3, pp. 141-162.
- McIntosh, W., Ott, S. and Liang, Y. (1995), "The wealth effects of real estate transactions: the case of REITs", *Journal of Real Estate Finance and Economics*, Vol. 10 No. 3, pp. 299-306.
- McIntosh, W., Liang, Y. and Thompkins, L. (1991), "An examination of the small-firm effect within the REIT industry", *Journal of Real Estate Research*, Vol. 6 No. 1, pp. 9-18.
- Marzuki, J.M. and Newell, G. (2018), "The emergence of Spanish REITs", *Journal of Property Investment & Finance*, Vol. 36 No. 5, pp. 495-508.
- Miller, N., Clayton, J., Eichholtz, P. and Geltner, D. (2007), *Commercial Real Estate Analysis and Investments*, LEAP Publishing Services, Nashville, TN.
- Miller, S.M., Clauretje, T.M. and Springer, T.M. (2006), "Economies of scale and cost efficiencies: a panel-data stochastic-frontier analysis of real estate investment", *Journal of the Manchester School Press*, Vol. 74 No. 4, pp. 483-499.
- Newell, G., Adair, A. and Kim Nguyen, T. (2013), "The significance and performance of French REITs (SIICs) in a mixed-asset portfolio", *Journal of Property Investment & Finance*, Vol. 31 No. 6, pp. 575-588.
- PWC (2017), "Compare and contrast Worldwide Real Estate Investment Trust (REIT) Regimes", available at: [www.pwc.com/sg/en/real-estate/assets/pwc-compare-and-contrast-complete-worldwide-reit-regimes-2013.pdf](http://www.pwc.com/sg/en/real-estate/assets/pwc-compare-and-contrast-complete-worldwide-reit-regimes-2013.pdf) (accessed November 7, 2018).
- Schacht, U. and Wimschulte, J. (2008), "German property investment vehicles and the introduction of G-REITs", *Journal of Property Investment & Finance*, Vol. 26 No. 3, pp. 232-246.
- Scherer, P. (1995), "Investors capitalize on REIT's industry through LBOs", *Business Credit*, Vol. 97 No. 9, pp. 1-38.
- Sham, H.T., Sing, T.F. and Tsai, C. (2009), "Are there efficiency gains for larger Asian REITs?", *Journal of Financial Management of Property and Construction*, Vol. 14 No. 3, pp. 231-241.

- Sin, T.J., Chun-Kei, S. and Yat-Hung, C. (2008), "Time-varying performance of four Asia-Pacific REITs", *Journal of Property Investment & Finance*, Vol. 26 No. 3, pp. 210-231.
- Tahir, H., Latipah, S. and Zahrudin, Z. (2012), "Measuring efficiency of real estate investment trust using data envelopment analysis approach, paper presented at The Fifth Foundation of Islamic Finance Conference, Kedah, July, available at: [www.researchgate.net/publication/259009941\\_Measuring\\_Efficiency\\_of\\_Real\\_Estate\\_Investment\\_Trust\\_Using\\_Data\\_Envelopment\\_Analysis\\_Approach](http://www.researchgate.net/publication/259009941_Measuring_Efficiency_of_Real_Estate_Investment_Trust_Using_Data_Envelopment_Analysis_Approach)
- Topuz, J.C. and Isik, I. (2006), "How efficient the REITs are upon entry?", paper presented at 2010 IABR & ITLC Conference, South-Eastern Oklahoma, available at: [www.researchgate.net/publication/255671318\\_How\\_Efficient\\_The\\_REITs\\_Are\\_Upon\\_Entry](http://www.researchgate.net/publication/255671318_How_Efficient_The_REITs_Are_Upon_Entry)
- Topuz, J.C. and Isik, I. (2017), "Meet the 'born efficient' financial institutions: evidence from the boom years of US REITs", *The Quarterly Review of Economics and Finance*, Vol. 66 No. C, pp. 70-99.
- Vogel, J. (1997), "Why the conventional wisdom about REITs is wrong", *Journal of Real Estate Finance*, Vol. 14 No. 2, pp. 7-12.

#### Further reading

- Aigner, D., Lovell, S. and Schmidt, P. (1977), "Formulation and estimation of stochastic frontier production function models", *Journal of Econometrics*, Vol. 6 No. 1, pp. 21-37.
- Anderson, D.C. and Shelor, M. (1999), "The financial performance of REITs following initial public offerings", *Journal of Real Estate Research*, Vol. 16 No. 2, pp. 375-386.
- (Data set) Bloomberg (2017), "Bloomberg terminal: professional stock data and research tool", available at: [www.bloomberg.com/professional/solution/bloomberg-terminal/](http://www.bloomberg.com/professional/solution/bloomberg-terminal/) (accessed November 10, 2018).
- [Data set] Security exchange commission (2018), available at: [www.sec.gov/](http://www.sec.gov/) (accessed in October 14, 2018).
- National Association of real estate investment trusts (2017), "Global real estate investment", available at: [www.reit.com/investing/global-real-estate-investment](http://www.reit.com/investing/global-real-estate-investment) (accessed November 8, 2018).

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