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# A cluster analysis of tourist attractions in Spain

## Natural and cultural traits and implications for global tourism

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### Abstract

**Purpose** – Natural and cultural tourism are important motivators for international tourism. Spain has impressive tourist attractions that are outstanding on the natural and cultural tourism dimensions. The purpose of this paper is to identify traits of the most attractive destinations in Spain and to understand the relative importance of natural, cultural, and dual (natural and cultural) attractions to target consumers.

**Design/methodology/approach** – The authors compare the level of tourism in the 17 major regions of Spain and identify the key natural, cultural, and dual attractions using a two-step cluster analysis to ascertain the relative importance of the three types of attractions.

**Findings** – The findings of the cluster analysis suggest that natural attractions had the highest importance, followed by dual attractions, with cultural attractions having the lowest importance in affecting the level of tourism in a region. The study identified four categories of regions resulting from “high vs low” total number of attractions by “high vs low” levels of tourism (operationalized via the number of tourist-nights). The regions with high levels of tourism were either located in the bodies of water (a group of islands) or on ocean/sea(s) surrounding Spain. The study suggests placing greater emphasis on promoting cultural attractions in Spain.

**Practical implications** – The findings suggest that there is a need to put more emphasis on promoting the cultural attractions in Spain. Spain is a diverse country with huge potential for tourism from people all over the world, due to its diverse geography and rich history.

**Originality/value** – To the best of the authors' knowledge, this is the first study that analyzes 17 regions of Spain in relation to their tourism characteristics, identifying attractions that are not sufficiently leveraged, and suggesting strategies for identifying opportunities for the tourism industry in Spain.

**Keywords** Cultural attractions, Dual attractions, Natural attractions, Tourist attractions

**Paper type** Research paper

### 1. Introduction

In 2016, the travel and tourism industry supported the global economy with 10.2 percent of global gross domestic product; this industry provided \$7.6 trillion to the global economy and generated 292 million jobs. In 2016, these tourism-related jobs accounted for 10 percent of the jobs in entire world (World Travel and Tourism, 2017). These figures are projected to grow even more over the next decade, and hold great potential for countries to generate economic growth, job creation, and develop nationally



and regionally. International tourist arrivals were at 68.5 million in 2017, and that number is only projected to see more and more growth.

In Spain, tourism accounts for 5 percent of GDP and is a key economic sector; the industry employs one in ten of the workforce (Euromonitor, 2017). Revenue from tourism has increased by 4.6 percent in 2017, and this trend is expected to continue (Euromonitor, 2017). The success of tourism in Spain is attributed to the fact that, as a destination, it provides both cultural resources (ranked 2nd worldwide) and natural resources (ranked 9th), according to the World Economic Forum (2017). Other important factors for Spain are the fact that it combines successful tourism service infrastructure with air transportation and policy support (World Economic Forum, 2017). The cultural and natural attractions are recognized as the two top considerations and motivations for tourism. The fastest growing segments of the tourism industry today are the cultural – and historical – sites (Timothy and Nyaupane, 2009) along with natural tourism (Kuenzi and McNeely, 2008).

In its 2017 annual Travel and Tourism Competitiveness Report, the World Economic Forum ranked Spain as first among the top ten countries on the Tourism Competitiveness Index. The rankings were as follows: (1) Spain, (2) France, (3) Germany, (4) Japan, (5) UK, (6) USA, (7) Australia, (8) Italy, (9) Canada, and (10) Switzerland (World Economic Forum, 2017).

Spain is geographically very diverse. It shares borders with Portugal in the West and France in the Northeast. Spain is surrounded by many bodies of water – Mediterranean Sea in the East, Atlantic Sea, Gulf of Gibraltar and Gulf of Cadiz in the South, Atlantic Ocean in the West, and Bay of Biscay in the North. This waterfront location of Spain creates ample opportunities for water sports and adventure for tourists. Two very popular tourist destinations, namely, Balearic Islands and Canary Islands, are a part of Spain and a big draw for tourists. Inland, Spain has several mountain ranges, such as the Cantabrian Mountains, Iberian Mountains, Sierra Morena Mountains, etc. The country of Spain is thus gifted with abundant natural attractions.

Spain has a very rich history as well. Dating back to the Iberians and Phoenicians, cave paintings from that era still exist. Many historical attractions go back to the times of Romans. Roman rule was followed by the rule of Germanic tribes. A significant event in Spanish history is the Moorish invasion in 711 AD, with the Moorish rule lasting for nearly seven centuries, particularly in cities such as Seville and Granada. In later years, many of the Islamic monuments and buildings were taken over by Christian rulers, who built churches and cathedrals within the walls of the mosques. A classic example of the building of Islamic and Christian architecture is the Palace of Alhambra, which is probably the top cultural/historical attraction in Spain.

The purpose of the study is to identify traits of the most attractive tourism destinations in Spain using a two-step cluster analysis to ascertain the relative importance of natural, cultural, and dual attractions to target consumers. Once identified, promoting attractions that are not sufficiently leveraged will offer important opportunities to the tourism industry in Spain.

This paper is organized in seven sections. In Section 2, we provide an overview of the geographical diversity of Spain. In Section 3, we discuss the history of Spain highlighting the major events and places that make Spain a historically rich land. In Section 4, we describe the lengthy process of selection and identification of the major natural, cultural, and dual (both natural and cultural) tourist attractions in each of the 17 regions of Spain. In Section 5, we add data on tourism (number of tourist-nights) for each of the 17 regions of Spain. We use the data on the number of tourist attractions and number of tourist-nights to conduct two different types of data analyses. First, we divide the 17 regions into four categories using “high vs low” number of total attractions and “high vs low” number of tourist-nights. Next, we use a two-step cluster analysis to attribute relative importance of the natural, cultural, and dual attractions in affecting tourism. Section 6 discusses the findings

of our data analysis and directions for future research. Finally, Section 7 discusses the global marketing implications of this research.

A map of Spain is presented in Figure 1, and the 17 regions are marked 1-17.

2. Geographical diversity

Figure 2 presents a map of Spain with major natural attractions and topographical features outlined.

The Iberian Peninsula, comprising Spain and Portugal, is located in the Southwestern tip of Europe. Including the Canary Islands, in the Atlantic, West of Morocco, and the Balearic Islands, in the Western Mediterranean, Spain has a total area of 504,782 square kilometers (194,896 square miles). Relatively speaking, this is about two times the size of Oregon in the USA. The country is 1,085 kilometers from east to west, along with 950 kilometers from north to south (Kurian, 2017). Spain accounts for 85 percent of the Iberian Peninsula, occupying more area in the peninsula than Portugal. The Pyrenees Mountains act as a geographic border to separate it from the rest of Europe in the north. These mountains were formed when the Iberian microcontinent collided with continental Europe millions of years ago. The mountains create the Franco-Spanish border for 435 kilometers, stretching from the Bay of Biscay all the way to the Mediterranean Sea.



|                    |                   |                 |                       |              |
|--------------------|-------------------|-----------------|-----------------------|--------------|
| 1. Andalusia       | 2. Aragón         | 3. Asturias     | 4. Balearic Islands   |              |
| 5. Basque Country  | 6. Canary Islands | 7. Cantabria    | 8. Castilla La Mancha |              |
| 9. Castilla y León | 10. Catalonia     | 11. Extremadura | 12. Galicia           |              |
| 13. La Rioja       | 14. Madrid        | 15. Murcia      | 16. Navarra           | 17. Valencia |

Figure 1.  
Map of Spain and  
surrounding countries



|                    |                   |                 |                       |
|--------------------|-------------------|-----------------|-----------------------|
| 1. Andalusia**     | 2. Aragón         | 3. Asturias     | 4. Balearic Islands   |
| 5. Basque Country  | 6. Canary Islands | 7. Cantabria    | 8. Castilla La Mancha |
| 9. Castilla y León | 10. Catalonia*    | 11. Extremadura | 12. Galicia           |
| 13. La Rioja       | 14. Madrid*       | 15. Murcia      | 16. Navarra           |
|                    |                   |                 | 17. Valencia*         |

**Figure 2.**  
Natural attractions  
and cultural hubs\*  
in Spain

The waters surrounding the country create a natural boundary accounting for 88 percent of Spain's border. The northwestern coast has excellent harbors, especially along the Galician coast (Spain: At-A-Glance, 2017). In the Northeast, Spain shares a border with France and Andorra. A diverse topography creates varied climates throughout the Peninsula, as addressed later in the paper. The Balearic Islands in the East, including Majorca and Ibiza, plunge into the Mediterranean Sea (Payne, 1973). The Mediterranean coast stretches for 1660 km on the East (Spain: At-A-Glance, 2017). To the South are the Canary Islands in the Atlantic off the Coast of Africa, along with Ceuta and Melilla in the North of Africa.



The Canary Islands – an archipelago of 13 islands in the Atlantic – are big attractions due to their volcanic black sand beaches. The largest island, Tenerife, comprises Mount Teide, the third tallest volcano in the world (Kurian, 2017). The Atlantic and the Mediterranean comprise the southern border, with the Atlantic Coast stretching for over 710 km. The coastal plains are narrow, broken up by mountains in the sea forming rocky points. These southern regions tend to be desert-like. Due to the vast variety in landscapes and diversity in geography, Spain has everything to offer its tourists (Payne, 1973).

Spain is topographically divided into five different parts – aside from the 17 regions defined based on other considerations. First is Meseta, the central plateau, physically enclosed in all cardinal directions by mountains. This is the most important physical feature in Spain's diverse topography, sloping downward from the north to the south, and from east to west. It is almost treeless, with elevations of 610 meters above sea level. The flat land extends from the Cordillera Cantábrica in the North, to the Sierra Morena in the South. From the east, it reaches from the Iberian Mountain Range to the Portuguese border in the West. Next, the northern mountains stretch from the Atlantic to the Mediterranean. The Guadalquivir Basin, in the Southwest, is the third region. The Ebro Basin, the fourth region covering one sixth of the country, is situated in the Northeast, in Aragón. Its Río Ebro is Spain's longest river, and flows into the Mediterranean. Finally, the Mediterranean Coastal Plains constitute the fifth topographical region (Kurian, 2017).

There are also the Places of Sovereignty, a three-island group near Africa, the Penon de Velez de Gomera, Penon de the Alhucemas, and Chafarinas Islands (Spain: At-A-Glance, 2017). There are about 1,800 rivers and streams cutting through Spain creating even more topographical diversity in the various regions; they flow from west to south into the Atlantic, winding through mountain valleys, along rocky courses – many are dry most of the year (Kurian, 2017). The Douro, Miño, Tagus, and Guadiana rivers begin in Spain and flow through Portugal, flowing into the Atlantic. The Guadalquivir River is Spain's deepest river and the only one navigable, an excellent tourist destination for sightseeing and cruising. As they are not used for travel, transport, or irrigation, the rivers serve as a source of power for the local communities (Spain: At-A-Glance, 2017). The lower Guadalquivir valley is marshy and salty. The flat fertile plain of the river is unique among Andalusia's otherwise mountainous regions (Kurian, 2017).

The highest mountain in Spain – and the peninsula – is Mulhacén, in the Baetic Range, in Sierra Nevada, at 3,482 meters. On a clear day, from its peak, one can see views of the Moroccan Rif Mountains, and half of Andalusia. This mountain attracts tourists, both experienced and inexperienced, with ice climbing, hiking, mountaineering, skiing, and snowboarding, with a geodesic vertex that draws experienced climbers from all over the world (Mulhacén, 2017). Some of the country's best agricultural areas are found around Seville (Kurian, 2017).

Spain's diverse topography and varied physical land features create different regional climates. Most of Spain has extreme temperatures and inadequate rainfall, as most of the country is on a high plateau with full seasons, but hot summers and cold winters. A colder climate characterizes the northern plateau and the Pyrenees Mountains bordering the north (National Geographic, 2017). The central plateau has arid, hot summers that dry up local streams and lead to droughts and lack of water – on average, Spain receives less than 610 mm (24 inches) of precipitation per year. The Biscayan and Atlantic coasts and the northern mountains are cooler and wetter than other areas. Madrid has cold winters that may freeze local streams, but the summers are hot, with temperatures at times above 40 degrees Celsius (104 Fahrenheit); however, winter temperatures can drop down to 4 degrees Celsius (40 Fahrenheit) (Spain: At-A-Glance, 2017). The southern Mediterranean coast has a subtropical climate – Malaga's winter temperatures average 14 degrees Celsius (57 Fahrenheit) (Spain: At-A-Glance, 2017).



### 3. Historical richness

Figure 2 also shows five key cultural hubs identified with “\*” in the regions of Andalusia (two cultural hubs, namely, \*Seville and \*Granada), Catalonia (\*Barcelona), Madrid (\*Madrid), and Valencia (\*Valencia).

A key attraction for world travelers to Spain is its historical richness, its major landmarks and tourist attractions that relate this history. Spain is a country with diverse culture that date back to the Iberians, the country's earliest inhabitants. These warlike tribes, the largest single ethnic group, traveled to the Iberian Peninsula during the second millennium BC (Payne, 1973). The Eastern Iberians were influenced by Greek and Phoenicians, and their alphabet was found in pre-Roman Hispania (Payne, 1973). In Cantabria, cave paintings still remain from the earliest inhabitants at Altamira, depicting prehistoric life (History of Spain, 2016). Multitudes of monuments, architecture, statues, art, and artifacts have been kept intact over the centuries and are key points of interest for those traveling to Spain. To fully understand its historical significance, we herein outline the history of Spain, beginning with the Roman period.

Evidence of prehistoric life abound in Spain – in the Sierra de Atapuerca, 780,000-year-old bone fragments were found. Phoenicians, Greeks, Iberians, Celts, and Carthaginians resided in Spain at some point. However, the true birth of the historical culture is commences with the strong Roman presence in Spain. Romans arrived to the Iberian Peninsula before 200 BC, and occupied the peninsula for upwards of 600 years. They brought with them knowledge to create a road system, aqueducts, theaters, baths, and language (Payne, 1973). The historic influence of Roman Catholicism is present in the “fervent mystical element” within historical Spanish art and literature. It is also evident in the long list of saints and the many religious congregations and orders throughout history (Spain: At-A-Glance, 2017). Many of these Roman-influenced historic sites remain today and are a huge draw for tourists traveling to the area.

As Germanic tribes came through the area, Roman rule dwindled. Visigoth allies of the Romans helped restore order and established a capital. They did not leave much behind for tourists, other than the oldest church (661 AD), Baños de Cerrato, in Palencia (History of Spain, 2016). The Visigoths, numbering 300,000 out of a peninsula with 4,000,000 inhabitants, had powerful armed forces, but were weak economically, socially, and culturally than the Hispania majority (Payne, 1973). Barcelona was occupied by the Visigoths, who changed its name to Barcinona (History of Barcelona, 2017).

The Moors invaded Spain in 711 AD, from North Africa, with a lasting influence of more than 700 years. Most of the Moorish power was held in southern cities, such as Cordoba, Seville, and Granada, whose architecture reflects Moorish influence. The Mezquita of Cordoba, the world's third largest mosque, was created by Abd ar-Rahhman and is an excellent example of Islamic art in Spain. Ferdinand III took over Cordoba, and a Christian church built within the walls of the mosque now serves as a Christian cathedral (History of Spain, 2016). In the Picos de Europa Mountains of Northern Spain lies the tomb of Pelayo, one of the greatest heroes of the Christian Re-conquest. This is also a major historical tourist landmark.

The Spanish nation emerged from the marriage of Fernando and Isabella, which united the Aragón and Castile territories. After persecuting Muslims, they funded the voyage of Christopher Columbus. This led to the emergence of the Spanish Empire, after Columbus discovered the Americas, in 1492 AD. A major cultural attraction marking this period is the Granada's Alhambra Palace (originally built in 889), where Queen Isabella is buried. After the reign of Felipe II, the Spanish Empire peaked as he made Madrid the new capital of the country. An attraction related to this ruler is El Escorial, Felipe II's palace-monastery, near Madrid. Prior to the Spanish Inquisition, when Jews were expelled or forced to convert, the Jewish community in Spain was one of Europe's most lively – with the Sinagoga Del Tránsito in Toledo as an important historical attraction.

The Spanish Civil War, led by General Franco's Nationalist forces against the Republicans, inspired many art works on display in many museums, and Picasso's "Guernica," famous for portraying the terrors of the Spanish Civil War. The victory of the Nationalist forces of Franco in the Civil War place him at the helm of a fascist dictatorship until 1975 (History of Spain, 2016). His dictatorship impeded Catalanian independence, creating a difficult period for Barcelona; but, once Franco died, Barcelona became one of the most important areas of Spain (History of Barcelona, 2017). He was buried in Valle de los Caidos, near Madrid, an important tourist attraction, but a controversial one, as it fails to mention that it was built by more than 12,000 political prisoners, and that 40,000 bodies of Nationalists and Republicans are buried beneath its floor (History of Spain, 2016). The government transformed the monument into one for all Spaniards that remembers the horrors of war, and its victims (Rainsford, 2011).

After Franco's death, in 1975, Juan Carlos I was crowned King, moving the country to a constitutional monarchy (National Geographic, 2017). The Constitution, approved by the legislature and passed by referendum, became effective in 1978. It removed Catholicism as the official state religion even though 94 percent of the country practices Roman Catholicism (Spain: At-A-Glance, 2017), and legalized divorce and abortion, previously illegal; in 2005, same sex marriage became legal (Spain: At-A-Glance, 2017). Carlos I led Spain to become a stable democratic nation. Its center-left government led Spain to join the European Union in 1986, resulting in an economic boom. However, throughout the 1990s, pro-business policies created a strong divide between the rich and the poor, and high unemployment (National Geographic, 2017). Barcelona was the site of the 1992 Olympic Games, which brought publicity and tourism to the city. Barcelona is one of the key cultural hubs of Spain and its architecture is peppered with Gaudí artwork (History of Barcelona, 2017).

The current capital and largest city in Spain is Madrid. The second largest city, Barcelona, is its key port and important commercial center. Valencia is its manufacturing and railroad hub, with significant importance to the economy. Seville is not only the capital of the Andalusia region, but also a strong cultural center for tourists. In addition, along with being the capital of Aragón, Saragossa is also a key industrial center of Spain. In Basque country, Bilbao is a busy international port (Spain: At-A-Glance, 2017) and cultural center.

Modern Spain has many cultural hubs that draw people all over the world. The four major cities most popular with tourists are Barcelona, Madrid, Seville/Granada, and Valencia, offering unique draws that attract not only tourism, but also immigration. Barcelona is known for its cosmopolitan vibe, with medieval quarters and Roman artifacts, evidencing its rich historical ties. It also features stunning artwork and architecture created by Antoni Gaudí and Lluís Domènech. This historic and artistic background makes Barcelona a unique city to visit, especially for those interested in art history. Barcelona is also one of the world's largest business centers due to the ease of transportation, its Mediterranean climate, and variety of attractions. This hub not only features a city, but also urban beaches for tourists to relax and enjoy themselves.

Another major city of interest is Madrid, the capital, which combines a rich history with its current status as the economic, financial, and service center in Spain. The Plaza Mayor features an area called the "aristocratic center", with the Royal Palace that dates back to the seventeenth century. There are over 60 museums drawing in tourists, and a rich nightlife culture. It is also home to the San Isidro bullfighting festival, noted as the most important in the world. Seville and Grenada are known as important cities in Spanish tradition. Seville historically was a major port for distribution of goods, as it is located on the Guadalquivir River. The Moorish culture is prominent there, making it a unique destination. Granada, at the tip of the Sierra Nevada Mountains, between the Darro and Genil rivers, features Renaissance architectural sites along with beautiful gardens. The Alhambra and Generalife are two major points of interest for travelers in this area. Finally, Valencia, Spain's Mediterranean Port, and an important cultural

hub dating back to 138 BC, harmoniously mixes innovative and experimental buildings from the new millennium with its rich historical architecture. The sea along the coast draws people in looking to relax and enjoy its natural beauty (Tourism in Spain, 2017).

Celebrations abound in Spain, and are important cultural attractions in numerous cities and regions. Fiestas, for example, are important ancient traditions that begin with a mass, followed by a procession with images carried on the shoulders of the participants. They involve music, dancing, singing, and poetry readings. Two of the important fiestas that draw many tourists are the fiesta at Valencia, and San Fermin, in Pamplona. There are also solemn fiestas including the Feast of Corpus Christi in Toledo and Granada, along with Holy Week in Valladolid, Zamora, and Cuenca. A famous bullfight is the Fiesta Brava, another staple fiesta that draws people from all over the world (Spain: At-A-Glance, 2017).

#### 4. Tourist attractions in Spain: identification and selection

Spain is gifted with abundant natural, cultural, and dual (both natural and cultural) attractions. The source used for selection of the attractions for the analysis in this paper was Tourism in Spain (2017). The source was selected after considering numerous other sources, including commercial tourism websites that we eliminated because they advocated for certain tourism destinations, subscription international tourism guidebooks – e.g., *Fodor's*, *Lonely Planet* – and travel websites – e.g., TripAdvisor, Expedia, and Orbitz – which focused primarily on the most popular tourist attractions.

The analysis revealed that the Tourism Office of Spain (Spain.info), of the Spanish government, provided the most comprehensive and vetted impartial list of attractions, and facilitated their organization based on the criteria designated – natural, cultural, and dual (natural and cultural) tourist attractions.

#### 5. Attraction-tourism data analysis

In this section, we add data on the number of nights spent by tourists in each of the 17 regions of Spain (Eurostat, 2017).

Table I shows a region-wise number of attractions (natural, cultural, and dual attractions) and the number of tourist-nights for each of the 17 regions. These data were used to perform two different types of analyses. First, we classified 17 regions into four categories. These categories were developed on the basis of “High-Low” (above average-below average) number of total tourist attractions by “High-Low” (above average-below average) number of tourist-nights. Next, we used the two-step cluster analysis procedure in SPSS with type of tourist attractions, namely, natural, cultural, and dual as well as a categorical variable based on “High-Low” (above average-below average) number of tourist-nights. In the two-step cluster analysis procedure, the number of clusters was selected using the Akaike’s information criterion (AIC). This approach suggests that, for a given statistical model, if  $k$  is the number of estimated parameters in the model, and  $L$  is the maximum value of the likelihood function for the model, then the AIC value of the model is the following (Akaike, 1974; Burnham and Anderson, 2002):

$$AIC = 2k - 2 \ln(L)$$

Given a set of candidate models for the data, the preferred model is the one with the minimum AIC value. Thus, AIC rewards goodness of fit (as assessed by the likelihood function), but it also includes a penalty that is an increasing function of the number of estimated parameters. The penalty discourages overfitting, because increasing the number of parameters in the model almost always improves the goodness of the fit. For our analysis, we proceeded as follows:

Number of total attractions – Number of tourist - nights - based categorization

**Table I.**  
Number of attractions  
(natural, cultural,  
dual, and total  
attractions) and  
number of  
tourist-nights

| Region             | Natural attractions | Cultural attractions | Dual attractions | Total | Number of nights spent by tourists in 2016 |
|--------------------|---------------------|----------------------|------------------|-------|--|
| Andalusia          | 5                   | 9                    | 9                | 23    | 35,947,059                                 |
| Aragón             | 5                   | 10                   | 5                | 20    | 1,532,540                                  |
| Asturias           | 4                   | 8                    | 6                | 18    | 769,881                                    |
| Balearic Islands   | 5                   | 3                    | 2                | 10    | 64,165,819                                 |
| Basque Country     | 2                   | 4                    | 2                | 8     | 2,774,644                                  |
| Canary Islands     | 4                   | 1                    | 3                | 6     | 91,274,362                                 |
| Cantabria          | 1                   | 1                    | 2                | 4     | 865,486                                    |
| Castilla La Mancha | 2                   | 9                    | 2                | 13    | 674,482                                    |
| Castilla y León    | 1                   | 8                    | 3                | 12    | 1,001,693                                  |
| Catalonia          | 1                   | 8                    | 4                | 13    | 52,209,012                                 |
| Extremadura        | 2                   | 5                    | 2                | 9     | 410,833                                    |
| Galicia            | 1                   | 9                    | 2                | 12    | 2,280,578                                  |
| La Rioja           | 1                   | 4                    | 4                | 9     | 239,267                                    |
| Madrid             | 1                   | 7                    | 3                | 11    | 12,789,369                                 |
| Murcia             | 1                   | 8                    | 2                | 11    | 1,904,167                                  |
| Navarra            | 3                   | 2                    | 1                | 6     | 618,088                                    |
| Valencia           | 1                   | 8                    | 1                | 10    | 24,015,497                                 |

**Source:** Eurostat (2017)

The average number of total tourist attractions in a region was computed at 11.47. Therefore, regions with 11 or less attractions are classified as “Low Attractions” regions while the regions with 12 or more attractions were classified as “High Attraction” regions. Next, we computed average number of tourist-nights across 17 regions. The average was 17.26 million tourist-nights. Thus, the regions with more than 17.26 million tourist-nights were classified as “High Tourism” regions, while the regions with less than 17.26 million tourist-nights were classified as “Low Tourism” regions. This two-way (high-low) classification of regions based on number of total attractions and number of tourist-nights resulted in four categories. Table II shows the regions falling under each of the four categories.

**Table II.**  
Number of attractions/  
number of tourist  
categories for 17  
regions of Spain

|   |  |
|---|--|
| Low no. of tourist-nights (< 17.26 million) | High no. of tourist-nights (> 17.26 million) |
| Low no. of total attractions ( $\leq 11$ )  | Low no. of total attractions ( $\leq 11$ )   |
| Basque Country                              | Balearic Islands                             |
| Cantabria                                   | Canary Islands                               |
| Extremadura                                 | Valencia                                     |
| La Rioja                                    |  |
| Madrid                                      |  |
| Murcia                                      |  |
| Navarra                                     |  |
| Low no. of tourist-nights (< 17.26 million) | High no. of tourist-nights (> 17.26 million) |
| High no. of total attractions (> 11)        | High no. of total attractions (> 11)         |
| Aragón                                      | Andalusia                                    |
| Asturias                                    | Catalonia                                    |
| Castilla La Mancha                          |  |
| Castilla y León                             |  |
| Galicia                                     |  |

### 5.1 Two-step cluster analysis

Next, a two-step cluster analysis procedure was performed and the number of clusters was selected using AIC. The variables used in this procedure were number of natural, cultural, and dual attractions, and a categorical variable “High-Low” (above average-below average’ number of tourist-nights). This procedure computed AIC for possibility of a single cluster to 17 clusters, and resulted in a final two cluster solution corresponding the lowest value of  $AIC = 62.592$ . The final two clusters solution corresponded to a “fair” cluster quality on the “Silhouette measure of cohesion and separation” = 0.4. The membership of the two clusters is given in Table III. Also reported in Table III are the profiles of the two cluster-centroids (means and standard deviations) on the three variables, namely, number of natural, cultural, and dual attractions.

## 6. Discussion of results and directions for future research

An examination of Table III identifying regions with high tourism indicates that all five regions with high tourism, namely, Andalusia, Balearic Islands, Canary Islands, Catalonia, and Valencia are located either on or in a sea that surrounds Spain (see Figure 1, map of Spain and surroundings). This suggests that Spain attracts many tourists with its beaches and opportunities for water sports. Spain has opportunities in its mountainous regions as well (see Figure 2, map of natural attractions in Spain), but, clearly, water attractions are the biggest draw.

Similarly, an analysis of the results of the two-step cluster analysis procedure summarized in Table III indicates that the same five regions, namely, Andalusia, Balearic Islands, Canary Islands, Catalonia, and Valencia are grouped together in Cluster 1 (with “High” above average tourist-nights). Additionally, two other regions Aragón (located not too far from the Mediterranean ocean) and Asturias (located on the Bay of Biscay) are also placed in Cluster 1. Thus, the two-step cluster analysis procedure supports the finding that water-related sports and activities constitute a big draw for tourism in Spain.

In order to obtain further insights into the relative importance of the three types of attractions (natural, cultural, and dual attractions) on tourism, we examined the input (predictor)

|                       |                        |   |
|-----------------------|------------------------|---|
| Cluster 1 (7 regions) | Cluster 2 (10 regions) |   |
| Andalusia             | Basque Country         |   |
| Aragón                | Cantabria              |   |
| Asturias              | Castilla La Mancha     |   |
| Balearic Islands      | Castilla y León        |   |
| Canary Islands        | Extremadura            |   |
| Catalonia             | Galicia                |   |
| Valencia              | La Rioja               |   |
|                       | Madrid                 |   |
|                       | Murcia                 |   |
|                       | Navarra                |   |
| Cluster 1 (7 regions) | Cluster 2 (10 regions) | <i>t</i> -stat (df) and <i>p</i> -value |
| Centroid mean and SD  | Centroid mean and SD   | For mean differences                    |
| Natural attractions   | Natural attractions    | <i>t</i> -stat = 2.57 (df = 15)         |
| $\mu = 3.29$          | $\mu = 1.50$           | <i>p</i> -value < 0.05                  |
| $\sigma = 1.890$      | $\sigma = 0.707$       |   |
| Dual attractions      | Dual attractions       | <i>t</i> -stat = 2.0555 (df = 15)       |
| $\mu = 4.29$          | $\mu = 2.30$           | <i>p</i> -value < 0.10                  |
| $\sigma = 2.690$      | $\sigma = 0.823$       |   |
| Cultural attractions  | Cultural attractions   | <i>t</i> -stat = 0.6545 (df = 15)       |
| $\mu = 6.71$          | $\mu = 5.70$           | <i>p</i> -value < 0.50                  |
| $\sigma = 3.352$      | $\sigma = 2.908$       |   |

**Table III.**  
Results based on the  
two-step cluster  
analysis procedure

importance weights computed by the two-step cluster analysis procedure for the three types of tourist attractions for making assignment of regions to the two clusters. The means, standard deviations, and *t*-stats (testing the differences between the means of centroids for the two clusters) of three types of attractions are reported in Table III. As can be seen from Table IV, natural attractions are the most important, dual attractions are next in importance, and cultural attractions are the least important. This finding is consistent with our earlier interpretation that regions located on or in major bodies of water attract a larger number of tourists compared to the land-locked regions.

Having said that we must acknowledge the cultural tourism potential of Spain, which attracts tourists all over the country. Cultural gems and historical hubs like Barcelona, Granada, Madrid, Seville, and Valencia, as identified in the “History” section of this paper, offer numerous monuments, museums, and historical sites to visitors. Thus, tourism can be broadly classified into two categories of “activity tourism” and “visitation tourism” (Manrai *et al.*, 2017). The current discussion mainly draws upon activity tourism in the above-mentioned areas. It would be important to identify why regions such as Aragón, Asturias, Castilla La Mancha, Castilla y León and Galicia have less tourist traffic as evidenced by the lower number of tourist-nights, even though they have a high number of attractions.

A limitation of this study is that it did not address the current marketing efforts of national and regional tourism boards to increase tourism traffic, especially in the above-mentioned areas. Future research might investigate existing marketing efforts that national and regional tourism boards are currently undertaking to increase tourist-nights/visitors in these areas and offer suggestions for appropriate targeting world visitors to the Aragón, Asturias, Castilla La Mancha, Castilla y León and Galicia regions. It is well possible that regional efforts are not adequately funded, and that national tourism funds might be successfully redirected to promote tourism in these regions and increase traffic to their respective attractions, many of them UNESCO World Heritage destinations.

In future research, there is much scope for further differentiating tourists on the basis of their motivation for tourism (natural vs historical/cultural), and for tracking the different types of tourists who are attracted to different destinations in Spain.

## 7. Implications for global marketing

Currently, Spain ranks number one in Travel and Tourism Competitiveness Index (TTCI) in the 2017 annual Travel and Tourism Competitiveness Report of World Economic Forum. The TTCI index is based on four category of variables, namely: enabling environment (business environment, safety and security, health and hygiene, human resources and labor market, and international communication technology, ICT, readiness), travel and tourism enabling conditions (prioritization of travel and tourism, international openness, price competitiveness, environmental sustainability), infrastructure (air transportation

**Table IV.**  
Relative importance  
of input (predictor)

| Input (predictor): I(P) ↓  | Cluster 1   | Cluster 2  |
|--|---|--|
| No. of tourist-nights<br>(Low-High)<br>(Below average-above average) | High (above average)<br>No. of tourist-nights<br>71.4%<br>I(P) Importance = 1.0 | Low (below average)<br>No. of tourist-nights<br>100.0%<br>Importance = 1.0 |
| No. of natural attractions   | $\mu = 3.29$<br>I(P) Importance = 0.8   | $\mu = 1.50$<br>Input importance = 0.8                                     |
| No. of dual attractions  | $\mu = 4.29$<br>I(P) Importance = 0.6   | $\mu = 2.30$<br>Input importance = 0.6                                     |
| No. of cultural attractions  | $\mu = 6.71$<br>I(P) Importance = 0.4   | $\mu = 5.70$<br>Input importance = 0.4                                     |



infrastructure, ground and port infrastructure, tourist services infrastructure), and natural and cultural resources (natural resources, cultural resources, business travel).

Spain had received several other top performance rankings in the world. For example, Spain was ranked No. 2 in the world on Tourist Service Infrastructure and Cultural resources and Business Travel; No. 5 in the World on Prioritization of Travel and Tourism; and No. 9 in the World on Natural Resources and Air Transport Infrastructure. However, it had also received several lower performance rankings. For example, it was ranked No. 98 in the world on Price Competitiveness; No. 75 in the world on Business Environment; No. 43 in the world on International Openness; and No. 31 in the world on Environment Sustainability. In order to maintain its leadership position in the Global Tourism business, Spain must keep reinforcing its strengths and address the issues that will consistently propel it to tops of international rankings.

The current study analyzed tourism by regions and by three types of tourist attractions (natural, cultural, and dual attractions). Our findings suggest that five regions in particular, namely, Andalusia, Balearic Islands, Canary Islands, Catalonia, and Valencia, attract significantly higher number of tourists than the other 12 regions. Furthermore, natural attractions were found to be most important determinants of tourism with the dual attractions being next most important, and cultural attractions being the least important tourism determinants. This is problematic, considering that Spain has gems like the Alhambra, which tell the stories of struggles between multiple civilizations, and the City of Toledo, which transports the visitors to medieval times in a time capsule.

The natural attractions of Spain were discussed earlier mainly from the point of beaches and bodies of water that offer access to water sports. Spain has several mountain ranges offering opportunities year round for mountain tourism. In the north are the Cantabrian Mountains, spanning across the region of Castilla y León and the Galicia region, boarding Portugal, has Leon Mountains. In the center of the country, in the southern part of Castilla y León region, is the Central Mountain chain, and Aragón region houses the Iberian Mountain chain. The southern part of Spain has Sierra Morena mountain range in the regions of Castilla La Mancha and Extremadura. Thus, many of the regions in Spain, which are not located “in” or “on” water, are remarkable for other natural elements that are attractive to tourists – for example, mountains. There is a need to promote tourism in these regions. Overall, thus, there are ample opportunities for global tourism in Spain.

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# Inconsistency in intertemporal choice: a behavioral approach

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Inconsistency  
in  
intertemporal  
choice

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## Abstract

**Purpose** – The purpose of this paper is to introduce the main measures of inconsistency in the context of intertemporal choice and to identify the relationships between them (more specifically, the measures by Prelec, Takahashi and Rohde). In effect, Thaler (1981), awarded the Nobel Prize in Economics 2017, argued that when a preference must be expressed between two reward options, some people may reverse their original preference when a significant delay is introduced before the reward is to be received. This anomaly is known as inconsistency in intertemporal choice.

**Design/methodology/approach** – After a revision of the existing literature and by using the methods from mathematical calculus, the authors have derived the logical relationships between the measures presented in this paper.

**Findings** – The main contribution of this paper is the proposal of a novel parameter, the so-defined ratio of two instantaneous discount rates, which the authors call the instantaneous variation rate, which allows relating some other measures of inconsistency, namely the measures described by Prelec and Rohde. A limitation of this paper is the unavailability of empirical information about the inconsistency measures needed to substantiate the theoretical findings. Indeed, this paper has social implications because recent behavioral and neuroeconomic studies have shown the existence of preference reversal or time inconsistency in other areas. The authors' models can be implemented in these fields in order to better analyze the situations of inconsistency.

**Originality/value** – The originality of this paper lies in the authors' aim to bring some order to the proposed measures of inconsistency which have arisen as a result of the different approaches adopted.

**Keywords** Preferences, Discount function, Impatience, Intertemporal choice, Time inconsistency

**Paper type** Research paper

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## 1. Introduction

The process of intertemporal choice involves deciding between several alternatives whose monetary amounts or utilities take place at different moments in time. Decisions about savings, nutrition, exercise, and health are intertemporal choices. In economy, the study of intertemporal choice began in 1937 when Samuelson proposed his well-known Discounted Utility (DU) Model. The paradigm of the DU Model is exponential discounting which exhibits a constant instantaneous discount rate. This is based on the assumption that the behavior of people with respect to the choice does not change with the passage of time.

However, the latest behavioral and neuroeconomic studies have shown the existence of several limitations of the DU Model. In effect, a key concept in intertemporal choice is impatience which has been defined by different authors as a synonym of impulsivity. Thus, Takahashi *et al.* (2012) defined impatience as a strong preference for small immediate rewards over large delayed ones. But another question is the situation in which the subject changes his/her choice when the initial offered rewards are delayed over the same period of time. For instance, Thaler (1981) argued that some people may prefer one apple today over two apples tomorrow but, at the same time, they may prefer two apples in one year plus one



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day over one apple in one year. Another situation is described by the following example (Takeuchi, 2012) in which a person is requested to respond to the following two questions:

Q1. Which of the following reward options do you prefer?

- (1) \$100 paid today.
- (2) \$110 paid in 1 week.

Q2. Which of the following reward options do you prefer?

- (3) \$100 paid in 52 weeks.
- (4) \$110 paid in 53 weeks.

Table I summarizes the pairs of possible answers and the description of behavior.

Observe that, if subjects prefer smaller sooner rewards in the distant future, but prefer larger later rewards in the near future, their intertemporal choices are inconsistent, because their preferences reverse as time passes. On the other hand, if someone expresses a preference for smaller sooner rewards when responding to the above questions, his/her intertemporal choice is impulsive but consistent, because the preference does not reverse over time.

In other words, people may exhibit inconsistency when making intertemporal choices. This behavior is characterized by a variable (mainly, increasing or decreasing) instantaneous discount rate. The limitations of the DU Model allowed for the development of some alternatives to exponential discounting such as quasi-hyperbolic discounting (Phelps and Pollak, 1968) and generalized hyperbolic discounting (Loewenstein and Prelec, 1992), which replaced a constant with a variable discount factor. Additionally, other intertemporal choice models have been proposed in order to describe the inconsistency (increasing and decreasing impatience) in actual human behavior in intertemporal decision making.

This paper considers the subject of intertemporal choice which is of increasing interest within the field of behavioral finance. More specifically, it is devoted to the analysis of several measures of the paradox or anomaly labeled as "time inconsistency." In effect, many procedures have been proposed to tackle this phenomenon. The aim of this paper is therefore to present all the previously proposed measures of time inconsistency, trying to find the relationships between them. For example, in this paper the well-known measures proposed by Prelec (2004) and Rohde (2010) will be considered by using the ratio of instantaneous variation introduced by Cruz and Muñoz (2001). Table II shows some of these measures.

Figure 1 summarizes the framework of this paper.

This paper is focused on the field of behavioral finance where the importance of time inconsistency has been highlighted by several authors. For example, Hardisty and Pfeffer (2017) showed the relationship between temporal uncertainty and the preference for immediate or future gains. In this context, we can also mention the research by Sedghi and Gerayli (2015) about the inconsistency existing in the absence of timely payment of delayed receivables. On the other hand, the results obtained by Imas (2016) demonstrate that people take less risk after a realized loss and more risk if it is a paper loss, and this increase is due to the inconsistency in preferences. Very relevant to the last reference, although outside the economic-financial context, we must mention the work by Gneezy *et al.* (2014) who studied

**Table I.**  
Decreasing  
impatience, increasing  
impatience and  
consistent behavior

|                          | (3) \$100 paid in 52 weeks              | (4) \$110 paid in 53 weeks              |
|--------------------------|---|---|
| (1) \$100 paid today     | Consistent and impatient                | Inconsistent and decreasingly impatient |
| (2) \$110 paid in 1 week | Inconsistent and increasingly impatient | Consistent and patient                  |

**Source:** Takeuchi (2012)

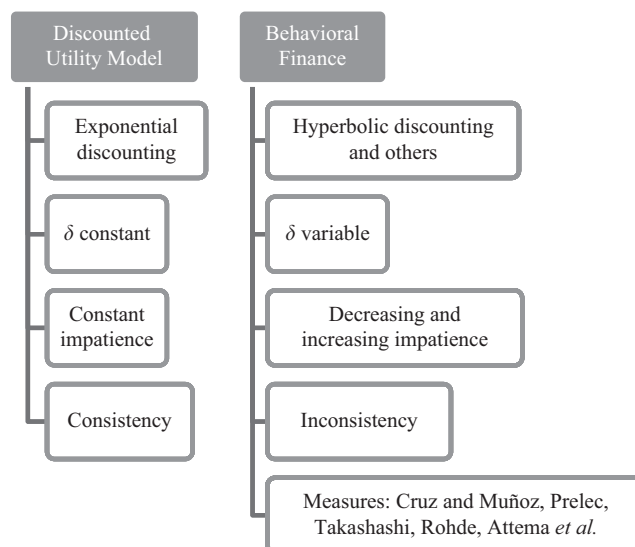
the intertemporal inconsistency observed in moral and immoral attitudes of people. In this way, they concluded that a moral choice increases because of the temporal increase in guilt induced by a previous immoral choice.

The issue of time inconsistency is not confined to behavioral finance. Thus, in the context of market strategies and marketing, we can highlight the work by Gilbert and Jonnalagedda (2011) who proposed manufacturers to make their durable products (e.g. printer) incompatible with contingent consumable product (e.g. ink) that are produced by other firms. This strategy forces consumers to reduce willingness to pay for the durable due to the higher consumables prices in the future. On the other hand, Feit *et al.* (2010) proposed a new model to describe the behavior of consumers when making decisions about the design and marketing of a given product.

This paper has been organized as follows. In the current section, we have contextualized this topic within the field of intertemporal choice and we have indicated the objectives we intend to achieve. In Section 2, we have introduced the concept of discount function as a necessary first step for the definition of impatience. In Section 3, we have introduced the concept of time inconsistency and some of the most relevant measures proposed by different authors. First, the instantaneous discount rate, denoted by  $\delta(t)$ , is a parameter whose behavior

| Author                                  | Measure of variation impatience                      |
|---|--|
| Cruz and Muñoz (2001)                   | $\frac{\delta(t)}{\delta(s)}$ , with $s < t$         |
| Prelec (2004)                           | Degree of convexity of $\ln F(t)$                    |
| Takahashi (2007)                        | $\delta'_q(t)$ ( $q$ -exponential discount function) |
| Rohde (2009)                            | $\frac{F'(t)}{F(t)}$                                 |
| Rohde (2010)                            | Hyperbolic factor                                    |
| Attema <i>et al.</i> (2010)             | TTO sequence   |
| Rohde (2015)                            | DI-index   |
| <b>Source:</b> Authors' own elaboration |  |

**Table II.**  
Several measures of  
impatience variation



**Source:** Authors' own elaboration

**Figure 1.**  
Discount utility model  
vs behavioral finance

(decrease or increase) is considered as a necessary and sufficient condition for inconsistency (decreasing or increasing impatience). In the same way, we propose the ratio of two instantaneous discount rates, which we call the instantaneous variation rate, denoted by  $v(s,t)$ , which will help us to relate some other measures of inconsistency. This section is divided into three subsections, one for each author under consideration: Prelec, Takahashi and Rohde, where the different parameters provided to measure the time inconsistency in intertemporal choice have been analyzed. Finally, Section 4 summarizes and concludes.

## 2. Impatience in intertemporal choice

The DU (Samuelson, 1937) is the classical model used in problems involving intertemporal choices, in which the present utility of a series of installments (hereinafter, called “stream” by using Rohde’s terminology) is the sum of the discounted individual values over a given time horizon. It assumed that people discount future amounts with an exponential function, but Strotz (1956) demonstrated that they often display preference reversal (this concept will be seen in Section 3) as time passes, and so the exponential discount function fails to explain this fact. The necessity of modeling this change in individual time preference has made hyperbolic discounting an important tool in behavioral economics. Moreover, several types of hyperbolic discount functions have been introduced, such as quasi-hyperbolic discounting, proportional hyperbolic discounting and generalized hyperbolic discounting. In effect, most articles on behavioral neuroeconomics have used the simple hyperbolic discount function (Frederick *et al.*, 2002). However, Loewenstein and Prelec (1992) proposed the generalized hyperbolic discount function:

$$F(t) = \frac{1}{(1+kt)^{\alpha/k}}, \quad k > 0, \quad \alpha > 0,$$

which is similar to either the exponential function or the simple hyperbolic function, depending on the value of  $\alpha$ . Recent papers have studied the  $q$ -exponential discount function whose parameter  $q$  indicates the deviation from exponential discounting. Table III summarizes some of the discount functions used in most papers (see Takahashi *et al.*, 2012).

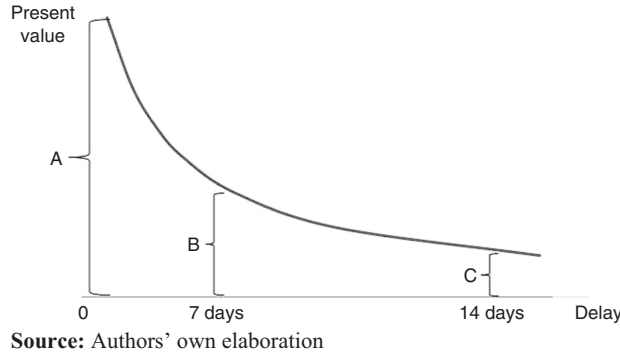
At this point, it is necessary to introduce a general definition of discount function (Cruz and Muñoz, 2016) which indicates that, when a reward is subject to a delay, its present value decreases (Figure 2).

**Definition 1.** A stationary discount function  $F(t)$  is a continuous real function  $F: \mathfrak{R}^+ \rightarrow \mathfrak{R}^+$  such that  $t \mapsto F(t)$ , defined within an interval  $[0, t_0[$  ( $t_0$  can even be  $+\infty$ ), where  $F(t)$  represents the value at 0 of a \$1 reward available at instant  $t$ , satisfying the following conditions:

- $F(0) = 1$ ;
- $F(t) > 0$ ; and
- $F(t)$  is strictly decreasing.

**Table III.**  
Different discount  
functions alternative  
to the exponential

| Discount Function                             | Equation  |
|---|---|
| Simple exponential                            | $F(t) = \exp\{-kt\}$ , $k > 0$                        |
| Simple hyperbolic                             | $F(t) = 1/(1 + kt)$ , $k > 0$                         |
| $q$ -exponential                              | $F(t) = 1/[1 + (1 - q)k_q t]^{1/(1 - q)}$ , $k_q > 0$ |
| <b>Source:</b> Takahashi <i>et al.</i> (2012) |   |



**Figure 2.**  
Displaying a discount  
function

In order to formulate more accurately the DU model, an outcome stream  $(t_1: x_1, \dots, t_m: x_m)$  is defined as a sequence of dated amounts which yields outcome  $x_j$  at time point  $t_j$ , for  $j = 1, \dots, m$  and nothing at other time points. We assume  $t_j \geq 0$  for all  $j$ . Time point  $t = 0$  corresponds to the present moment. In this context, the DU is defined as (Rohde, 2015):

$$DU(t_1 : x_1, \dots, t_m : x_m) = \sum_{j=1}^m u(x_j)F(t_j),$$

where  $F$  is the discount function and  $u$  the (instant) utility function.

Alternatively, an intertemporal choice process can be treated by means of a preference relation  $\geq$  (at least as preferred as) over a set  $X$  of outcomes. Strict preference and indifference are denoted by  $>$  and  $\sim$ , respectively. For two outcome streams  $x$  and  $y$ , we will write  $x \geq y$  (resp.  $x > y$ ) if  $u(x) \geq u(y)$  (resp.  $u(x) > u(y)$ ), and  $x \sim y$  if  $u(x) = u(y)$ .

The following statement (Cruz and Muñoz, 2016) relates the preference existing in an intertemporal choice and its associated discount function:

*Theorem 1.* A discount function  $F(t)$  gives rise to the total preorder  $\geq$  defined by:

$$(t_1 : x_1) \sim (t_2 : x_2) \text{ if } x_1 F(t_1) \geq x_2 F(t_2),$$

satisfying the following conditions:

- if  $t_1 \leq t_2$  then  $(t_1 : x) \geq (t_2 : x)$ , and
- if  $x_1 \geq x_2$  then  $(t : x_1) \geq (t : x_2)$ .

Reciprocally, every total preorder  $\geq$  satisfying the former conditions gives rise to a discount function. ■

Once a discount function has been defined, it is easier to introduce the (im)patience corresponding to a time interval. In effect, a measure of the patience (resp. impatience) exhibited by the discount function associated with certain underlying intertemporal choice (Cruz and Muñoz, 2013) is presented in Definition 2 (resp. 3):

*Definition 2.* The patience associated with the discount function  $F(t)$  in the interval  $[t_1, t_2]$  is defined as the value of the discount factor  $f(t_1, t_2)$  corresponding to this interval, namely:

$$f(t_1, t_2) := \frac{F(t_2)}{F(t_1)} = \exp \left\{ - \int_{t_1}^{t_2} \delta(x) dx \right\},$$

where  $\delta(x)$  is the instantaneous discount rate at time  $x$ :

$$\delta(x) = -\frac{d \ln F(z)}{dz} \Big|_{z=x} = -\frac{F'(x)}{F(x)}.$$

Observe that the patience lies in the interval  $[0, 1]$ . Moreover, the greater the discount factor, the less sloped is the discount function in the interval  $[t_1, t_2]$ , and then the lesser is the preference for immediate over delayed rewards, i.e. people are more patient. On the other hand, the instantaneous discount rate represents the impatience of a decision maker at a given moment:

*Definition 3.* The impatience associated with  $F(t)$  in the interval  $[t_1, t_2]$  is defined as  $1 - f(t_1, t_2)$ , which also lies within the interval  $[0, 1]$ .

As  $F$  is strictly decreasing, the decision maker is always impatient. However, as time goes by, his/her impatience may increase or decrease. This variation will be analyzed in Section 3.

However, the instantaneous rate of discount has been the commonly used measure of impatience. This is logical because the difference  $1 - f(t_1, t_2)$  is directly related to the discount rate. In Frederick *et al.* (2002), we can find a résumé of the implicit discount rates from all the reviewed studies. On the other hand, some authors consider the term impatience as a synonym of impulsivity, e.g. Cheng and González-Vallejo (2014), and Takahashi *et al.* (2007). This term has been used not only in economics, but also appears in psychological studies. Takahashi (2007) showed some examples of impulsivity in intertemporal choice in smokers, addicts and attention-deficient hyperactivity-disorder patients. In the same way, Tanaka *et al.* (2010) related impatience with risk-aversion and household income, Nguyen (2011) analyzed the relationship between impatience and work environment, and finally Espin *et al.* (2015) studied the impatience in a game involving bargaining.

### 3. Variation of impatience: inconsistency in intertemporal choice

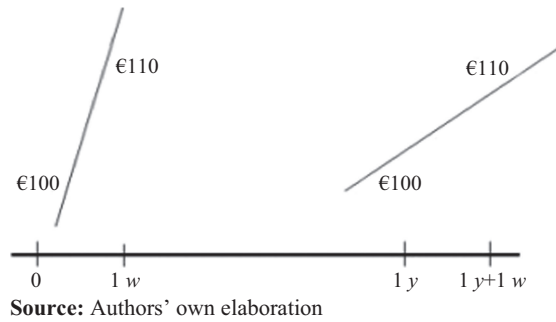
Based on the first study of inconsistency in intertemporal choice by Strotz (1956), many economists have defined the change of preference as a disagreement between the current subject and the same subject in the future. As an example, Kirby and Herrnstein (1995) offered subjects a choice between a small but earlier reward and a larger but later reward. After showing a preference for the small earlier reward when offered immediately, they then delayed both outcomes maintaining the temporal interval between them. Subjects typically switched to the larger later outcomes, even for very small amounts of added delay. This reversal in preferences or the fact that individuals show impulsivity and self-control at the same time is known as time inconsistency.

Example 1 (Frederick *et al.*, 2002): suppose one subject is asked to choose between receiving €100 now and receiving €110 in a week, and between receiving €100 in one year and receiving €110 in one year plus one week. If the subject chooses €100 now and €110 in one year plus one week, a choice reversal is detected in his/her decision. In Figure 3, we can observe the decrease in the slope of indifference lines which results in a convex discount function.

In the following paragraphs, we can consider either sequences or single values  $\beta$  and  $\gamma$  of money amounts in a given set of outcomes. In this case,  $\beta > \gamma$  if  $u(\beta) > u(\gamma)$ , where  $u$  is a utility function. In the case of a single outcome, we will simply write  $\beta > \gamma$ . Many economic and psychological studies have found evidence for deviations from constant impatience such as decreasing impatience (Frederick *et al.*, 2002), but they have also determined the degrees of such deviations:

*Definition 4.* A decision maker exhibiting preferences  $\succeq$  has decreasing impatience if for all  $s < t$  and  $\tau > 0$ ,  $0 < \gamma < \beta$ , and  $(\gamma, s) \sim (\beta, t)$  imply  $(\gamma, s+\tau) \preceq (\beta, t+\tau)$  (Rohde, 2009).





**Figure 3.**  
Preference reversal  
and indifference lines

Taking into account that the inconsistency shown by a subject at an instant is given by the instantaneous discount rate, in order to characterize the decreasing impatience it is sufficient to examine the behavior of  $\delta(x)$ . In effect, we can write the following statement:

- P1.* The time preference exhibits decreasing (resp. increasing) impatience if and only if the instantaneous discount rate  $\delta(x)$  is decreasing (resp. increasing).

According to Rohde (2009), decreasing impatience means that a difference in timing is weighed less the further in the future it occurs, indicating that the subject is more willing to wait. This weight or the willingness to wait (WTT) is given by  $-F'(t)$ . Thus, decreasing impatience corresponds to an increasing  $F'(t)$ , which corresponds to the discount function being convex. This suggests that individuals can be compared in terms of their degrees of decreasing impatience by comparing the degrees of convexity of their discount functions. On the other hand, observe that the condition in *P1* is equivalent to saying that  $-\ln F(t)$  is convex. This introduces a discussion between using the convexity of  $-F(t)$  or  $-\ln F(t)$  as a sufficient condition for decreasing impatience. Obviously, the convexity of  $-\ln F(t)$  necessarily implies the convexity of  $-F(t)$ . So hereinafter, we will only consider the convexity of  $-\ln F(t)$  as a condition stronger than the convexity of  $-F(t)$ .

Next, we are going to develop the characterizations of inconsistency which different authors have introduced starting from the concept of instantaneous discount rate. Prelec (2004) showed that the degree of decreasing impatience can be measured by the Arrow-Pratt degree of convexity of the logarithm of the discount function.

### 3.1 Inconsistency by Prelec

The objective of this subsection is to define the degree of inconsistency introduced by Prelec and to relate it with the hyperbolic factor (Rohde, 2010) with the help of the instantaneous variation rate (Cruz and Muñoz, 2001) which will be defined below. In effect, according to Prelec (2004), the degree of decreasing impatience is the rate of change of the instantaneous discount rate:

$$P(t) = -\frac{[\ln F(t)]''}{[\ln F(t)]'} = -[\ln \delta(t)]'.$$

This result has not yet been applied to empirical and experimental research because the discount function is hard to measure. Nevertheless, in recent years many economists have tried to obtain an approximation of Prelec's result. In order to resolve this difficulty, we are going to introduce the following three subsections.

*3.1.1 Measure from Cruz and Muñoz (2001).* Consider the indifference relationship  $(\gamma, s) \sim (\beta, t)$ , with  $s < t$ . If the availability of the reward  $\gamma$  is delayed until moment  $s+\sigma$ , with

$\sigma > 0$ , the delay  $\tau > 0$  for which the former indifference is preserved,  $(\gamma, s + \sigma) \sim (\beta, t + \tau)$ , satisfies the following equation:

$$\frac{\sigma}{\tau} = \frac{(F(t + \tau) - F(t)) / \tau F(t)}{(F(s + \sigma) - F(s)) / \sigma F(s)}.$$

Letting  $\sigma \rightarrow 0$  (which implies  $\tau \rightarrow 0$ ), one has:

$$\lim_{\sigma \rightarrow 0} \frac{\sigma}{\tau} = \frac{-\mathrm{d} \ln F(z) / \mathrm{d} z \big|_{z=t}}{-\mathrm{d} \ln F(z) / \mathrm{d} z \big|_{z=s}},$$

or equivalently:

$$\lim_{\tau \rightarrow 0} \frac{\sigma}{\tau} = \frac{\delta(t)}{\delta(s)}.$$

The left-hand side of the equation represents the instantaneous relative variation in the availability of rewards which will be denoted by  $v(s, t)$  and will be called the instantaneous variation rate:

$$v(s, t) := \lim_{\sigma \rightarrow 0} \frac{\sigma}{\tau} = \frac{\delta(t)}{\delta(s)}.$$

Obviously, the instantaneous variation rate has the following properties:

- (1)  $v(s, t) = 1$  if and only if the discount function is exponential.
- (2)  $v(s, t) < 1$  (resp.  $v(s, t) > 1$ ) if and only if:
  - $\delta(t) < \delta(s)$  (resp.  $\delta(t) > \delta(s)$ );
  - $\delta(z)$  is decreasing (resp. increasing); and
  - the function  $\ln F(z)$  is concave (resp. convex).

Therefore, the instantaneous variation rate is an indicator of the behavior of instantaneous discount rate as shown by the following corollary:

*Corollary 1.* The time preference exhibits decreasing impatience if and only if the instantaneous variation rate is less than 1.

**3.1.2 Measure from Rohde.** Rohde (2010, 2015) introduced two measures of decreasing impatience which can be easily calculated from experimental data without any knowledge of utility. So they can also be used as a measure when preferences cannot be represented by DU, instead of Prelec's measure which essentially needs a discount function. In effect, let us consider the indifference pair:

$$(\gamma, s) \sim (\beta, t)$$

and:

$$(\gamma, s + \sigma) \sim (\beta, t + \tau),$$

where  $\gamma$  and  $\beta > 0$ , with  $s < t$  and  $\tau > 0$ . As indicated, time preference exhibits increasing impatience if  $\sigma > \tau$ . Obviously, as  $s < t$ , then  $s\tau < t\sigma$ .

Reciprocally, time preference exhibits decreasing impatience if  $\sigma \leq \tau$ , but nothing can be deduced about the relationship between  $s\tau$  and  $t\sigma$ . Therefore, we will say that:

- Moderate decreasing impatience holds if  $s\tau < t\sigma$ . This condition is equivalent to require that:

$$0 < \tau - \sigma < \frac{\tau(t-s)}{t}.$$

- Strongly decreasing impatience holds if  $s\tau \geq t\sigma$ . This condition is equivalent to require that:

$$\tau - \sigma \geq \frac{\tau(t-s)}{t} > 0.$$

An immediate measure of decreasing impatience is  $\tau - \sigma$  which is a parameter depending on  $s$ ,  $t$ ,  $\gamma$ , and  $\beta$ . In order to aggregate all these variables, Rohde (2010) proposed the following measure:

*Definition 5.* For every indifference pair, the hyperbolic factor is the function defined as:

$$H(s, t, \sigma, \tau) = \frac{\tau - \sigma}{t\sigma - s\tau}.$$

$H$  is said to be regular if  $t\sigma > s\tau$ . Regularity implies the existence of an upper bound of the degree of decreasing impatience. Contrarily to regularity,  $H$  is infinite if  $t\sigma = s\tau$ , and negative if  $t\sigma < s\tau$ .

*Theorem 2.* Let regularity hold. Preferences  $\geq$  exhibit decreasing impatience if and only if  $H \geq 0$ .

Another question is to know whether a discount function changes from moderate to strongly decreasing impatience (or vice versa). To do this, we have to determine the poles of the function  $H(s, t, \sigma, \tau)$ , that is to say, it is necessary to solve the following equation for  $\tau$ :

$$tF^{-1} \left[ \frac{F(s)}{F(t)} F(t + \tau) \right] - s(t + \tau) = 0,$$

or equivalently:

$$\frac{F(s)}{F(t)} F(t + \tau) = F \left[ \frac{s}{t} (t + \tau) \right].$$

The following paragraph describes an example in which the discount function changes from moderate to strongly decreasing impatience.

Example 2 (moderate and strongly decreasing impatience): assume that the intertemporal choice is ruled by the discount function:

$$F(t) = \exp\{\exp\{-kt\} - 1\}, \quad k > 0.$$

Let us consider  $k = 0.3$  and a first time interval  $[1, 3]$ . The following indifferences hold:

$$(10, 1) \sim (13.97, 3)$$

and:

$$(10, 2) \sim (13.97, 5.13).$$

Observe that, in this case:

- $\tau = 2.13 > 1 = \sigma$ ,
- $\tau\sigma = 3 > 2.13 = s\tau$ , and
- $H(1,3,1,2.13) = 1.299$ .

Thus, in this interval a moderate decreasing impatience is observed. Now, let us consider the time interval  $[11,14]$ . The following indifferences hold:

$$(10, 11) \sim (10.22, 14)$$

and:

$$(10, 12) \sim (10.22, 27.98).$$

Observe that, in this case:

- $\tau = 13.98 > 1 = \sigma$ ,
- $\tau\sigma = 14 > 153.78 = s\tau$ , and
- $H(11,14,1,13.98) = -0.0928$ .

Thus, in this interval a strongly decreasing impatience is observed. Now we must ask what will be the characterization of a discount function exhibiting moderate decreasing impatience. For  $t \geq 1$ , the following necessary condition can be obtained:

$$\delta(t) \geq \frac{\delta(1)}{t}.$$

Rohde (2015) introduced another measure of decreasing impatience, the so-called DI-index, as defined below:

*Definition 6.* For every indifference pair, the decreasing impatience index is defined by:

$$\text{DI-index} = \frac{\tau - \sigma}{\sigma(t - s)}.$$

Thus, constant, decreasing, and increasing impatience correspond to a DI-index being zero, positive, or negative, respectively. The following theorem relates Prelec's degree of inconsistency with the DI-index by using the instantaneous variation rate as a tool. Observe that the proof of this theorem is much easier than that presented by Rohde (2015):

*Theorem 3.* The DI-index is an approximation of Prelec's degree of inconsistency.

Proof. In effect, by dividing the numerator and the denominator of the DI-index by  $\tau$ , one has:

$$\text{DI-index} = \frac{1 - \sigma/\tau}{\sigma/\tau(t - s)}.$$

Recall that the instantaneous variation rate is:

$$v(s, t) := \lim_{\sigma \rightarrow 0} \frac{\sigma}{\tau} = \frac{\delta(t)}{\delta(s)}.$$

Inconsistency  
in  
intertemporal  
choice

Thus:

$$\lim_{\substack{\tau \rightarrow 0 \\ s \rightarrow t}} \text{DI-index} = \frac{1 - \frac{\delta(t)}{\delta(s)}}{\frac{\delta(t)}{\delta(s)}(t-s)} = -[\ln \delta(t)]' = P(t). \quad \blacksquare$$

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The DI-index is obtained from similar indifferences as the hyperbolic factor (Rohde, 2010). However, the latter has a drawback, because it is a measure of impatience only for people who exhibit moderate decreasing impatience or increasing impatience. The DI-index does not have this problem and can also be computed for people who exhibit strongly decreasing impatience. Moreover, the DI-index approximates Prelec's measure of decreasing impatience, whilst the hyperbolic factor does not (Theorem 3).

Example 3 (strongly decreasing impatience,  $\sigma < \tau$ ): if the intertemporal choice is ruled by the discount function:

$$F(t) = \exp\{-\arctan(t)\},$$

the following indifferences hold:

$$\left(10, \frac{\sqrt{3}}{3}\right) \sim (10\exp\{\pi/12\}, 1)$$

and:

$$(10, \sqrt{3}) \sim (10\exp\{\pi/2\}, 3.73).$$

Therefore, DI-index = 3.2278, but  $H((\sqrt{3}/3), 1, (2\sqrt{3}/3), 2.73) = -3.7377$ .

*3.1.3 Attema et al.'s measure.* Attema *et al.* (2010) gave another measure of time inconsistency, the so-called time-tradeoff (TTO) sequences:

*Definition 7.* A TTO sequence is a sequence  $t_0, t_1, \dots, t_n$  of time points such that there are two outcomes  $\beta > \gamma$  with:

$$\begin{aligned} (\gamma, t_0) &\sim (\beta, t_1), \\ (\gamma, t_1) &\sim (\beta, t_2), \\ &\vdots \\ (\gamma, t_{n-1}) &\sim (\beta, t_n) \end{aligned}$$

that is, each delay between two consecutive time points exactly offsets the same outcome improvement. Such a delay,  $t_i - t_{i-1}$ , is called the WTW.

Thus, stationarity implies that the WTW is constant, so that points  $t_0, t_1, \dots, t_n$  are equally spaced in time units. Increasing and decreasing impatience correspond to decreasing and increasing WTW, respectively.

A TTO sequence is equally spaced in  $\ln F$  units and also in the units of any renormalization of  $\ln F$ . We consider a convenient renormalization, being  $\ln F$  normalized at  $t_0$  and  $t_n$ :

$$\varphi_{t_0, t_n}(t) = \frac{\ln F(t) - \ln F(t_n)}{\ln F(t_0) - \ln F(t_n)}.$$

This function will be called the TTO curve of the TTO sequence:

*P2.* The degree of convexity of a TTO curve determines the degree of decreasing impatience.

Proof. In effect, if  $\varphi$  is convex, then  $\varphi' = F'(t)/F(t) = -\delta(t)$  is increasing. By *P1*, the time preference exhibits decreasing impatience. ■

From a mathematical point of view, the contribution of Attema *et al.* is elementary with respect to Prelec's result: replacing the convexity of  $\ln F$  by the equivalent convexity of  $\varphi$ . But, from an empirical perspective, *P2* is essential because  $\varphi$  is directly observable, whilst  $\ln F$  is not.

### 3.2 Inconsistency by Takahashi

Cajueiro (2006), based in Tsallis' statistics, introduced the so-called  $q$ -exponential discount function which was used by Takahashi (2007) to quantify the inconsistency in an intertemporal choice. In effect, if  $F_q(t)$  denotes the  $q$ -exponential discount function:

$$F_q(t) = \frac{1}{[1 + (1-q)k_q t]^{1/(1-q)}},$$

the parameter  $k_q$  quantifies the impulsivity whilst the parameter  $q$  represents a measure of consistency in the intertemporal choice process described by the discount function. In effect, when  $q \rightarrow 1$ , the  $q$ -exponential discounting tends to the exponential discounting and so the intertemporal choices are consistent, and when  $q = 0$ , the  $q$ -exponential discounting is equivalent to the hyperbolic discounting. In this latter case and in all the cases where  $0 \leq q < 1$ , the intertemporal choices are inconsistent. In effect, the  $q$ -exponential discount rate is given by:

$$\delta_q(t) = \frac{k_q}{1 + (1-q)k_q t},$$

where at delay  $t = 0$ ,  $\delta_q(t) = k_q$ , for any  $q$ . Therefore, at delay  $t > 0$ , the value of  $\delta_q(t)$  indicates the impulsivity in the plan of future intertemporal choice behavior. It is important to examine how the inconsistency (or time-dependency of  $\delta_q(t)$ ) depends on the parameters of the  $q$ -exponential discounting model. The time-dependency of  $\delta_q(t)$  is given by:

$$\delta'_q(t) = \frac{-k_q^2(1-q)}{[1 + (1-q)k_q t]^2}.$$

Thus:

- decreasing impatience holds if  $\delta'_q(t) < 0$ , that is, if  $q < 1$ ;
- consistency holds if  $\delta'_q(t) = 0$ , that is, if  $q = 1$ ; and
- increasing impatience holds if  $\delta'_q(t) > 0$ , that is, if  $q > 1$ .

The  $q$ -exponential discount function is mathematically equivalent to Loewenstein and Prelec's generalized hyperbolic function. The advantage of the  $q$ -exponential function over the generalized hyperbolic function is that the first model can parameterize the deviation of temporal discounting from the exponential function as the amount  $1-q$ . Takahashi (2007) showed that the  $q$ -exponential discounting model is well defined also for  $q < 0$ , unlike Cajueiro (2006) who assumed that  $q$  is non-negative. Later Cruz and Muñoz (2013) demonstrated that the range of values of  $q$  in the  $q$ -exponential discount function can be extended to the joint interval  $(-\infty, 1) \cup (1, +\infty)$ . Table IV summarizes the results.

Takahashi *et al.* (2007) demonstrated that the  $q$ -exponential discounting model explained human intertemporal choice behavior better than the exponential and simple hyperbolic discounting models.

The following result characterizes the  $q$ -exponential discount function according to the hyperbolic factor introduced by Rohde (2010):

P3. The hyperbolic factor corresponding to an intertemporal choice is constant if and only if the underlying discount function is the  $q$ -exponential.

Proof. Assume the discount function underlying the process of intertemporal choice is the  $q$ -exponential. Then:

$$\left(\frac{\gamma}{\beta}\right)^{1-q} = \frac{1+(1-q)k_q t}{1+(1-q)k_q s}$$

and:

$$\left(\frac{\gamma}{\beta}\right)^{1-q} = \frac{1+(1-q)k_q(t+\tau)}{1+(1-q)k_q(s+\sigma)}.$$

By identifying both fractions:

$$\frac{1+(1-q)k_q t}{1+(1-q)k_q s} = \frac{1+(1-q)k_q(t+\tau)}{1+(1-q)k_q(s+\sigma)},$$

from where:

$$H(s, t, \sigma, \tau) = \frac{\tau - \sigma}{t\sigma - s\tau} = (1-q)k_q.$$

Reciprocally, assume that  $H(s, t, \sigma, \tau) = \alpha$ , with  $\alpha$  a constant. Then:

$$\frac{1 - (\sigma/\tau)}{t(\sigma/\tau) - s} = \alpha.$$

| $q$                     | $F_q(t)$                       | $\delta_q(t)$        | Impatience |
|-------------------------|--------------------------------|----------------------|------------|
| $q \rightarrow +\infty$ | 1                              | 0                    | Zero       |
| $q \in (1, +\infty)$    | $1/([1+(1-q)k_q t]^{1/(1-q)})$ | $k_q/(1+(1-q)k_q t)$ | Increasing |
| $q \rightarrow 1$       | $\exp\{-k_q t\}$               | $k_q$                | Constant   |
| $q \in (0, 1)$          | $1/([1+(1-q)k_q t]^{1/(1-q)})$ | $k_q/(1+(1-q)k_q t)$ | Decreasing |
| $q = 0$                 | $1/(1+k_q t)$                  | $k_q/(1+k_q t)$      | Decreasing |
| $q \in (-\infty, 0)$    | $1/([1+(1-q)k_q t]^{1/(1-q)})$ | $k_q/(1+(1-q)k_q t)$ | Decreasing |
| $q \rightarrow -\infty$ | 1                              | 0                    | Zero       |

Source: Authors' own elaboration from Cruz and Muñoz (2013)

**Table IV.**  
Behavior of  $F_q(t)$   
according to different  
values of  $q$



Letting  $\sigma \rightarrow 0$  (which implies  $\tau \rightarrow 0$ ):

$$\frac{1 - (\delta(t)/\delta(s))}{t(\delta(t)/\delta(s)) - s} = \alpha.$$

Then:

$$\frac{1 + \alpha s}{1 + \alpha t} = \frac{\delta(t)}{\delta(s)},$$

from where  $\delta(t) = h(1/(1 + \alpha t))$ . Thus:

$$- \ln F(t) = \int_0^t \delta(x) dx = \frac{h}{\alpha} \ln(1 + \alpha t).$$

Therefore:

$$F(t) = \frac{1}{(1 + \alpha t)^{h/\alpha}},$$

which is the  $q$ -exponential discount function once suitable changes of the involved variables are introduced. ■

### 3.3 Inconsistency by Rohde

Rohde (2009) introduced the concept of decreasing relative impatience which can be measured by the convexity of the discount function itself, rather than its logarithm, as Prelec (2004) showed. This new notion of impatience considers sequences of two outcomes, unlike the concept of decreasing impatience, which considers single outcomes. Observe that when a subject is faced with a decision, he/she incurs costs today to receive a reward in the future. So, the sequence of two outcomes means “cost now” and “reward later.”

First, we define the concept of relative impatience and then the concept of decreasing relative impatience:

*Definition 8.* Preferences  $\succeq$  satisfy relative impatience if:

$$(\beta, 0; \gamma, s) \succ (\beta, 0; \gamma, t),$$

whenever  $s < t$  and  $\gamma > 0$ .

That is to say, the delay in receiving  $\gamma$  from  $s$  to  $t$  is considered relative to the payment of  $\beta$  today.

*Definition 9.* Preferences  $\succeq$  satisfy decreasing relative impatience if for all outcomes  $\alpha, \beta, \gamma$  with  $\alpha < \beta$  and  $\gamma > 0$ , all time points  $s < t$ , and  $\sigma > 0$ ,  $(\alpha, 0; \gamma, s) \sim (\beta, 0; \gamma, t)$  implies  $(\alpha, 0; \gamma, s + \sigma) < (\beta, 0; \gamma, t + \sigma)$ .

The indifference  $(\alpha, 0; \gamma, s) \sim (\beta, 0; \gamma, t)$  means that to speed up the receipt of  $\gamma$  from  $t$  to  $s$  the decision maker is willing to pay  $\beta - \alpha$ . But, if  $\gamma$  is delayed at  $t + \sigma$ , the decision maker is no longer willing to pay  $\beta - \alpha$ . Thus, a delay of  $t - s$  units of time becomes less important the further it lies in the future.

In the following theorem it is shown that the degree of decreasing relative impatience is indicated by the degree of convexity of the discount function:

*Definition 10.* Let  $F$  be a twice continuously differentiable discount function. The rate of decreasing relative impatience, denoted by  $DRI(t)$ , is defined as the degree of convexity of the discount function:

$$DRI(t) = -\frac{F''(t)}{F'(t)}.$$

*Theorem 4.* The degree of decreasing relative impatience at any point in time is the sum of the degree of decreasing impatience and the discount rate at that point in time:

$$DRI(t) = P(t) + \delta(t), \quad \text{for all } t. \quad \blacksquare$$

*Corollary 2.* Decreasing impatience implies decreasing relative impatience. In other words,  $P(t) \geq 0$  implies  $DRI(t) \geq 0$ .  $\blacksquare$

This section finishes with the concept of spread-seeking introduced by Rohde (2009). Consider a decision maker who receives a reward at two different dates. If the decision maker wants to speed up the early receipt and delay the late receipt by the same temporal interval, we say that he/she is spread-seeking because he/she is increasing the spread of the two benefits:

*Definition 11.* Preferences  $\succeq$  satisfy spread-seeking if, for all  $\gamma > 0$  and all  $0 \leq s < t$ ,  $0 < \tau \leq s$ :

$$(\gamma, s - \tau; \gamma, t + \tau) \succeq (\gamma, s; \gamma, t).$$

Spread-seeking can be characterized as follows:

*Theorem 5.* Preferences  $\succeq$  satisfy spread-seeking if and only if  $F$  is convex.  $\blacksquare$

#### 4. Conclusions

This paper starts from the classical model of DU proposed by Samuelson (1937). Despite the fact that this model has been used in intertemporal choice, several recent studies have contributed empirical evidence which contradicts its principles, giving rise to the so-called anomalies in intertemporal choice. One of them is inconsistency, because people often display preference reversal as time passes. Thus, numerous alternative models have been studied over the years, such as hyperbolic discounting.

In order to tackle the inconsistency, we introduce the concept of impatience corresponding to a time interval. We observe that, as  $F$  is strictly decreasing, the decision maker is always impatient. However, as time goes by, the preferences may change; in other words, the impatience may increase or decrease. This behavior is called time inconsistency. Therefore, in this paper we study the variation of impatience, more specifically decreasing impatience. To do this, we introduce the instantaneous discount rate,  $\delta(t)$ , and its relation with decreasing impatience. In the same way, we propose the ratio of two instant discount rates, which we call the instantaneous variation rate,  $v(s, t)$ , for  $s < t$ , as an indicator of decreasing impatience (Cruz and Muñoz, 2001). From these results, we deduce that the convexity of the logarithm of the discount function is a strong condition for decreasing impatience.

We show different measures of time inconsistency which different authors have proposed in recent years. We highlight the following behavioral economists: Prelec, Rohde and Takahashi. The main measure was given by Prelec (2004) who considered that

the degree of decreasing impatience is indicated by the convexity of the logarithm of the discount function. The drawback of this result is the difficulty to measure it, so we have shown three tools which approximate to Prelec's measure. Rohde (2010) derived the hyperbolic factor starting from an indifference pair, from which increasing impatience, moderate decreasing impatience and strongly decreasing impatience are defined. Moreover, we offer an example where we can observe a discount function changing from moderate to strongly decreasing impatience. Alternatively, Rohde (2015) provided another measure of decreasing impatience which approximates to Prelec's result: the DI-index. This tool is an improvement on the hyperbolic factor because it can be computed for people exhibiting strongly decreasing impatience. In the same way, Attema *et al.* (2010) proposed replacing the convexity of the logarithm of the discount function by the convexity of a curve which is directly observable.

On the other hand, Takahashi (2007) introduced the  $q$ -exponential discount function and the connection between the parameter  $q$  and the measure of the inconsistency in intertemporal choice. Rohde (2009) introduced some new concepts related to the study of time inconsistency: decreasing relative impatience and spread-seeking. The degree of decreasing relative impatience is defined as the degree of convexity of the discount function, and we highlight the result which relates this degree to the discount rate used in Prelec's measure.

Although this paper is focused on the field of behavioral finance, where the importance of time inconsistency has been highlighted by several authors (Hardisty and Pfeffer, 2017; Sedghi and Gerayli, 2015; and Imas, 2016), Section 1 has stressed the importance of this topic in the context of marketing and managerial decisions. We conclude by listing the main contributions of this paper. First, the importance of the concept of the instantaneous variation rate, represented by  $v(s,t)$ , to facilitate relating Prelec's measure with Rohde's parameter. Second, the establishment of a necessary (not sufficient) condition which allows us to know if the decreasing impatience is moderate or strong for a limited range of values, namely  $\delta(t) \geq (\delta(1)/t)$  for  $t \geq 1$ . Third, the calculation of the poles of the function  $H(s,t,\tau)$  to know whether a discount function changes from moderate to strongly decreasing impatience (or vice versa). Fourth, the generalization of the  $q$ -exponential discount function to the joint interval  $(-\infty, 1) \cup (1, +\infty)$ , increasing the range of possible inconsistencies. Fifth, the statement of a necessary condition for a decision maker being spread-seeking has been included.

A limitation of this paper is the lack of empirical evidence to support the obtained theoretical results. Thus, our future research is addressed to the design of a survey to analyze the degree of inconsistency in intertemporal choice, using the most suitable measures.

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#### **Further reading**

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# Do work-life balance practices mediate in the relationship between female participation and financial performance?

Work-life  
balance  
practices

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## Abstract

**Purpose** – The purpose of this paper is to analyse the relationship between the participation of women in companies with financial performance. However, this relationship does not arise directly. The authors argue that the participation of women in the company's staff has a positive effect on the creation of work-life balance (WLB) practices, due to women have traditionally assumed family responsibilities, and subsequently these practices positively affect financial performance. WLB practices are a tool to balance employees' professional and personal goals.

**Design/methodology/approach** – This study aims to determine whether WLB practices mediate in the relationship between female participation in the workforce and financial performance on large companies listed in the Spanish Stock Exchange Index during the period from 2008 to 2013.

**Findings** – The main finding is that female participation in the workforce positively affects to the availability of WLB practices, but WLB practices are not a mediator to increase financial performance.

**Originality/value** – The study is a new contribution for academics and practitioners, since the WLB has a role of moderating variable; and the positive joint effect of female participation and WLB practices is tested over the company's outcomes, instead of over the individual employee behaviour like in previous literature. In addition, this effect is studied in a country with economic recession where corporate WLB practices have increased in the last decade.

**Keywords** Mediation, Financial performance, Female workforce, Work-life balance

**Paper type** Research paper

## Introduction

According to the International Labor Organization report, although the share of women in the labour force, which reaches rates close to 50 per cent, is still lower than the share of men (approximately 76 per cent), this follows an increasing trend that is slowed down by the additional responsibilities that this segment assumes. The working days of women are still longer than those of men, because “women continue to take on most of the care tasks and unpaid housework, which limits their ability to increase their hours in paid and formal employment” (International Labor Organization, 2016). All the above give rise to situations in which family interferes with work (FIW), or when they assume more responsibilities in their work, also can be possible that work interferes with family (WIF) (Allen and Finkelstein, 2014).

A work-life conflict (WLC) situation causes negative outcomes in the employee, such as decrease in satisfaction at work (Bruck *et al.*, 2002), increase of stress levels

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(Schieman *et al.*, 2003), the possibilities of higher turnover (Balmforth and Gardner, 2006; Barrah *et al.*, 2004; Wang *et al.*, 2004), absenteeism (Grzywacz and Marks, 2000; Boyar *et al.*, 2005; Lu *et al.*, 2008), low productivity and lack of commitment (Lambert *et al.*, 2006; Rothbard *et al.*, 2005; Siegel *et al.*, 2005). In order to resolve the WLC, managers could implement family-friendly practices into the strategy of the firm, known as practices of work-life balance (WLB), which emerged to balance work and personal demands and to avoid the loss of the high qualified employees.

WLB practices, defined as “those institutionalized structural and procedural arrangements as well as formal and informal practices that enable individuals to easily manage the conflicting worlds of work and family leaves” (Kar and Misra, 2013), help reduce FIW and WIF. In addition, academic literature cites benefits derived from the implementation of WLB practices such as increased satisfaction, retention of talent, or increased worker commitment among others. This work helps to understand whether the WLB practices (besides helping to improve the individual perceptions of the workers) can cause a positive effect on final outcomes of the companies, like the financial performance.

Increasing profitability through practices derived from human resources management is not a simple objective, since the manager must consider economic, social and cultural changes (Poelmans, 2005). These changes in the environment have implications for human resources management due to its impact on the personal and labour role of the employee. For example, when the environmental conditions become particularly difficult for companies, managers demand employees committed to the company and a high degree of dedication to work during the day (Hughes and Bozionelos, 2007; Hyman *et al.*, 2003), creating conflict by pressures from work domains to family domains.

Most of the literature about WLB practices is focussed on Northern Europe or North America (Idrovo Carlier *et al.*, 2012). However, research about WLB is not enlightening in other countries with different legal, cultural, economic and political conditions (Poelmans, 2005), such as countries of the south of Europe or Latin American countries. For example, Spain has been for other EU countries a model for job creation in the period of economic boom that preceded the outbreak of the financial crisis at the end of 2007, and the opposite during the economic crisis with job destruction (from an unemployment rate of 10.53 per cent in early 2005 to 22.56 per cent at the end of 2011).

Therefore, this paper aims to analyse whether female participation in the workforce affects positively to implement WLB practices in firms. Second, this study aims to contrast whether WLB practices act as a mediator of the relationship between female participation in the workforce and corporate financial performance, in a context where women frequently assume a traditional role, and the country’s culture does not favour many family-friendly measures. The Spanish context, being part of the same cultural cluster as Portugal or Latin American countries, represents this case. We have composed a sample of large companies listed in the Spanish Stock Exchange (SSE), specifically in the Ibex-35 index, because they represent more than 95 per cent of the total capitalisation. The evolution of this index is the basic reference for the SSE nationally and internationally.

### **Balance between personal and work life**

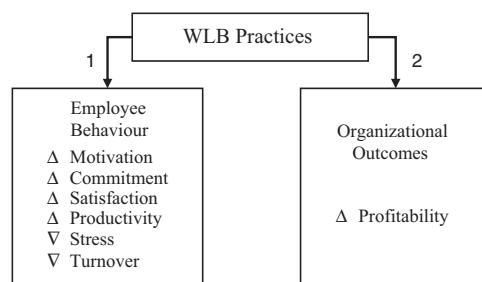
WLB practices are a subject of interest in the management of human resources, as their usefulness for companies has been debated by academics and practitioners. The research conducted about the effects of WLB practices can be classified according to two lines of research (see Figure 1) (Adame-Sánchez and Miquel-Romero, 2012). First, there are studies that analyse the consequences or impact of WLB practices on individual behaviours (such as attitudes of workers). This is the research line that gathers most of the studies of the academic literature about WLB. The changes that the use of WLB practices may



produce in the employee (individually) can be physical or psychological. These changes in the employee may have positive consequences for the development of personal and professional life, and finally, they may be the cause of enhancement of employee performance (Adame-Sánchez and Miquel-Romero, 2012). Many studies developed in this line of research confirm that WLB practices increase staff loyalty and commitment, job satisfaction and productivity, as well as a reduction of absenteeism, sick days, tardiness, turnover intentions, or stress at work, among others (Lobel, 1999; Dex and Scheibl, 2000; Glass and Finley, 2002; Carrasquer and Martín, 2005; Hughes and Bozionelos, 2007; Albert *et al.*, 2010). This literature on WLB focusses on the improvement of skills or behaviours of employees as a way to enhance organisational results than those obtained before the implementation of WLB practices.

The second line of research, considerably less studied than the first one, brings together the scarce evidence that analyse the relationship between WLB practices and organisational performance. Authors like Carrasquer and Martín (2005) support that WLB practices are a source of competitive advantages for the company, and more specifically, the study of Konrad and Mangel (2000) demonstrates how WLB practices are predictors of the company's performance. However, due to the shortage of papers in this line, the impact of WLB practices on organisational performance remains unclear in the current literature (Meyer *et al.*, 2001; Ngo *et al.*, 2009), and the inconclusive findings about the impact of these practices in the firm's profitability highlights the need to develop new contributions (Bardoel *et al.*, 2008). In Spain, a growing number of companies have implemented WLB practices in response to demands of employees in the last decade (Albert *et al.*, 2010), but the study on the potential impact of such practices on firm performance is in a nascent stage, becoming into an object of attention and debate (Mañas and Garrido, 2008). The difficulties of the employee to balance the time dedicated to working and personal lives are influenced by demographic, cultural and economic changes in their environment.

The main socio-demographic change that has caused the greatest impact on the labour market has been the incorporation of women into it. Women have traditionally assumed family responsibilities, without sharing them with men. Some authors claim that the labour role is added to other roles that women traditionally was performing, and this has hampered their opportunities to reconcile work and family in a more difficult way than men do it (Forma, 2009). Besides, there are other socio-demographic changes in families, such as the division of family and domestic responsibilities between couples, couples with children where both parents develop a labour career, the increase of single parenting, fathers heavily involved in parenting, the employees seeking a better quality of life and the necessity to take care of elderly people (De Luis-Carnicer *et al.*, 2004; Cánovas *et al.*, 2005; Hughes and Bozionelos, 2007). However, women are still with the highest burden of family and domestic responsibilities.



**Figure 1.**  
Two lines of research  
about the effects of  
WLB practices

Furthermore, cultural aspects have had a prominent role in the development of WLB practices in different regions. In this regard, Spain has extra difficulties to balance work and family time due to its long school holidays, long working days (typically from nine till eight with a long lunch break) and limited existence of part-time work arrangements (Macinnes, 2005). According to data from the European Commission, Spain has more than 18m employees, and only 2.5m have a part-time job (average data for the period 2008–2013), of which 76.53 per cent are women. If we analyse the part-time jobs of workers who have children, 93.12 per cent are women and 6.92 per cent men (see Table I).

Moreover, Spanish firms have taken a long time to support family-friendly culture, possibly as a consequence of customs and established traditions (Cegarra-Leiva *et al.*, 2012a), and indeed, Spain has the lowest financial aid to families with children in the European Union (De Luis-Carnicer *et al.*, 2004; Cegarra-Leiva *et al.*, 2012b). The northern European countries, among which stands Norway, are considered to give more importance to the support of WLB practices (Seierstad and Kirton, 2015). Compared with other European countries, the Spanish culture stands as one in which the family is considered a strong institution but also where the participation of women in the labour market continues to rise (De Luis-Carnicer *et al.*, 2004). In Spain, the visibility of the role of women and the growth of female participation rates in the company have been supported by gender policies. The Organic Law for effective equality of women and men came into force in 2007. It becomes clear that this cultural context is quite different from those represented in previous research about WLC and WLB (De Luis-Carnicer *et al.*, 2004). The academic literature review developed by Poelmans (2001) on the field of WLB noted the absence of empirical studies conducted for Spanish companies.

Finally, economic changes can be an important factor to determine if firms develop WLB practices or if the economic situation allows employees to use them. According to Hyman *et al.* (2003) and Grau-Grau (2013), the economic crisis and the perceived insecurity in the labour market increase the continual presence of employees at the workplace as a way to demonstrate their commitment. From 2008 to the present time, the countries of southern Europe have been suffering high unemployment rate. Besides, the labour law in Spain was changed to allow a more flexible policy of recruitment and redundancy, which has resulted in an increase of temporary jobs and the reduction of permanent work contracts (Valle *et al.*, 2001). This situation has created insecurity in the labour market and less demanding employees. The economic crisis in Spain has exacerbated the complexity of balancing work and personal life, because it had a negative impact on the control and autonomy that Spaniards had of their jobs; diminishing the level of flexibility at work, and increasing the level of stress (Grau-Grau, 2013).

| Year           | Total household composition |           |             | Single adult with children |           |             |
|----------------|-----------------------------|-----------|-------------|----------------------------|-----------|-------------|
|                | Total                       | Males (%) | Females (%) | Total                      | Males (%) | Females (%) |
| 2008           | 2,428.9                     | 20.85     | 79.15       | 35.2                       | 11.93     | 88.35       |
| 2009           | 2,526.4                     | 21.32     | 78.67       | 43.0                       | 5.12      | 94.88       |
| 2010           | 2,460.1                     | 21.74     | 78.26       | 64.5                       | 7.91      | 92.09       |
| 2011           | 2,612.0                     | 24.36     | 75.64       | 57.2                       | 4.37      | 95.63       |
| 2012           | 2,626.0                     | 25.30     | 74.70       | 74.8                       | 8.42      | 91.58       |
| 2013           | 2,793.1                     | 27.23     | 72.77       | 100.3                      | 3.79      | 96.21       |
| Average        | 2,574.4                     | 23.47     | 76.53       | 62.5                       | 6.92      | 93.12       |
| Evolution rate |                             | 30.57     | −8.05       |                            | −68.25    | 8.90        |

**Table I.**  
Employed persons  
working part-time  
in Spain

**Note:** Employed population between 15 and 64 years (in thousands)

**Source:** Eurostat – Number of persons by sex, age groups, household composition and working status

### Can WLB practices be a mediator between women in the workforce and organisational outcomes?

The female participation in the workforce has been considered in academic literature as an important aspect to research about. Academic literature mentions competitive advantages derived from the female participation in the workforce, that in this work have been classified in three epigraphs. First, advantages derived from individual job performance based on a female style. Second, advantages derived from the creation of work teams with greater gender diversity. Finally, advantages derived from what the participation of women in the company represents for other employees and external stakeholders:

- (1) In the performance of their work, women are characterised by being more likely to consider social causes within the company (charitable donations) (Williams, 2003), have a more interactive and inclusive style than men (Berry and Franks, 2010), encourage participation by sharing information and facilitating direct communication channels with their subordinates (Dezső and Ross, 2012), and they are considered less hierarchical and more cooperative than men (Eckel *et al.*, 2008).
- (2) Work teams with gender diversity also have advantages, such as enrichment of work leading to greater diversity and quality of decisions (Rogelberg and Rumery, 1996), new points of view about strategic issues (especially those relating to female consumers, employees and business partners (Daily *et al.*, 1999 in Dezső and Ross, 2012)), and greater creativity and innovation.
- (3) A higher rate of female participation in the workforce motivates other women to commit to the company and promote it. For the external stakeholders, the female participation in the company is a sign that the company is committed to the diversity of its workforce, it gives a more inclusive and respectful culture, and improves its image and reputation (Dezső and Ross, 2012).

Theoretically, the participation of women in the business world has several positive connotations that could help to obtain higher financial results (Miller and Triana, 2009). However, there is no unanimity in the results found. Authors considering that female participation can have a positive effect on FP, but argue that it is derived from other mediating variables (Dezső and Ross, 2012). In this sense, WLB could be a mediating variable of this relationship, since WLB practices are increasingly spreading to encourage and facilitate the participation of women in the workplace, and those companies with a higher percentage of women are more likely to put WLB practices at their disposal. Straub (2007) confirms in her study “European companies’ efforts to enhance a gender-equitable workplace by implementing work-life balance programmes” that WLB practices enhance the advance of women’s careers.

Glass and Estes (1997) classified common WLB practices into three categories: family and parental leave, flexible work arrangements and child and dependent care. Managers have to choose which practices are most suitable for the company and for their employees. It is important to consider that WLB practices have a cost in the short term. Some WLB practices involve an organisational cost (selecting a new employee to replace a person who has an extended leave or to manage potential conflicts between workers arising from the redistribution of work shifts to favour staff that need balance work and family time), and it is also possible a monetary cost (paid leaves, financial aids for children of employees, etc. (Matus *et al.*, 2007; Albert *et al.*, 2010).

Otherwise, WLB practices reduce costs in human resource management of absenteeism (Osterman, 1995), tardiness, turnover, recruitment (recruiting high-quality professionals or retaining their employees) (Bruck *et al.*, 2002; Lambert, 2000), or minor accidents and grievances (Havlovic, 1991; Hall and Parker, 1993; Greenhaus and Parasuraman, 1997;

Lobel, 1999; Konrad and Mangel, 2000). Family-friendly benefits can also provide a competitive advantage to businesses, for example, flexitime arrangements with employees can help organisations to maintain flexible structures to respond to changing conditions (Kossek and Ozeki, 1998).

Finally, workforce characteristics and employee demands are fundamental for the company in the decision to implement WLB practices. Pasamar and Valle (2011) highlight the following reasons to decide facilitate WLB practices: coercive pressures (pressures exerted by other organisations or by the state through the enactment of laws), mimetic pressures (giving rise to the imitation when these measures prevail in a given sector or by the perceived success of companies that have adopted them), and normative pressures (because society demands an active role of the organisations on this issue as part of their moral obligations). Therefore, whether WLB practices are enhancers of the possible positive impact that female participation in the workforce can have on the firm profitability will be a key reason to implement them by the manager (Pasamar and Valle, 2011; Cegarra-Leiva *et al.*, 2012b).

The importance of demonstrating that these social practices fulfil a social and economic purpose at the same time would be a trigger for their propagation. Due to cultural characteristics that define the labour market in Spain, the implementation of WLB practices can be a differentiating feature for companies that offer them to their employees. Therefore, two different hypotheses are suggested to be tested in this paper:

*H1.* Female participation in the workforce has a positive influence to make available WLB practices on the firm.

*H2.* WLB practices mediate the relationship between female participation in the workforce and firm financial performance.

To test whether the firm performance could be explained through WLB practices and female participation in workforce, we considered the main control variables that have been justified in previous studies. The following variables were measured using public available information to increase the chances to compare this study in future periods.

#### *Size*

The literature review confirms that size can have a positive impact on performance, so it is considered as a control variable. The resource theory advocates that large firms have more resources than small firms to implement singular strategies that allow them to obtain competitive advantages (Barney, 1991). Also a greater size can benefit the company through economies of scale (Osterman, 1995) or they can have a greater market share.

#### *Strategy of differentiation*

Companies adopt a differentiation strategy to make their products stand out against the competitors, in order to retain customers and achieve a supplement on the price of their products. Previous studies concluded that the higher financial effort to differentiate its products or services, the greater the benefit obtained from their activities, exerting a positive effect on the financial results (Fernández and Luna, 2007; Miller and Triana, 2009).

#### *Debt*

The debt variable is necessary in this analysis because it indicates available financial resources in the company. The higher the debt, the higher the risk assumed by the company and less capacity to invest in socially responsible practices (Roberts, 1992).

### Sector of activity

The sectorial differentiation among the companies of the sample is a factor that must be considered for empirical testing, since the sector of business activity establishes intersectional features, such as the competitiveness of each sector, the degree of monopoly, and differences in demand or asset specificity among others. According to the academic literature, the sector of activity influences the profitability of firms (Calvo and Martínez, 2004). There are also sectorial differences in the level of awareness with WLB policies. According to the findings of Albert *et al.* (2010), Spanish companies belonging to financial sectors and consumer goods (food, pharmaceutical and cosmetic) are more likely to develop such practices.

### Methodology

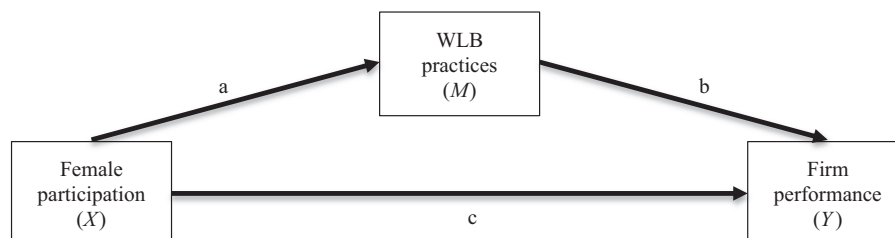
The proposed model examines the mediator effect of WLB practices on the relationship between female participation and the profitability of the firms listed in the Spanish Ibex-35 index during the financial crisis period. Mediation models have one independent variable, one mediator and one final outcome variable. In this case, the effect of female participation ( $X$ ) on financial performance ( $Y$ ) can be divided into two effects: the indirect effect  $ab$ , which is the product of the direct effects  $a$  and  $b$ , and the direct effect  $c$  (see Figure 2).

To test  $H1$  and  $H2$  we follow the methodology to analyse the mediator effect proposed by Baron and Kenny (1986) and Miller and Triana (2009) with four sequential steps through multiple linear regressions estimated by ordinary least square with the software SPSS. Below, the four steps for our model are detailed:

- Step 1: female participation on workforce has to be correlated with FP;
- Step 2: female participation on workforce should be significant to explain WLB;
- Step 3: WLB must influence FP while controlling female participation on workforce; and
- Step 4: previous relationship between Female participation on workforce and FP must be reduced in presence of WLB practices.

### Sample

In order to test the proposed model, firms listed in the Ibex-35 between 2008 and 2013 have been selected. The selection of these firms is justified because they are the companies with the greatest capitalisation (more than 95 per cent of the total capitalisation) of the SSE, and the evolution of the index is the reference of Spanish stock market. To support this argument, academic literature confirms that large firms (like the firms listed in Ibex-35) are “more likely to have engaged in CSR activities” (Husted and Allen, 2007) in a formal or an informal way (Melé *et al.*, 2006); because they have to respond to the demands of a large number of stakeholders (Martínez *et al.*, 2016), and they have more resources than small firms (Barney, 1991; Osterman, 1995). Besides, the fact that all these firms are exposed to



**Figure 2.**  
Pathway of a  
mediation process of  
the relationship  
between Female  
participation in  
workforce and  
firm performance

similar conditions (regulations, legislations and law) make possible the creation of a homogeneous sample.

Table II presents the companies of the Ibex-35 index that have available information about the measure of WLB according to the sector classification. Finally, the sample is composed of 160 observations regarding the Ibex-35 companies in the period from 2008 to 2013.

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### *Data collection*

In order to increase the usefulness of this study for the decision making process by human resources managers with respect to WLB practices, a measure of profitability based on accounting has been used. Return on assets is used as a proxy variable of profitability (Fernández and Luna, 2007). This measure is widely used in the management field, and therefore easily accessible. WLB practices variable is measured by the WLB index developed by the observatory for corporate social responsibility of the trade union UGT (General Union of workers) in collaboration with the Research Group on Corporate Social Responsibility at the University of Valencia. The information of this Observatory has been previously used in several studies (Gil-Estallo *et al.*, 2009; Prósper and Reche, 2011; Coller *et al.*, 2014; Odriozola and Baraibar-Diez, 2017). This index is published in the report called "Cultures, Policies and Practices of Corporate Social Responsibility (CSR) of Ibex-35 companies" disclosed on the web page of the Observatory (see Observatory for Corporate Social Responsibility – UGT). The WLB index is based on the normative standards of social assessment processes which express the aspirations for quality and progress of the European social model (European Commission, 2001). Furthermore, considering the most

|  |   |   |
|--|---|---|
| Oil and energy                           | Electricity and gas   | Enagas SA<br>Endesa SA<br>Gas Natural SDG SA<br>Iberdrola SA<br>Red Eléctrica Corporación SA  |
| Raw materials, industry and construction | Oil<br>Engineering<br>Mineral, metals and transformation  | Repsol SA<br>Abengoa SA<br>Acerinox<br>Acciona SA<br>ACS SA<br>Ferrovial SA<br>Fomento de construcciones y contratas SA<br>Obrascon Huarte Lain SA<br>Sacyr Vallehermoso SA             |
| Consumer goods and services              | Electronics /Software<br>Capital goods<br>Textile /Apparel /Footwear<br>Highways /Parking<br>Media and advertising<br>Technology and telecommunications | Indra sistemas SA<br>Gamesa Corporación Tecnológica SA<br>Industria de diseño textil SA<br>Abertis infraestructuras SA<br>Mediaset España comunicación S.A.<br>Amadeus<br>Telefónica SA |
| Financial and property                   | Investment services   | Banco Popular<br>Banco Sabadell<br>Banesto<br>Bankinter<br>BBVA<br>Caixabank<br>Mapfre<br>Santander   |

**Table II.**  
Ibex-35 companies  
analysed



applied practices for Spanish firms, either by cost or by its utility, according to the study of Albert *et al.* (2010) and Cegarra-Leiva *et al.* (2012b), this index measures the performance of the following actions: short working day, part-time work, flexible working hours and maternity leave in excess of the legal minimum. The information published in CSR reports (considering CSR: “the firm’s consideration of, and response to, issues beyond the narrow economic, technical and legal requirements of the firm in order to achieve social benefits, along with the traditional economic profits that the company seeks” (Davis, 1973)) is subjected to an evaluation process to verify whether the company implements the measures included in the index. If an analysed company informs about the availability of four measures it obtains the maximum score (33 points), three measures is a satisfactory level (25 points), two measures is a sufficient level of development (14 points) and one measure is insufficient (7 points). In addition, in the same report where the WLB practices index is collected, we can obtain the percentage of women over the total number of firm’s employees for the IBEX 35 companies, which serve to measure the female participation on the workforce.

The measures used for the control variables included in the model are described below. Total assets was used as a measure of size (Griffin and Mahon, 1997; Brammer and Millington, 2006; Mahoney and Roberts, 2007). The variable strategy of differentiation was measured using a proxy, the ratio of advertising and R&D expenses divided by the net sales of the company. Explicit data for the advertising and R&D expenses of each company or sector could not be obtained, so following the measure taken by Fernández and Luna (2007) we estimate these costs from the other operating costs entry in the company accounts, which covers these expenses. The ratio used to measure the level of debt of a company, and therefore the risk, is the total long-term debt divided by total assets (Mahoney and Roberts, 2007). Sector activity was represented by dummy variables. Sector 1 takes value 1 if the company belongs to the sector Oil and Energy, otherwise 0. Sector 2 takes value 1 if the company belongs to the sector Raw materials, industry and construction, otherwise 0. Sector 3 takes value 1 if the company belongs to the sector Consumer goods and services, otherwise 0. The Financial and Property sector is the omitted category in the regressions because of the dummy variable trap. The sector variable follows the sector classification defined by the Madrid Stock Exchange. The dependent variable, size, debt and the data used to obtain the differentiation strategy were obtained from the accounts of each firm using the SABI database.

## Results

These results were computed using the statistical software IBM SPSS Statistics Version19. Table III shows how female participation on workforce has a positive

| Variables                             | Mean     | SD      | 1        | 2        | 3         | 4         | 5        | 6 |
|---------------------------------------|----------|---------|----------|----------|-----------|-----------|----------|---|
| <sup>a</sup> FP (%)                   | 8.64     | 47.05   | 1        |          |           |           |          |   |
| <sup>b</sup> WLB                      | 28.35    | 6.56    | 0.022    | 1        |           |           |          |   |
| <sup>c</sup> Size (thousands €)       | 8.34e+07 | 2.35    | 0.008    | −0.056   | 1         |           |          |   |
| <sup>d</sup> Debt (%)                 | 44.30    | 30.34   | −0.164** | −0.067   | −0.419*** | 1         |          |   |
| <sup>e</sup> Strategy of Differe.     | 0.961e+6 | 2.36e+6 | −0.012   | −0.075   | 0.909***  | −0.311*** | 1        |   |
| <sup>f</sup> Female participation (%) | 35.55    | 15.09   | 0.163**  | 0.241*** | 0.318***  | −0.405*** | 0.357*** | 1 |

**Notes:** The above variables are measured as follows: <sup>a</sup>Return on assets (%). <sup>b</sup>WLB Index (0-100). <sup>c</sup>Total Assets (thousands of euros). <sup>d</sup>Ratio: total long-term debt/total assets. <sup>e</sup>Ratio: R & D and advertising expenses/Net sales. <sup>f</sup>Percentage of women over the total number of firm’s employees. \*, \*\*, \*\*\*Significant at 90, 95 and 99 per cent levels, respectively

**Table III.**  
Means, SD and  
Pearson correlations  
coefficients

correlation with corporate financial performance, and Table IV shows that female participation is significant at the level of 95 per cent in the regression to explain the financial performance (as dependent variable). Then, the expected relationship between these variables according to the academic literature is corroborated, and it complies with Step 1 of the Sequential analysis.

The regressions developed to test the following steps are showed in Tables V and VI. Female participation is significant at level of 95 per cent to explain WLB practices, fulfilling the requirement of step 2 in the sequential steps for the mediating model. In addition, the *H1* ("Female participation in the workforce has a positive influence to make available WLB practices on the firm") of this study is confirmed.

Finally, the results obtained in the regressions for models 3 and 4 (see Table VI), show that WLB practices has not a significant effect on financial performance. So, the second hypothesis (*H2*) is rejected. In addition, the steps 3 and 4 were not fulfilled in the statistic sequential analysis.

**Table IV.**  
Results of regression:  
female participation in  
workforce on financial  
performance

| Linear Regression – Data estimation       |                      | Model 1                  |                 |
|---|----------------------|--------------------------|-----------------|
| Dependent variable: financial performance | $\beta$ standardized |                          | <i>p</i> -value |
| <i>Control variables</i>                  |                      |                          |                 |
| Size                                      | 0.195                |                          | 0.322           |
| Strategy                                  | –0.370               |                          | 0.050**         |
| Debt                                      | –0.378               |                          | 0.002***        |
| Sector 1                                  | 0.599                |                          | 0.000***        |
| Sector 2                                  | 0.443                |                          | 0.005***        |
| Sector 3                                  | 0.460                |                          | 0.000***        |
| <i>Independent variable</i>               |                      |                          |                 |
| Female participation                      | 0.300                |                          | 0.012**         |
|   |                      | $R = 0.513$              |                 |
|   |                      | $R^2$ adjusted = 0.225   |                 |
|   |                      | $F = 6.835$ sig. = 0.000 |                 |

**Notes:** \*, \*\*, \*\*\*Significant at 90, 95 and 99 per cent levels, respectively

**Table V.**  
Results of regression:  
female participation in  
workforce on WLB

| Linear Regression – Data estimation |                      | Model 2                 |                 |
|-------------------------------------|----------------------|-------------------------|-----------------|
| Dependent variable: WLB practices   | $\beta$ standardized |                         | <i>p</i> -value |
| <i>Control variables</i>            |                      |                         |                 |
| Size                                | –0.261               |                         | 0.211           |
| Strategy                            | 0.069                |                         | 0.727           |
| Debt                                | 0.103                |                         | 0.425           |
| Sector 1                            | 0.211                |                         | 0.125           |
| Sector 2                            | –0.043               |                         | 0.795           |
| Sector 3                            | –0.178               |                         | 0.131           |
| <i>Independent variable</i>         |                      |                         |                 |
| Female participation                | 0.519                |                         | 0.000***        |
|                                     |                      | $R = 0.169$             |                 |
|                                     |                      | $R^2$ adjusted = 0.126  |                 |
|                                     |                      | $F = 3.928$ sig = 0.001 |                 |

**Notes:** \*, \*\*, \*\*\*Significant at 90, 95 and 99 per cent levels, respectively



| Linear Regression – Data estimation       |                          |                 |                          |                 |
|---|--------------------------|-----------------|--------------------------|-----------------|
| Dependent variable: financial performance | Model 3                  |                 | Model 4                  |                 |
|   | $\beta$ standardized     | <i>p</i> -value | $\beta$ standardized     | <i>p</i> -value |
| <i>Control variables</i>                  |                          |                 |                          |                 |
| Size                                      | 0.211                    | 0.298           | 0.184                    | 0.354           |
| Strategy                                  | –0.359                   | 0.062*          | –0.367                   | 0.052*          |
| Debt                                      | –0.415                   | 0.001**         | –0.374                   | 0.002**         |
| Sector 1                                  | 0.427                    | 0.000***        | 0.608                    | 0.000***        |
| Sector 2                                  | 0.290                    | 0.051**         | 0.441                    | 0.005**         |
| Sector 3                                  | 0.510                    | 0.000***        | 0.452                    | 0.000***        |
| <i>Mediator</i>                           |                          |                 |                          |                 |
| Work-life balance                         | 0.028                    | 0.723           | –0.043                   | 0.600           |
| <i>Independent variable</i>               |                          |                 |                          |                 |
| Female participation                      |                          |                 | 0.322                    | 0.011**         |
|   | $R = 0.228$              |                 | $R = 0.265$              |                 |
|   | $R^2$ adjusted = 0.180   |                 | $R^2$ adjusted = 0.220   |                 |
|   | $F = 5.654$ sig. = 0.000 |                 | $F = 5.983$ sig. = 0.000 |                 |

Notes: \*, \*\*, \*\*\*Significant at 90, 95 and 99 per cent levels, respectively

**Table VI.**  
Results of regression:  
WLB as mediator of  
female participation in  
workforce and firm  
performance  
relationship

Table VII summarises the relationships found between the main variables considered to test the mediating effect through a sequential step model from the results found in the various linear regressions. Steps 1 and 2 verified what was expected in *H1*. The female participation in the company contributes to increase the entrepreneurial business value, and also explains that the company make available more WLB practices. However, steps 3 and 4 are not fulfilled, since WLB practices are not significant to explain greater financial performance.

### Discussion, conclusion and implications

This research focusses on clarifying whether WLB practices mediates in the relationship between female participation on workforce and financial performance. According to the results obtained, the mediating effect is not confirmed because the relationship between WLB practices and profitability cannot be significant for the period studied. Meyer *et al.* (2001) analyse the impact of different WLB practices on the profitability of the company, and they concluded that not all practices have a significant positive effect on corporate profitability.

Motivational theories support that only when employees have their basic needs covered they will be concerned about the highest needs. So, the lack of job security perceived by the employee during the period studied in the Spanish market could explain the absence of significant correlations between WLB practices and profitability in a period of economic recession. In an environment of economic instability, where the risk of unemployment is higher, employees may feel more concerned about meeting their basic needs, rather than

|           |                                       | Estimate   | Z      |
|-----------|---------------------------------------|--|--------|
| ✓ Step 1: | $X \rightarrow Y: = c$                | Female participation $\rightarrow$ Financial performance | 0.300  |
| ✓ Step 2: | $X \rightarrow M: = a$                | Female participation $\rightarrow$ WLB practices         | 0.519  |
| ✗ Step 3: | $M \rightarrow Y: = b$                | WLB practices $\rightarrow$ Financial performance        | 0.028  |
| ✗ Step 4: | $X \rightarrow M \rightarrow Y: = ab$ | WLB practices $\rightarrow$ Financial performance        | –0.043 |
|           |                                       | Female participation $\rightarrow$ Financial performance | 0.322  |

Notes: \*, \*\*, \*\*\*Significant at 90, 95 and 99 per cent levels, respectively

**Table VII.**  
Summary of the  
mediating model in  
sequential steps

voluntary practices in WLB. The European Foundation for the Improvement of Living and Working Conditions (2010) affirms that the economic downturn is likely to lead to increased job insecurity and work intensification, being contrary to the will of the companies that support current family responsibilities to improve the quality of jobs (Kossek *et al.*, 2010).

Another possible explanation for this result may be that WLB practices were more valued by workers at the first years of their implementation. They were innovative practices and sign of differentiation among firms, and over time, those practices are more common and they have less impact on employees' behaviour. In the sample in this study, the average value given to the WLB practices index is 28.35, and there are no significant differences among sectors. This aspect can be justified by the Institutional Theory (Acosta *et al.*, 2007; Martínez *et al.*, 2016), according to which companies adopt forms of behaviour or policies to respond to the demands of their stakeholders because their competitors are also carrying them out, and consider it a way to legitimise their activity socially. All this leads them to reach a similar level or status. Taking the above into account, making available more WLB practices than the competitors could be still a way to differentiate. This explanation is supported by Huselid (2003), who confirms the positive impact of high performance work practices in corporate profitability, but states that the positive impact loses effect gradually in the long term. This argument is based on traditional economic theory, because the returns on investment in a differentiating asset, such as WLB practices in the context of the Spanish business, tends toward equilibrium as more and more companies invest into it. Instead, the participation of women in the workforce shows greater divergence. The average percentage of women in IBEX 35 companies is 35.5, although there are sectors that show greater gender inequality than others. Sectors 1 and 2 have an average of 24.51 and 26.40, respectively; while sectors 3 and 4 reach 49.74 and 48.05, respectively. The participation of women is higher in service sectors with customer service tasks, as opposed to more traditional sectors (energy and construction).

The results of the present study have practical and academic implications. The participation of women in the workforce is a powerful tool, due to the competitive advantages derived from the gender diversity in the firm, but WLB practices in similar stage to competition could not cause a substantial variation in profitability in the short term. Furthermore, the results of this study could serve as a reference for countries with a similar culture. Historically between the Iberian countries (Spain, Portugal and the nations of Latin America) there have been strong cultural ties, highlighting issues such as the political and cultural legacy, language, religion or lifestyle (Idrovo Carlier *et al.*, 2012). Comparative studies about the culture and support of WLB practices in the workplace for Spanish and Latin American companies (Idrovo Carlier *et al.*, 2012) stand out that in Latin America, the number of companies supporting WLB is slightly higher than for Spain, with the singularity that Latin Americans are more sensitive with family responsibilities (with practices such as holiday calendars or permits) but the implementation of WLB practices is less formal.

Other authors such as Maxfield (2005) notes that in Latin American culture, because of the high roots of family responsibilities, women find obstacles to promote or be part of the senior management of the company (while globally 40 per cent of the management positions are held by women in the case of Latin America up 25 per cent, and only an average of 15 per cent is part of the senior management of companies), and as in Spain, WLB practices are at a nascent stage.

This work also has limitations. WLB index is based on the evaluation of the disclosure of information that companies publish in their corporate social responsibility reports about WLB practices, so we do not know if these practices are being used or not by employees. Nevertheless, many studies argue that the mere availability of WLB practices, even if the employees do not make use of them, have a positive effect on the results of the organisation (Scandura and Lankau, 1997; Cegarra-Leiva *et al.*, 2012b). Future studies could analyse

the impact on financial performance of indicators that demonstrate the use of WLB practices (number of extended leaves, duration of maternity and maternity leave, jobs developed through teleworking, etc.). Finally, considering the nascent stage of this line of research, there are many possibilities and new opportunities for future contributions. In this sense, it would be interesting to differentiate the role of female participation by category, department or power in the firm, to know whether there are differences in the implementation of WLB practices depending on those variables. In addition, a sample collected during more years could analyse whether WLB practices need a long-term period to impact on organizational outcomes.

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# Analysis of the behaviour of the clients assisted and sales variables in the different phases of the product life cycle

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## Abstract

**Purpose** – The Bass model was created to analyse the product life cycle (PLC) in order to help sales and marketing departments in their business decision making. The purpose of this paper is to analyse the differences between the clients assisted and sales variables, to discover which of the two variables is the more useful for the estimation of the PLC phases through the Bass model, thus aiding the managers of company sales and marketing departments.

**Design/methodology/approach** – In this research, the authors analysed the 223,577 clients assisted by a nationwide network of car dealerships, who acquired 36,819 vehicles, during a 24-month period. In the analysis, the Bass model was applied to define the PLC phases; and nonlinear regression models were used to carry out the estimations.

**Findings** – The results show that more consistent estimates of the PLC phases are obtained from the clients assisted variable. This work has theoretical and practical implications that can help business management.

**Research limitations/implications** – The most remarkable thing about this research is that we have shown that the functionality of the clients assisted variable is greater than the sales variable for the Bass model and, therefore, for PLC estimation.

**Practical implications** – The results of this research are very useful, since they allow marketing decision makers to obtain more consistent estimations of the PLC phases using the Bass model and the clients assisted variable. This is based on the fact that the use of this variable helps to detect if there is any deficiency in the design of the marketing strategy when the client does not make the purchase.

**Social implications** – The data on clients assisted are as easily available to companies as sales data. However, the use of this variable improves PLC analysis and this allows an improvement in company forecasting. Thus, making the clients assisted variable a tool to strategically plan investments in innovation and marketing would reduce uncertainty in business management.

**Originality/value** – The purpose of this paper is to analyse the differences between the clients assisted and sales variables, to discover which of the two variables is the more useful for the estimation of the PLC phases through the Bass model, thus aiding the managers of company sales and marketing departments.

**Keywords** Consumer behaviour, Time series, Automotive, Bass model, Life product cycle

**Paper type** Research paper

## 1. Introduction

The product life cycle (PLC) is an important concept in the product marketing process, for consumer behaviour and in adapting to the changes that occur in the environment and in the competition. These changes condition the design of marketing strategies and, therefore,

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knowledge of the behaviour of the market can contribute to reduce uncertainty and improve marketing decisions (Briede-Westermeyer *et al.*, 2016, p. 622); hence, the importance of PLC analysis for marketing and sales departments. Miquel and Mollá (1982) pointed out that “the recognition of the existence of the PLC highlights the need for product innovation by companies. Therefore, an important element in planning the company’s innovation strategy is the position of its products in reference to the PLC and the form it adopts”.

PLC analysis is of utmost importance for companies, since it allows them to use forecasting as a tool to strategically plan investments in innovation and marketing; therefore, PLC knowledge and development represents a future scientific challenge. Saffo (2007) supports this ... “the art of forecasting is in identifying an S curve when it begins to emerge, well before its inflection point”. In addition, it has been proven (Qualls *et al.*, 1981; Shu *et al.*, 2015) that sales data for the most recent innovations show a progressive shortening of life cycle duration, especially of the product introduction and growth phases.

Some authors (Aguilar *et al.*, 2012, Rink and Swan, 1979, Fu, 2009) noted that PLC phases differ from the normal “S” form model widely used in the literature. Sales data, currently the commonly adopted performance measurement in PLC analysis, may not be the most consistent variable because they are affected by certain economic phenomena, such as general price increases in the economy (inflation) or by variations in relative prices (in some products in respect to others). Spain is one of the member countries of the OECD where disposable income is significantly affected by tax and redistributive policies, especially in times of expansion, where these have a strong social component (Camacho and Galiano, 2009).

In this regard, some studies (Rodríguez Escudero, 1996; Aguilar *et al.*, 2012; Muñoz Ferrer, 2008, Mahajan *et al.*, 1995) corroborated that the sales variable is not the best measurement. They argued that this is due to it being affected by economic and sociodemographic variables, as well as the evolution of complementary markets; and they point out the inadequacy of long-term PLC forecasts based on the sales variable, given the extreme sensitivity of the sales curve to initial conditions. It can be inferred from this that there is a possibility that anomalous behaviour in some PLC cases is caused by the influence of external (to the company) macroeconomic phenomena, but that these can strongly affect the sales variable and, therefore, PLC analysis.

The objective of this study is to study the development of the life cycle of a durable consumer product in the Spanish market. The analysis of the PLC is intensified, differentiating between the customers assisted and sales variables, with the purpose of developing a business decision methodology that allows us to distinguish between the uses of both variables.

In this context, we consider that this study could be a significant opportunity within the scientific landscape and an ambitious challenge to analyse the influence of the sales and customers assisted variables in the PLC phases in the Bass model. We consider that the originality of the use of the clients assisted variable, which opens up a new research line, gives this research fundamental importance. Our main methodological contribution is the use of the clients assisted variable, which has previously not been studied in this context, in the Bass model. Historically, only the sales variable has been consistently used.

This leads us to formulate the following question: can the clients assisted variable constitute an efficient and consistent substitute for the sales variable in estimations of the PLC?

## 2. Theoretical framework

### 2.1 PLC

We have conducted a thorough review of the PLC and Bass model (which has a predominant role in dating the PLC phases) literature, finding that the studies all refer to sales volume as the single analytical variable. The most relevant articles that use the sales variable for PLC and Bass model analysis are summarised in Table I.

**Table I.**  
Summary of the  
revision of the  
theoretical framework  
of the use of the sales  
variable for the  
analysis of PLC and  
Bass model

| Variable<br>employed      | Scope of application                               | Research objective   | Study limitations  | Sources                                 |
|---------------------------|--|--|--|---|
| Sales                     | Sales of 314 industrial vendors                    | New product launches   | First years of product launches                                | Fu (2009)                               |
| Sales                     | Sales of technological products                    | PLC prediction model   | The use of historical data                                     | Orbach and Fruchter (2014)              |
| Sales                     | Sales of 29 brands                                 | Introduction into new markets  | Little depth on the product PLC                                | Shankar <i>et al.</i> (1999)            |
| Sales                     | Sales of new products and PLC                      | PLC analysis   | No benefits are defined in the relation between both variables | Suomala (2004)                          |
| Sales and price evolution | Sales and price evolution                          | PLC analysis   | Supply and demand evolution                                    | Kaldasch (2015)                         |
| Sales                     | Analysis of the sales of 8 products in 9 countries | PLC analysis   | Analysis of consumer durables                                  | Palacios (2013)                         |
| Sales                     | Potential clients' purchase intentions             | New product launches   | Absence of analysis of purchase decisions                      | Briede-Westermeyer <i>et al.</i> (2016) |
| Sales                     | Sales of 3 products                                | PLC analysis   | Absence of analysis of the influence of habit                  | Ratcliff and Doshi (2016)               |
| Sales                     | Sales evolution over the course of time            | New product launches   | Absence of market size analysis                                | Cetinkaya and Thiele (2016).            |
| Sales                     | General Electric sales                             | Conversion rates   | Analysis of sales in a market                                  | Ledingham <i>et al.</i> (2006)          |
| Sales                     | Mobile phone sales and internet access             | Communications and digital economy sector                                  | Absence of patterns of adoption between countries              | Weissmann (2008)                        |
| Sales                     | Sales in the electrical energy sector              | PLC  | Absence of business implications                               | Hachula and Schmeidel (2016)            |
| Sales                     | Analysis of customer product fatigue               | PLC analysis   | Homogenous population  | Wu <i>et al.</i> (2015)                 |
| Sales                     | Apparent consumption                               | Analysis of the development of the PLC of consumer durables                | Inability to take account of cross sales                       | Polo (1983)                             |
| Sales                     | Sales estimate real diffusion curve                | Analysis of sales diffusion in different countries                         | Estimation of sales due to lack of data                        | Zhu <i>et al.</i> (2017)                |
| Sales                     | Unit product sales in the industrial sector        | PLC measurement  | Poor model adjustment in some countries                        | Aguilar <i>et al.</i> (2012)            |
| Sales                     | PLC approximation theory                           | Confluence between Chaos Theory and PLC                                    | Influence of macroeconomic variables on sales                  | Rodriguez Escudero (1996)               |
| Sales                     | Sales simulations and inventory management         | Forecast of fashion industry demand based on the Bass model and Newsvendor | Sensitivity of the sales curve used in PLC                     | Spragg (2017)                           |
|                           |  |  | Use of theoretical models                                      |   |

From the discussion above, and this review, where we found that sales was the only variable used, the authors argue that it is important for companies to use not only sales performance to understand the status of their products. As we propose in this study, they can use other types of performance parameters when studying PLC phases and, by extension, in the Bass model, such as the number of clients assisted.

The PLC has historically been defined as the evolution of sales of a product during the time it remains in the market (Levitt, 1981). The PLC concept can also be applied to different levels of product aggregation. Three basic levels are used: the product class, the particular form of the product and the specific brand. Some authors consider that it is necessary to define the product according to product class, since this relates more to the different ways of satisfying a need (Lambkin and Day, 1989). Other authors (Lambin, 1995) advocate the product form, which is more closely related to its technological features and its market and, finally, there are authors who argue that analysis should be undertaken at the brand level, because the company holds control over the brand and over its strategy (Ryan and Riggs, 1996). It can be said that a certain scientific approach has been developed on the effectiveness of the sales variable in PLC analysis and for the company (Underhill, 2006, Ledingham *et al.*, 2006, Fu, 2009).

The PLC is represented graphically and determined from when it appears in the market until it is removed from the market (Clifford, 1965). Aguilar *et al.* (2012) conducted a study of the life cycles of three products based on a logistic model of population growth as a PLC measurement tool. In addition, they obtained the inflection points of the curves. These points could be used as tools for making strategic decisions about the product and can be the keys to deciding when to launch technological innovations, make investments and execute marketing strategies. Along these same lines, Rink and Swan (1979) establish that the PLC of products can be altered. These authors, analysing some 20 empirical PLC studies, conclude that there are different forms of the PLC. Along the same lines, Fu (2009) also argued the existence of a relationship between the success of new product launches and the age of the salespeople and their years of sales experience, an aspect that supports the previous literature suggesting that the sales variable may not be the most appropriate for PLC analysis.

Orbach and Fruchter (2014) developed a model that was able to predict PLC patterns that could not previously be explained. Their study demonstrated that the PLC analysis can and should be intensified. Despite this, the PLC in relation to the development of new products has been investigated only in a very limited way in the scientific literature (Suomala, 2004, p. 198). The evolution of sales and profits is what characterises the PLC; however, there are a wide variety of life cycle forms, which can be due to different causes (Midgley, 1981).

Studies carried out with the objective of identifying the different variables that affect product sales demonstrate that the development of the PLC concept has been based mainly on demand variables, specifically on the theory of innovation diffusion (Bass, 1980; Day, 1981; Lambkin and Day, 1989; Rodríguez Escudero, 2001). These authors showed that the limited predictive capacity of the PLC was due to the use of the sales variable.

There are some works – although they are scarce – such as that of Lambkin and Day (1989), that refer to the use of other variables, based on the analysis of the competitive context and the evolution of competition (supply factors), and that of Aguilar *et al.* (2012), which suggest the importance of companies using other measurement variables. The PLC theory has faced numerous criticisms; however, it continues to be used as an explanatory model of product sales evolution in the academic marketing field. Currently, research in this area has resumed as a consequence of the shortening of the PLC and improvements in information systems.

## 2.2 Bass model origin and applications

The Bass model was developed primarily to estimate the PLC phases and to predict innovation diffusion in consumer durables (Cetinkaya and Thiele, 2016, p. 264). The model argues that the sales of a new product at a given time are a function of the probability of conversion of the “innovators” and the influence they exert on the “imitators” (Santesmases, 2012, p. 464). First, there is the rapid wave, constituting the innovation rate, due to the spontaneous purchases of potential adopters (innovators). The second phase is the slow

wave that spreads through the market triggered by social learning, where the number of adopters increases with the imitation rate (Kaldasch, 2015, p. 6). The adoption of a product takes place at the moment it is introduced into a market. Once the new product is adopted, its diffusion pattern is formed. These two terms can be understood as the breadth and depth of a product in different countries (Palacios, 2013, p. 94). For a correct application of the Bass model, companies must take into account, in the first place, the rapidity with which customers adopt the innovation and, second, whether the enterprise has the appropriate capabilities and sufficient organisational capacity to handle this growth (Ratcliff and Doshi, 2016, p. 272).

In Table II, we list the main authors and their contributions constituting our theoretical framework.

This theoretical framework demonstrates (Moon, 2005, Midgley, 1981, Fu, 2009, Rink and Swan, 1979) that it is not inevitable that companies must adopt different positioning approaches for products and services in each of the PLC stages based on the sales variable. This argument encourages a new line of research based on customers assisted and not on sales.

In this context, this study aims to contribute to the joint research of commercial and marketing managers from theoretical and practical points of view, intensifying PLC analysis and distinguishing between the clients assisted and sales variables, in order to discover which of the two variables is the more useful for studying PLC phases using the Bass model. Thus, we propose the following hypothesis:

- H1. The clients assisted variable provides more efficient and more consistent results than does the sales variable for the estimation of the PLC.

### 3. Methodology

#### 3.1 The econometric model

To carry out this research, the Bass model was developed based on the distribution function  $F(t)$ , representing adoption in the period  $t$ , and its associated density function  $f(t)$ . From these and following a hazard rate, the probability of being an adopter, for those who are not yet adopters, at time  $t$  is:  $(f(t))/(1-F(t))$  which is defined in a linear way as:

$$\frac{f(t)}{1-F(t)} = p + q \cdot F(t) \quad (1)$$

where  $p$  is the innovation coefficient and  $q$  is the imitation coefficient.  $p, q \in (0,1)$  must fulfil  $p < q$  y  $(p + q) < 1$ . These parameters are also, respectively, known as external and internal influence coefficients. Thus, the model represents mixed influences (external and internal).

$F(t)$  is the accumulated number of people who adopt in  $t$ ,  $N(t)$  and  $m$  measures the ceiling of people who might adopt (maximum number of potential adopters of the product, that is, the potential market):  $F(t) = m \cdot N(t)$ . Thus, the hazard rate is:

$$\frac{f(t)}{1-F(t)} = p + q \cdot m \cdot N(t) \quad (2)$$

And it can be rewritten based on the accumulated adopters as:

$$\frac{N(t)}{m-N(t)} = p + \frac{q}{m} \cdot N(t) \quad (3)$$

Mahajan *et al.* (1995) explained product acquisition through this modelling, which follows the Bass model.

| Research objective                                     | Methodology   | Conclusions   | Source                                 |
|--|---|---|--|
| <i>Bass model</i>                                      |   |   |  |
| Analysis of the product life cycle                     | Chaos theory  | Implications for dynamic product management   | Rodríguez-Escudero (1996)              |
|  | Bass and mansfield models                             | Diffusion and adoption of new products in Latin America   | Palacios (2013)                        |
|  | Bass model  | The adjustment of the Bass innovation- diffusion model to the data on evolution of sales over time has been satisfactory      | Polo (1983)                            |
|  | Bass model  | PLC evolution is normal in homogenous markets   | Kaldasch (2015)                        |
|  | Bass model  | Use of the Bass model for the analysis of diffusion of new products   | Ratcliff and Doshi (2016)              |
|  | Bass model analysis of feature fatigue                | Sales evolution data can be used to analyse what features should be integrated to reduce product feature fatigue              | Wu <i>et al.</i> (2015)                |
| <i>Product life cycle</i>                              |   |   |  |
| Measurement of the product life cycle                  | Logistic model of demographic growth                  | Understanding of the inflection points in order to make strategic decisions   | Aguilar <i>et al.</i> (2012)           |
| Product life cycle                                     | Process management                                    | Proposed project management model   | Ferreira <i>et al.</i> (2017)          |
|  | Mathematical model                                    | Proposed mathematical model   | Hachula and Schmeidel (2016)           |
| Study of product innovations and their effects on PLC  | Qualitative Literature review                         | Proposed positioning strategies<br>Proposed typologies of different innovations   | Moon (2005)<br>Miquel and Molla (1982) |
| Literature review of the product life cycle            | Qualitative type inductive-analytical research method | Proposed ESVIPROMER model   | Peralta <i>et al.</i> (2014)           |
| Review of the modern utility of the product life cycle | Literature review                                     | The PLC provides valuable information for marketing decision making, however the predictive capacity of sales has limitations | Muñiz Ferrer (2008)                    |
| Product life cycle studies                             | Literature review                                     | The identification of 12 distinct types of product life cycle, the classic form being the most common                         | Rink and Swan (1979)                   |
| Analysis of the product life cycle                     | Chaos theory  | Implications for dynamic product management   | Rodríguez-Escudero (1996)              |
|  | Literature review                                     | Proposed different marketing techniques depending on PLC phase  | Suomala (2004)                         |
| Predictive model for PLC patterns                      | Parametric model                                      | The model explains PLC patterns incapable of previous explanation   | Orbach and Fruchter (2014)             |
|  | Dynamic system model                                  | Improvement in innovation performance in the PLC phases   | Zou <i>et al.</i> (2016)               |
| Introduction into new markets                          | Dynamic model   | Advantages of access to new markets when the product is in a PLC growth phase   | Shankar <i>et al.</i> (1999)           |
| <i>Theoretical problems</i>                            |   |   |  |
| New product launches                                   | Growth curve model                                    | The age and experience of vendors can determine the success of new products   | Fu (2009)                              |

**Table II.**  
Summary of the study  
(continued) theoretical framework

| Research objective                            | Methodology  | Conclusions   | Source                                  |
|---|--|---|---|
| Conversion rate                               | Extended conceptual design model   | Communication improvement (client, user and expert)   | Briede-Westermeyer <i>et al.</i> (2016) |
|   | Price-time sensitivity model   | The advantages of the application of appropriate pricing policies in the PLC phases   | Shu <i>et al.</i> (2015)                |
|   | Bass model   | Reduction of the uncertainty of new product launches  | Cetinkaya and Thiele (2016)             |
|   | Review   | Application of scientific methods to sales management to increase prospects and conversion rates  | Lendingam (2006)                        |
| <i>Applied uses of the Bass model</i>         |  |   |   |
| Tourism sector                                | Estimation of tourist demand   | New focus on tourist demand estimation methodology based on the dissemination of information by tourists who have previously visited a location | Ayavirina <i>et al.</i> (2017)          |
| Automobile sector                             | Estimation of the diffusion curve in different countries                   | The effectiveness of a proposed model to estimate the diffusion curve varies depending on country   | Zhu <i>et al.</i> (2017)                |
| Textile sector                                | Predicting seasonal fashion demand   | Analytical use of the Bass model with the Newsvendor model in the fashion industry. Actual sales data are not available                         | Spragg (2017)                           |
| Communications sector and the digital economy | Introduction of the individual's heterogeneity into Bass model estimations | Differences in Bass model estimations as a function of the age and education of the individuals   | Alonso and Arellano (2015)              |
|   | New technology diffusion and estimation of new product demand              | Determination of the patterns of new technology diffusion   | Weissmann (2008)                        |
|   | New technology diffusion model   | The Bass model has adjustment problems when it is applied to the internet sector  | López Sánchez <i>et al.</i> (2007)      |

Table II.

From Equation (3) a discrete version of this can be derived,  $N(t) - N(t-1)$ , this being the number of individuals that adopt at time  $t$ , also represented by  $S(t)$ :

$$S(t) = p \cdot m + (q-p) \cdot N(t) - \frac{q}{m} N(t-1)^2 \quad (4)$$

Regarding the estimation methods, we propose the use of a Minimum Ordinary Least Squares estimate (MOLS) derived from the discrete version of the previous model:

$$N(t) - N(t-1) = \beta_0 + \beta_1 \cdot N(t) + \beta_2 N(t-1)^2 + u(t) \quad (5)$$

where  $u(t)$  represents the model error,  $N(t-1)$  the accumulated number of individuals who adopt in the previous period ( $t-1$ ).

In the MOLS estimation, each of the estimated parameters is related to the Bass model items under study. Thus, from the estimation of these and following their relationship with  $p$ ,  $q$  and  $m$ :

$$\beta_0 = p \cdot m$$



$$\begin{aligned}\beta_1 &= q-p \\ \beta_2 &= \frac{-q}{m}\end{aligned}\quad (6)$$

However, the MOLS estimation has inconsistencies. Specifically, in addition to the multicollinearity problems detected by Mahajan *et al.* (1995), when the sample size is reduced, the estimations also lack robustness as they do not meet their own definition of the parameters; ( $p, q \in (0,1)$ ) must comply with  $p < q$  y  $(p+q) < 1$  (Kijek and Kijek, 2010).

To resolve this problem, we used nonlinear estimation methods from the initial equation proposed by the Bass model (1), expressed as a difference equation where:  $S(t) = m \cdot (dF(t))/(dt)$ , such that:

$$\frac{dF(t)}{dt} = p + (q-p)F(t) - qF(t)^2 \quad (7)$$

The first estimation method used, following Mahajan *et al.* (1995), would be the direct estimation by nonlinear methods of the solution reached by solving the difference Equation (7), whose solution for  $f(t)$  would be:

$$f(t) = \frac{\left(\frac{p+q}{p}\right)^2 \cdot e^{-(p+q)t}}{\left[1 + \frac{q}{p} \cdot e^{-(p+q)t}\right]^2} \quad (8)$$

The result of this estimation is obtained by nonlinear methods, in particular by applying a nonlinear estimation by MOLS for the defined equation. The estimation of this function allows us to directly estimate the parameters  $p$ ,  $q$  and  $m$ , and from these the estimation of  $f(t)$ , whose representation allows us to plot the density function previously introduced by the Bass model. We will use in this application of the nonlinear methodology the coefficients estimated by MOLS as a starting point in the iterations.

### 3.2 Sources of information and data

The data used in this study were provided by Automóviles Citroën España. The two vehicle models analysed are considered to be substitutes, which makes the research more relevant, since variations in the volume of clients assisted and/or the sales of both models cannot be attributed to variations in customer behaviour. This is because both products share a large part of their target customer base:

- C3: utility segment vehicle (3.94-metres long). The client targets are active families with up to two children and couples without children.
- C4 Cactus: compact segment vehicle (4.16-metres long). The client targets are older couples, young couples and single people.

In addition, it must be taken into account that both models represent an important proportion of the manufacturer's sales as follows:

- The C3 has been very well received in the market throughout its life, and continues so to be, with around 4,925 clients being assisted each month. Thus, we can expect the same during the analysed period, in the product maturity phase.
- The C4 Cactus model was launched onto the market August 2014, just as we started collecting data. There were two clear trends in its evolution corresponding to its introduction and growth phases (the first trend showed a marked increase in sales

until August 2015, with a growth rate of 3 per cent) and the maturity of the product in the market (where an average of 4,148 per month clients were assisted in a fluctuating market).

On the other hand, it should be noted that the observations were made at national level and collected by the entire Automóviles Citroën España dealer network, which amounts to 140 dealerships throughout the country. The data were collected over a period of 24 months from August 2014 to July 2016. It so happened that this period coincided with the entry into the market of a new model, the C4 Cactus, while the old model, the C3, continued to be sold.

Two types of variables are considered:

- (1) number of clients assisted (prospective clients) by dealership and by the total dealer network as defined by their interest in the C3 and/or C4 Cactus car models of a car dealer network; and
- (2) number of sales per dealer and for the total dealer network.

Of the 223,577 clients assisted, 36,819 acquired units of the C3 and C4 Cactus models (sales) at the points of sale during the study period.

This study intensifies the analysis of the PLC, distinguishing between the clients assisted and sales variables, in order to develop a business decision methodology that allows us to differentiate between the uses of both variables. The clients assisted variable is defined as the volume of customers who requested a quote for a car at a dealership. Thus, we counted as clients assisted all the individuals who requested a quote from the dealer, whether or not they purchased a car. However, the sales variable includes only the customers who bought a product.

The aim of this analysis is to show that the utility of the clients assisted variable is superior to the utility of the sales variable for PLC analysis. This is supported by the fact that data on both variables (clients assisted and sales) are easily obtained by the companies. In addition, as has already been stated, the sales variable may be affected by macroeconomic and sociodemographic phenomena related to the economic cycle. But, in addition, it should be noted that the sales variable is more seasonal in the short-term than the clients assisted variable, since vehicle purchases are linked to certain times of the year, specifically the months of March and June. Figure 1 shows how the sales variable demonstrates this effect in 2015 and 2016, while the clients assisted variable does not.

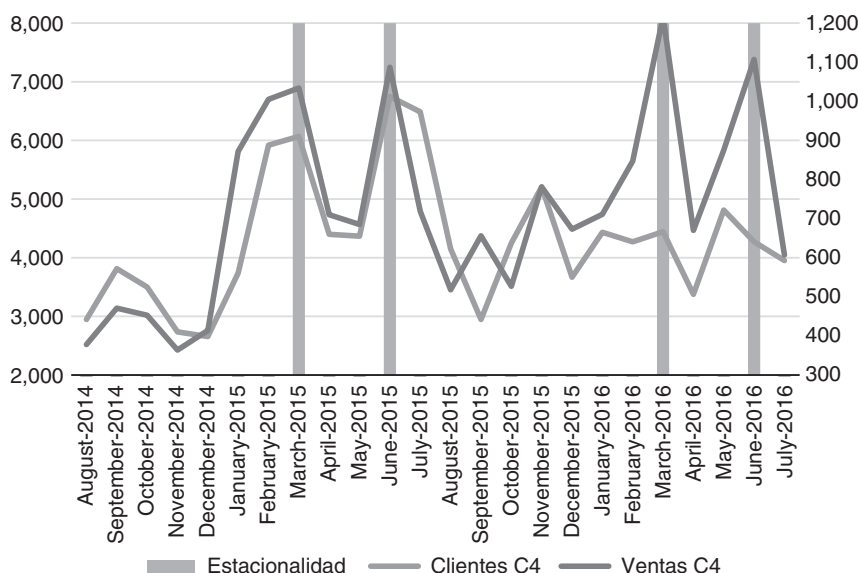
In order to carry out this research, it is necessary to date the stages of the life cycle of these consumer durable products (cars). The study meets this objective by using the above referenced two variables, clients assisted and sales of the vehicle models C3 and C4 Cactus, in order to observe differences in the effectiveness of these variables in the dating methodology. We assess whether the behaviour of the clients assisted and sales variables in the proposed analysis is in accordance with the PLC literature and the Bass model or if, on the contrary, differences are observed in the way these variables allow adjustment of the model.

This research poses an interesting scientific challenge, because the 24-month analysis period allows us to explain the behaviour and timing of each of the phases of the life cycle of a major investment, such as a car, which is located within the automotive sector, an area of great importance to the Spanish economy (Rodríguez *et al.*, 2015, p. 98).

### 3.3 Analytical strategy

In order to analyse the different behaviours in the different phases of the cycle of both products, the analysis period is divided into the following sub periods, based on the behaviours of the C3 and C4 Cactus models as defined in the previous section:

- August 2014-March 2015: C4 launch period and maturity phase of the C3.



**Notes:** August, September, October, November, December, January, February, March, April, May, June, July, seasonability, clients, sales

**Figure 1.**  
Representation of the  
seasonality of the  
sales and clients  
assisted variables

- April 2015-August 2015: C4 growth period and maturity phase of the PLC.
- September 2015-July 2016: both models in their maturity phases.

Using these sub periods, we propose three types of analysis to meet the previously defined objectives:

- Analysis 1: an analysis of the C3 and C4 Cactus models behaviour over the entire period from August 2014 to July 2016 to show if they have different behaviours due to being in different phases of the PLC.
- Analysis 2: an analysis of the behaviour of the C4 Cactus in the periods from August to March 2015, April to August 2015 and September 2015 to July 2016. This analysis aims to verify if the results of the research are consistent with the PLC literature.
- Analysis 3: a comparison of the results for the C3 and C4 Cactus from August 2014 to March 2015 and from April 2015 to August 2015. If the results of this analysis show differences, it would prove that they are in different PLC phases.

#### 4. Results

As previously stated, for each product, the C3 and the C4 Cactus, for the defined study periods, the innovation ( $p$ ) and imitation ( $q$ ) coefficients will be estimated through MOLS and NLLS. The results obtained through MOLS for the parameters  $\beta_0$ ,  $\beta_1$  and  $\beta_2$  do not allow us to obtain consistent estimates of  $p$  and  $q$  given the restrictions that these parameters must meet (contained in the interval (0, 1), and the sum of both must be less than unity); most estimates do not meet these restrictions. The contrary case is the estimation of parameters  $p$  and  $q$ , obtained by NLLS, which yield results that meet the aforementioned restrictions. This is why, we present the MOLS results in the appendix, since these values will be necessary as the starting point of the iterations of the nonlinear estimate, but they are not useful to obtain valid results for the  $p$  and  $q$  estimations.

#### 4.1 Comparison of the behaviour of both models over the entire period (Analysis 1)

Table III shows the estimations of  $p$  and  $q$  obtained for the two products over the entire analysis period, August 2014 to July 2016, distinguishing between the estimates obtained from the customers assisted and sales variables.

For both variables and both vehicle models, it is observed that the estimations of the innovation coefficient parameter ( $p$ ) are lower than that of the imitation coefficient ( $q$ ). On the other hand, the estimations show that the coefficient of innovation of the C4 Cactus is greater than that of the C3, both for the clients assisted variable and for the sales variable. Also, the imitation coefficient ( $q$ ) is greater, which indicates that the C4 has a higher imitation coefficient both when compared to itself and when compared to the C3. In addition, this result is significant at 1 per cent, although this only occurs for the customers assisted variable (at 10 per cent for the sales variable), which shows a better adjustment (0.96 for the determination coefficient vs 0.92 for the sales variable).

Obtaining a higher imitation coefficient ( $q$ ) for the C4 Cactus indicates that it is a model in its growth phase, as opposed to the behaviour of the C3.

From this analysis, it can be concluded that the clients assisted variable obtains better adjustment and greater consistency of estimation results in the analysed period. This shows that the clients assisted variable provides more reliable results than the sales variable. From these results, it can be seen that the behaviours of the C3 and C4 models are different throughout the study period and, therefore, it can be inferred that they are in different phases of their PLCs.

#### 4.2 Comparison of the behaviour of the C4 Cactus in the three sub periods (Analysis 2)

Table III gives the estimations of  $p$  and  $q$  obtained for the C4 Cactus for the sub periods.

In this analysis, it is advisable to highlight, in contrast to the previous analysis (analysis 1 in Section 4.1), that the model does not converge for the sales variable in any of the sub periods analysed. This should be understood as a deficiency of this variable when it comes to presenting Bass model estimations (convergence is reached for random values, therefore there is a lack of consistency in the model adjustment based on this variable), which supports the previous analysis that demonstrated that the sales variable showed a poorer adjustment. This shows that, for the estimation of each of the PLC phases, the clients assisted variable is more efficient and more consistent than the sales variable for the behaviour of the C4 Cactus model. This is a contribution to the previous scientific literature and represents an interesting new line of scientific research (Table IV).

As regard the clients assisted variable, although the results do not give significant estimations, it is observed that the innovation coefficient ( $p$ ) decreases when we pass from the introduction phase (August 2014-March 2015) to the growth phase (April 2015-August 2015), while the imitation coefficient shows the contrary, increasing from the introduction phase to the growth phase.

|                         | Coef. innovation ( $p$ ) | Coef. imitation ( $q$ ) | $R^2$ of model |
|-------------------------|--------------------------|-------------------------|----------------|
| <i>Clients assisted</i> |                          |                         |                |
| C4 Cactus               | 0.0223***                | 0.0995***               | 0.963          |
| C3                      | 0.0098                   | 0.0213                  | 0.983          |
| <i>Sales</i>            |                          |                         |                |
| C4 Cactus               | 0.0147**                 | 0.0647*                 | 0.925          |
| C3 <sup>a</sup>         | 0.0001***                | 0.0086                  | 0.955          |

**Table III.**

NLLS estimation for the complete period August 2014-July 2016

**Notes:** <sup>a</sup>Convergence after reaching a high number of iterations and does not find a value for the intercept of the model (m). The significance of the estimated parameters is given next to each estimation: \*5-10 per cent; \*\*1-5 per cent; \*\*\*1 per cent

A higher imitation coefficient ( $q$ ) is obtained in period 2, April 15-August 15, which corroborates the fact that this period should be regarded as a growth phase in the PLC. In addition, the results for both the introduction and growth phases are significantly different for all significance levels (we reject the hypothesis of equality of parameters). However, although the results are open to interpretation, they are not significant for any of the usual statistical significance levels.

As a consequence of these results, there are doubts about whether in choosing the client assisted variable based on the estimations presented, the analytical instrument is given priority over the business objective. In this regard, it is true that beyond the fact that the clients assisted variable correctly fits the Bass model, the authors must take into consideration whether this variable is useful for making successful forecasts or for the future evolution of the product. For this, the researchers made a six-month forward prediction for the C4 Cactus, using both variables (given that the C4 went through different phases of the cycle), employing in both cases a time series moving average model of order 1, this being the model that best represents the behaviour of both variables. The results obtained show that the measurement statistics and goodness of fit of the prediction give similar results with both variables, obtaining a Theil U Index of 0.87 in the case of the clients assisted variable and 0.89 for the sales variable. Although these results and their closeness to 1 show a weak prediction that does not contribute more than the use of criterion  $P_{t+1} = X_t$ , they show that one variable is not identified as better than the other as a prediction tool. Therefore, as it cannot be otherwise, the authors consider that both variables are equally useful for forecasting.

From everything discussed in this study, it can be stated that the clients assisted variable is more functional and effective than the sales variable due to the following aspects:

- The forecasts obtained from both variables (clients assisted and sales) do not identify one variable as better than the other.
- The ease of registration and control of the clients assisted variable is the same as that for the sales variable.
- However, sales are affected by macroeconomic phenomena that interfere in their usefulness as a reference variable for the analysis of the PLC. This discourages the use of sales as a single evaluation element for a product's economic success.
- In addition, as is noted above, in the short-term, sales are more seasonally variable than clients assisted, since vehicle purchases are linked to certain times of the year, specifically the months of March and June.

In short, the clients assisted variable:

- fits our Bass model better;
- is an equally effective forecasting variable;

|                                     | Coef. innovation ( $p$ ) | Coef. imitation ( $q$ ) | $R^2$ of model |
|-------------------------------------|--------------------------|-------------------------|----------------|
| <i>Clients assisted</i>             |                          |                         |                |
| August 2014-March 2015              | 0.0287                   | 0.1466                  | 0.954          |
| April 2015-August 2015 <sup>a</sup> | 0.0014                   | 0.5523                  | 0.975          |
| September 2015-July 2016            | No convergence           |                         |                |

**Notes:** Sales: There is no convergence in any of the sub periods. <sup>a</sup>The convergence value is reached with  $\hat{\beta}_0$  = accumulated in the period. The significance of the estimated parameters is given next to each estimate: \*5-10 per cent; \*\*1-5 per cent; \*\*\*1 per cent

**Table IV.**  
NLLS estimation for  
the C4 Cactus for the  
three sub periods

And:

- the data for both variables are equally easy for the companies to gather; and
- the clients assisted variable is not affected by macroeconomic phenomena and its seasonality is lower than that of the sales variable.

Based on the above, the authors propose that the clients assisted variable, rather than the sales variable, should be used for PLC analysis.

#### 4.3 Comparison of the behaviour of the C3 for the three sub periods (analysis 3)

Table V shows the previous 3C model analysis. Contrary to what was obtained in the C4 analysis, the results for the different sub periods are all significant at 5 and 1 per cent when both the clients assisted and the sales variables are used. However, if we look at the regression adjustment, again the results obtained for the C3 reinforce those obtained for the C4 Cactus, in relation to the greater efficiency of the clients assisted variable. This analysis shows that, for the estimation of each of the PLC phases, the clients assisted variable is more efficient and more consistent than the sales variable for the behaviour of the C3 model, similar to what was seen in analysis 2 with the C4 Cactus. This supports the results of analysis 2 and shows discrepancies with the previous scientific literature, reinforcing this as an interesting new line of scientific research.

The C3 results again show that the criterion that the innovation coefficient ( $p$ ) be less than that of the imitation ( $q$ ) is met. It happens, moreover, that we do not reject the hypothesis that the results of the values of the imitation coefficient are equal, so there is no difference between the two phases.

If we compare these results with those obtained in the C4 Cactus analysis, we see that for the period April 2015-August 2015 the value of  $q$  there is significantly higher than that for the C3, which reinforces the evidence that the C4 was in a growth phase, unlike the C3.

### 5. Conclusion

This work supports the use of the clients assisted variable for PLC analysis, with the purpose of evaluating its usefulness for the Bass model and its utility in the dating of the PLC phases in durable goods as against the repeated use of the sales variable in the existing literature.

This study is in line with the results obtained in previous works, such as those of Rodríguez Escudero (1996); Aguilar *et al.* (2012); Muñoz Ferrer (2008); Mahajan *et al.* (1995), who argue that the sales variable is not the best measure because it is affected by economic and sociodemographic variables. These authors point out the inadequacy of long-term PLC forecasts based on the sales variable given the extreme sensitivity of the sales curve to initial conditions.

**Table V.**  
NLS Estimation  
for the C3 over the  
three sub periods

|                            | Coef. innovation ( $p$ ) | Coef. imitation ( $q$ ) | $R^2$ of model |
|----------------------------|--------------------------|-------------------------|----------------|
| <i>Clients assisted C3</i> |                          |                         |                |
| August 2014-March 2015     | 0.0755***                | 0.1814**                | 0.99           |
| April 2015-August 2015     | 0.0118***                | 0.1330***               | 0.99           |
| <i>Sales C3</i>            |                          |                         |                |
| August 2014-March 2015     | 0.0783***                | 0.2922**                | 0.97           |
| April 2015-August 2015     | 0.0113***                | 0.1232**                | 0.96           |

**Notes:** The significance of the estimated parameters is indicated next to each estimation: \*5-10 per cent; \*\*1-5 per cent; \*\*\*1 per cent

The literature reviewed argues that knowledge of the PLC phases has been shown to be an important issue in the business strategy (Shankar *et al.*, 1999, Rink and Swan, 1979, Palacios, 2013). Understanding the PLC allows companies to improve their product-price positioning as well as to improve the effectiveness of their marketing strategies (Kaldasch, 2015; Moon, 2005). In this new business context, there is a broad consensus on the part of the different authors that the PLC should be taken into account when deciding which marketing strategies to follow. As previously explained, the main differences between the authors who, in terms of business practice, defend the usefulness of the PLC and those who criticise it are around the accuracy of the sales variable's predictive capacity for PLC analysis (Muñiz Ferrer, 2008, p. 411).

This statement is in line with previous papers, such as that of Camacho and Galiano (2009), which indicate that sales, which is currently the performance parameter commonly used in PLC analysis, may not be the most consistent variable because it is affected by certain economic phenomena, such as general price increases in the economy (inflation) or by changes in relative prices (some products with respect to others).

In the field of marketing and sales strategies, the analysis and duration of PLC phases is important. The authors compare the use of two variables in PLC dating: sales and clients assisted in the Bass model. This study also establishes the dates and demonstrates the phase or phases in which two specific products are situated within the Spanish automotive sector: the Citroën C3 and C4 Cactus. Both vehicles have been analysed to take into account the acceptance of both models in the study period (Rodríguez *et al.*, 2017, p. 233) and, therefore, the acceptance of the vehicle models cannot be considered as a distorting factor for the study results.

The results obtained, based on a three-step strategic analysis, are as follows:

- Analysis 1 shows that for the complete period August 2014-July 16, the C3 and C4 Cactus models go through different phases. This is also corroborated in the comparative analyses of strategies 2 and 3. This accords with the scientific literature. In this study it has been shown that the clients assisted variable is more efficient for analysis than the sales variable.
- Analysis 2 shows that, for the C4 Cactus, the clients assisted variable provides more efficient and more consistent results for PLC estimation than does the sales variable. These results represent an interesting new line of research, since they allow a greater and better adjustment to the PLC than that obtained by the sales variable.
- Analysis 3 shows that, for the C3, the clients assisted variable gives more efficient and consistent results for PLC estimation than the sales variable. In the previous analysis, it was observed that the C4 Cactus is in its growth phase as it shows a high imitation coefficient, significantly different from the previous period, which does not happen with the C3. These results offer the possibility of improving the effectiveness of marketing strategies throughout the PLC.
- The Bass method estimation obtains results consistent with analyses 1-3 of the study. The conclusion derived is that the clients assisted variable provides, as a result, more efficient and consistent estimations than the sales variable. Therefore, *H1* is accepted.

As a final conclusion, the results show that the C3 and C4 Cactus are in different phases of their PLCs, which is consistent with the previous literature. The C4 Cactus is clearly in a growth phase, where a greater influence of imitators is observed, while the behaviour of the C3 is different and well past that phase.

But the most remarkable thing about this research is that we have shown that the functionality of the clients assisted variable is greater than the sales variable for the Bass model and, therefore, for PLC estimation. These results open a new and interesting research line, which the authors of this study intend to pursue further.



### 5.1 Business implications

The results of this research are very useful, since they allow marketing decision makers to obtain more consistent estimations of the PLC phases using the Bass model and the clients assisted variable. This is based on the fact that the use of this variable helps to detect if there is any deficiency in the design of the marketing strategy when the client does not make the purchase.

As it has been shown in this study, in the short-term, sales is a more seasonal variable than the clients assisted variable, since vehicle purchases are linked to certain times of the year, the months of March and June. It should be noted that data on both variables are equally easy to obtain. This is due to the fact that the companies keep records of clients assisted so that they know the traffic that has passed through the store and, therefore, to know if their sales volume is due to the number of customers that come to the store or to the conversion rate.

The data on clients assisted are as easily available to companies as sales data. However, the use of this variable improves PLC analysis and this allows an improvement in company forecasting. Thus, making the clients assisted variable a tool to strategically plan investments in innovation and marketing would reduce uncertainty in business management.

We recommend the use of the clients assisted variable in the business field for the estimation of PLC phases. First, it allows us to understand the speed with which customers adopt innovations as well as to determine the behaviour and influence of the innovators on the imitators; and, second, it helps marketing managers to design more efficient communication plans in terms of setting objectives, to decide on the tools to be used, to decide on investment in communications in the different stages of the PLC and/or, to decide to extend the maturity stage, to continue to attract new customers to the dealership and to create brand preference.

### 5.2 Limitations and future research lines

The main limitation of this research is the absence of previous scientific literature that uses the clients assisted variable in the Bass model. In any case, the theoretical framework of the Bass model in PLC analysis is quite scarce in comparison with other areas of analysis of the product variable (Suomala, 2004, p. 198).

A further limitation of this study is that we focus on an analysis of consumer durables. This limits the extrapolation of our results. Therefore, we recommend replication of this study in other sectors to allow a comparison of results.

It can be considered as a limitation that the time periods analysed do not include the decline and product withdrawal phases, which in the automobile sector are very ephemeral.

On the other hand, the main lines of research lines opened in this study are as follows:

- a PLC analysis that considers all phases;
- analysis of the behaviour of the conversion rate in each of the PLC phases; and
- intensifying the relationship between investment in communication, clients assisted and PLC.

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#### Appendix

|                         | Constant $\hat{\beta}_0$ | Accumulated $N(t)$ | Accumulated <sup>2</sup> $N(t)^2$ | Goodness of fit $R^2$ |
|-------------------------|--------------------------|--------------------|-----------------------------------|-----------------------|
| <i>Clients assisted</i> |                          |                    |                                   |                       |
| C4 Cactus               | 3,186.68***              | 0.0735866**        | -6.96082e-07**                    | 0.272285              |
| C3                      | 4,850.1**                | -0.000805297       | 3.96066e-08                       | 0.040949              |
| <i>Sales</i>            |                          |                    |                                   |                       |
| C4 Cactus               | 542.593***               | 0.0428166          | -1.62690e-06                      | 0.149968              |
| C3                      | 791.984***               | -0.00324547        | 4.90583e-07                       | 0.039722              |

**Notes:** The significance of the estimated parameters is indicated next to each estimation. \*5-10 per cent; \*\*1-5 percent; \*\*\*1 per cent

**Table AI.**  
MOLS estimation for  
the complete period  
August 14-July16  
(analysis 1)

|                                   | Constant $\hat{\beta}_0$ | Accumulated $N(t)$ | Accumulated <sup>2</sup> $N(t)^2$ | Goodness of fit $R^2$ |
|-----------------------------------|--------------------------|--------------------|-----------------------------------|-----------------------|
| <i>Clients assisted</i>           |                          |                    |                                   |                       |
| Launch August 2014-March 2015     | 4,184.58**               | -0.224010          | 1.26042e-05                       | 0.748000              |
| Growth 2015-August 2015           | -29,085.3                | 1.65602            | -1.92912e-05                      | 0.718072              |
| Maturity September 2015-July 2016 | 10530.1                  | -0.141597          | 7.81476e-07                       | 0.248025              |
| <i>Sales</i>                      |                          |                    |                                   |                       |
| Launch August 2014-March 2015     | 789.144*                 | -0.882860          | 0.000431456                       | 0.844845              |
| Growth April 2015-August 2015     | 998.019                  | 0.0225294          | -8.64073e-06                      | 0.420443              |
| Maturity September 2015-July 2016 | -1,998.80                | 0.429871           | -1.58638e-05                      | 0.323979              |

**Notes:** The significance of the estimated parameters is indicated next to each estimation: \*5-10 per cent; \*\*1-5 per cent; \*\*\*1 per cent

**Table AII.**  
MOLS estimation for  
the C4 Cactus for the  
different sub periods  
(analysis 2)

**Table AIII.**  
MOLS estimation for  
the C4 Cactus for the  
different sub periods  
(analysis 3)

|                               | Constant $\hat{\beta}_0$ | Accumulated $N(t)$ | Accumulated <sup>2</sup> $N(t)^2$ | Goodness of fit $R^2$ |
|-------------------------------|--------------------------|--------------------|-----------------------------------|-----------------------|
| <i>Clients assisted</i>       |                          |                    |                                   |                       |
| Launch August 2014-March 2015 | 5,442.59***              | -0.0226429         | -2.05370e-07                      | 0.405577              |
| Growth April 2015-August 2015 | -8,618.00                | 0.511121           | -4.92505e-06                      | 0.567429              |
| <i>Sales</i>                  |                          |                    |                                   |                       |
| Launch August 2014-March 2015 | 445.238                  | 0.268035           | -0.0000381                        | 0.4601                |
| Growth April 2015-August 2015 | -128.4121                | 0.1400623          | -4.69e-06                         | 0.2413                |

**Notes:** The significance of the estimated parameters is given next to each estimation: \*5-10 per cent; \*\*1-5 per cent; \*\*\*1 per cent

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# North American entrepreneurs in Cuba: which entry mode and government affiliation strategy?

North  
American  
entrepreneurs  
in Cuba

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## Abstract

**Purpose** – To have success in newly liberalized markets, firms must have a plan of action before resources are committed. What some companies do not realize is that their own entrepreneurial orientation (EO) will dictate their strategies, and performance outcomes, in both their home market and abroad. In order to maximize firm performance in newly liberalized markets (such as Cuba), firms must be able to objectively gauge their own EO. The paper aims to discuss these issues.

**Design/methodology/approach** – Within this framework, the present paper will attempt to effectively measure the EO of decision-making managers from US companies that have an interest in entering the Cuban market. A final sample of 81 US managers accepted to collaborate. They were then split into two groups (high and low EO; with 41 and 35 managers in each group, respectively) and compared regarding three variables: entry mode strategy, government affiliation strategy, and performance outcomes.

**Findings** – The results show that EO is related with performance, but not with the two proposed variables of entry mode and government affiliation.

**Originality/value** – In sum, the added value of the paper is to link US managers' strategies and performance in a newly liberalized market which has been seldom studied: Cuba. The fields of entry mode strategies and government affiliation decisions in this newly liberalized market remain poorly investigated. Not all firms managed by highly entrepreneurial-orientated managers will decide to enter foreign markets and, on the contrary, domestic firms which are not interested in international markets can be run by highly entrepreneurial managers. This is due, in part, to the fact that internationalization can be driven by other factors. Therefore, this paper will attempt to demonstrate if certain entry modes will perform better than others when the foreign market is a newly liberalized economy. Additionally, the importance, and effect, of governmental relationships on performance outcomes will be tested within the research.

**Keywords** Risk-taking, Entry mode, Entrepreneurial orientation, Innovativeness, Newly liberalized market, Proactiveness

**Paper type** Research paper

## Introduction

The word entrepreneur is used often in business environments (Lumpkin and Dess, 1996). From entrepreneurial attitudes, to serial entrepreneurs, the term is becoming overused. However, one phrase that is rarely heard outside of academia is entrepreneurial orientation (EO). EO refers to the entrepreneurial inclination of the strategy managers utilize when leading a company. Being comprised of three dimensions (innovativeness, proactiveness, and risk-taking), this term can seem exciting, sophisticated, or even reckless (Matsuno *et al.*, 2002). It has been correlated with higher performance outcomes by firms displaying a higher degree than their competitors



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(Lumpkin and Dess, 1996; Matsuno *et al.*, 2002; Miller and Camp, 1985; Miller, 2011; Rauch, 2009; Boso *et al.*, 2013; Zhang *et al.*, 2014; Lonial and Carter, 2015). In all, EO describes the character and nature of the decision-making executive (or manager) that governs a company. Once this variable is known, a company's internal operations, outward goals, actions, management philosophies, marketing strategies, and performance can all be estimated against its competitors.

Every firm has an EO, which is determined by its managers' entrepreneurial strategy. As previous lines have stated, companies consisting of managers exhibiting a higher EO have been proven to have more success in both their home markets and abroad. Therefore, this measure is critical to know when entering a new market. This importance cannot be understated when a firm considers entering a newly liberalized market. Newly liberalized markets are exactly as their title states. As these environments offer challenges both known and unknown, every advantageous opportunity must be seized by companies hoping to expand into these countries (Del Sol, 2010).

The purpose of this paper is to explore the relationship between EO and three concepts: a firm's entry mode strategy, government affiliation strategy, and performance outcomes. The overarching goal is to determine whether firms that are managed by more entrepreneurial executives will achieve higher levels of success than less entrepreneurial firms. Additionally, we will explore if certain entry mode strategies, and government affiliation strategies, could explain this superior success. We have decided to connect EO with entry mode strategies, governmental affiliation, and performance outcomes because several previous works (i.e. Sánchez-Escobedo *et al.*, 2016) have demonstrated that managers' attitudes (EO) will determine their future decisions (i.e. entry modes and government relationships) and consequently, their level of success (performance outcomes).

We assert that having a high EO is greatly recommended when entering newly liberalized markets (Del Sol, 2010), as high levels of innovativeness, proactiveness, and risk-taking behaviors are needed. In this vein, Cuba was selected as the newly liberalized market in our study. Although previous literature has already investigated successful entry strategies regarding newly liberalized markets (i.e. Chilean market) (Del Sol, 2010), the relevance of Cuba as a newly liberalized market is a recent phenomenon as of December 2014. New possibilities, specifically for US firms, have emerged through political breakthroughs between the USA and Cuba that have promised to eliminate the US imposed trade embargo, allowing access the island nation for American businesses for the first time in over 50 years.

In sum, the added value of our paper is to link US managers' strategies and performance in a newly liberalized market which has been seldom studied: Cuba. As Ortega *et al.* (2016) remarked "a rising number of developing countries with good economic perspectives and a better business environment encourage the need of studies that explicitly address the occurrence of firms from developed economies entering newly liberalized markets." With this need in mind, the present paper attempts to bridge this gap. Therefore, although the relationships between EO and marketing orientation strategies in Cuba have already been investigated (White and Vila, 2017), the fields of entry mode strategies and government affiliation decisions in this newly liberalized market remain poorly investigated. Although all companies entering newly liberalized markets exhibit a certain grade of EO, internationalization strategies and EO are distinct fields of study (Jones and Coviello, 2005). Not all firms managed by highly entrepreneurial-orientated managers will decide to enter foreign markets and, on the contrary, domestic firms which are not interested in international markets can be run by highly entrepreneurial managers. This is due, in part, to the fact that internationalization can be driven by other factors. Therefore, this paper will attempt to demonstrate if certain entry modes will perform better than others when the foreign market is a newly liberalized economy. Additionally, the importance, and effect, of governmental relationships on performance outcomes will be tested within our research.



The remainder of this paper is structured as follows. First, the theoretical framework is developed to provide background and insight on the topic. Second, the theoretical framework also serves to provide the reader with the research that has been previously conducted on the various topics that affect the proposed hypotheses. Furthermore, the two EO levels of high and low will be tested against each other to determine which correlates more closely to firm performance. Lastly, the results will be analyzed in order to form managerial recommendations for companies in the USA that have a vested interest in entering the (soon-to-be) newly liberalized market of Cuba.

## Theoretical framework

### *The EO strategy*

Entrepreneurship does not refer to the idea of working for oneself in terms of self-employment. Following Lumpkin and Dess (1996), we define entrepreneurship as a new entry. As such, new entry explains “what entrepreneurship consists of, and entrepreneurial orientation describes how new entry is undertaken. New entry can be accomplished by entering new or established markets with new or existing goods or services” (Lumpkin and Dess, 1996, p. 136). In this line, previous literature has used several terms to describe the concept of EO as a generalized management process (Rauch, 2009). An entrepreneurship orientation refers to the processes, practices, and decision-making actions that lead to new entry (Matsuno *et al.*, 2002, pp. 136-137). In this paper, we will use the term EO following this popular approach (Rauch, 2009).

Regarding the factors underlying this term, strategic management and EO literature list three key elements to build EO: innovativeness, risk-taking, and proactiveness (Matsuno *et al.*, 2002). These factors do not always act together. Their application may be dependent on external factors, such as the industry or business environment, or internal factors, such as the organization structure or the characteristics of founders or general managers (Lumpkin and Dess, 1996). So, the three factors may vary independently, depending on the environmental and organizational context. We will explain more in the following text.

First, with regards to “innovativeness,” it is important to note that without this concept EO might very well not exist, as “innovativeness reflects a firm’s tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes” (Lumpkin and Dess, 1996, p. 142). New products or service introductions can fall into this category. Also, human resources and other financial commitments to innovation have been classified as product-market innovativeness (Lumpkin and Dess, 1996). Additionally, a firm’s innovativeness may be classified by the extent to which it emphasizes technological development and seeks to build a reputation for trying new methods and technologies (Lumpkin and Dess, 1996).

Second, with respect to “risk-taking,” we would like to remark that it is most commonly referred to in terms of the familiar risk-return trade off. From a strategic perspective, Thomas and Baird (1985) identified three types of strategic risk: venturing into the unknown, committing a relatively large portion of assets, and borrowing heavily (pp. 231-232). While managers do not always represent their firm’s proclivity toward risky endeavors, more often than not they will exemplify the EO of their entire company. “Presently, there is a well accepted and widely used scale based on Miller’s (1983) approach to EO, which measures risk-taking at the firm level by asking managers about the firm’s proclivity to engage in risky projects and managers’ preferences for bold versus cautious acts to achieve firm objectives” (Lumpkin and Dess, 1996, pp. 145-146).

Regarding the third factor, “proactiveness,” we will start indicating that the words proactiveness and initiative are interchangeable. It refers to the actions a firm takes compared to its competitors. Growth, vision, imagination, and first-mover advantage are all terms that can be used to describe the proactiveness of a firm. Proactiveness is

commonly used to depict a firm that is the quickest to innovate and first to introduce new products or services (Lumpkin and Dess, 1996). Therefore, consistent with Miller's (1983) definition, and in agreement with Lumpkin and Dess (1996), we can conclude that proactiveness refers to processes aimed at anticipating and acting on future needs (within the market or the firm) by seeking new opportunities (possibly including the present line of operations), introduction of new products (or services) and brands ahead of competition, and strategically eliminating operations which are in the mature or declining stages of life cycle. Again, introducing products ahead of competition does not necessarily indicate the first-mover advantage, rather that the product or service is introduced ahead of the majority of competing firms.

To summarize, in the present research we will align the characteristics of EO with that of Matsuno *et al.* (2002), Covin and Slevin (1989), Rauch (2009), and others, meaning only three elements (innovativeness, risk-taking, and proactiveness) are necessary to fully measure the EO of a firm.

To conclude, the existence of entrepreneurial-orientated managers can be crucial to enter into new markets, and more specifically, to enter newly liberalized markets. This is an emerging research topic concerning the transition from a socialist, state-controlled market mechanism into a market-based economy bringing about new forms of competition (Reijonen *et al.*, 2015). Newly liberalized markets have been referred to as privatized markets within the broad term emerging economy (Kumaraswamy *et al.*, 2012). Emerging economies, or markets, can include newly liberalized markets, along with nations that already facilitate a privatized market and are simply experiencing rapid growth.

In total, and following Sheth (2011), five dimensions can be identified in which newly liberalized markets differ from mature markets: first, market heterogeneity is often a common aspect of newly liberalized markets as they are underdeveloped when compared to modern economies; second, sociopolitical governance refers to the power exerted by public authorities (in the past) through direct law and social influence, thus privatization through government deregulation is a common instance of liberalization in action; third, unbranded competition means that the prospects for entering newly liberalized markets are high as there is little global competition in these markets; fourth, with regards to infrastructure, inadequacies generally accompany newly liberalized markets; and finally regarding resources, there is also a lack of resources in production, exchange, and consumption due to past restrictions.

Table I summarizes the five characteristics of new liberalized marketers, and how a firm can use them to enter these new markets.

One of the most recent, and interesting, newly liberalized markets is Cuba. Cuba's political and legal system would be classified as a coercive type of institutional isomorphism. In this instance, organizational decisions will be guided by the orientation of the state, its regulators, and political pressures on its sets of practices (Dimaggio and Powell, 1983). With Cuba not being a munificent environment, the state is very active. Close ties with the government are necessary to access resources, enjoy state favors, or compensate for a lack of factors such as institutional voids (Wang *et al.*, 2012).

Small, privately owned businesses were legalized throughout Cuba in recent years, but are scarce and heavily taxed. Outside multinational enterprises (MNEs) and small- and medium-sized enterprises alike have the technological, operational, and managerial expertise to quickly gain an advantage over these existing businesses. Large and small companies must establish trust and a working relationship with the government for any hope of developing a profitable business in Cuba. Large MNEs may be at an advantage with their ability to assist in infrastructure building. This business strategy would not only benefit a company's own operations, but will also provide value to potential consumers and establish a valuable relationship with the ruling communist government.

| Market characteristic            | Explanation of the characteristic  | Opportunity for an entrepreneur  |
|----------------------------------|--|--|
| 1. Market heterogeneity          | Local, fragmented, low scale, and often reflective of pre-industrialization  | Employ demand generation as the need for certain products or services has not yet been realized          |
| 2. Sociopolitical governance     | Strong power exerted by public authorities through direct law and social influence   | Creating relationships through government affiliation in order to curry favor                            |
| 3. Unbranded competition         | Not previously open to outside competition. Branded products usually do not exist or command much demand   | Utilize brand awareness to create a market place for certain products                                    |
| 4. Inadequate infrastructure     | Often lacking a basic network of operations including logistics, market transaction enablers, and basic banking functions. Also including a lack of communication, information, and transaction technologies | Establishing non-traditional production or selling methods in order to establish a competitive advantage |
| 5. Chronic shortage of resources | Lacking essential resources including not only natural resources, but production, exchange, and consumption resources as well  | Resource improvisation in order to avoid diseconomies of scale   |

**Source:** Based on Sheth (2011)

**Table I.**  
Newly liberalized  
market characteristics

#### *EO and entry mode strategies in a newly liberalized market*

Upon deciding to enter a foreign market, a firm must select its mode of entry. This decision involves a commitment of resources (ranging from various levels). Because altering the method of entry can cause considerable loss of time and money, making this decision is critical to future success in a foreign market. As the normative decision theory suggests, the choice of a foreign market entry mode should be based on trade-offs between risks and returns. Following this, a firm is expected to choose the entry mode that offers the highest risk-adjusted return on investment (Agarwal and Ramaswami, 1992, p. 3).

Several theories have attempted to demonstrate how entry mode strategies are chosen including: the resource-based theory (i.e. Madhok, 1997), transaction cost theory (i.e. Anderson and Gatignon, 1986), Dunning's (1980) eclectic or organizational, locational, internalization framework cite, and the organizational capability perspective among others (see Anderson, 1997; Nakos and Brouthers, 2002 for a deeper review). Each approach centers the lens on the influence of a different factor on entry mode decision making (i.e. managers' profile, cost savings, country characteristics, etc.).

We adopt the Upper Echelons theory suggested by Hambrick and Mason (1984), which states that companies are a reflection of their top managers, and their leadership. From this approach, organizational outcomes (strategic choices, entry mode strategy, and performance outcome) are partially predicted by managerial background characteristics. More specially, and following Simsek *et al.* (2010) and Herrmann and Datta (2006), a distinct dimension of the managers' profile has been studied in the present paper: its EO. As these authors posit, relationships between managers' characteristics (EO) and strategic choices in the international arena have been relatively unexplored. The following work will provide a brief description of the possible relationship between the entry mode strategy of a company and the EO of its manager, but in a specific type of environment: newly liberalized markets.

The most common modes of entry into new markets include exporting (direct and indirect), licensing, joint ventures, and foreign direct investment (FDI). Exporting and licensing can be classified as non-equity modes, while joint ventures and FDI are

equity-based modes of entry (Pan and Tse, 2000). The latter groups require more resources, and are riskier, but permit higher levels of control than the former.

Literature on entrepreneurship shows that EO is affected by top management features (Simsek *et al.*, 2010; Herrmann and Datta, 2006), and it is expected that a higher EO will be required by a general manager to implement equity-based entry modes, as far as entry mode selection is influenced by the initiator's characteristics (Hilmersson and Jansson, 2012).

From this approach, several works (Agarwal and Ramaswami, 1992; Anderson, 1997) have tested that riskier entry modes will be followed by more innovative, risk-taking, or proactive managers. This will occur especially when newly liberalized markets want to be entered (Del Sol, 2010). For example, in the work of Dunning (1988), the choice of entry mode correlates directly to a manager's EO by overlapping with innovativeness, risk-taking, and proactiveness. This is due to managers with a high EO looking for ownership advantages in order to be more innovative (Dunning, 1988). Further, they will look for location advantages to increase their proactiveness. As such, managers will prefer high-risk entry modes, such as joint ventures or FDI, to better control and protect their interests. Based on previous comments, it could be stated that:

- H1.* Highly entrepreneurial-orientated managers (higher innovativeness, proactiveness, and risk-taking) and lower entrepreneurial-orientated managers will differ in their entry mode strategies. The former will prefer high-risk entry modes, while the latter will prefer low-risk modes.

In the following lines, we will show how the three dimensions of EO are also connected to entry modes.

First, regarding innovativeness, a stream of literature (Anderson, 1997; Madhok, 1997; Nakos and Brouthers, 2002) supports that riskier entry modes (direct investment and joint ventures) will be associated with higher levels of managerial creativity. Examples include protecting their highly valued properties (Nakos and Brouthers (2002). Protection requires a larger investment, even more when entering newly liberalized markets because potential competition is even more intense. The problem is that equity-based entry modes also bear more financial risk at the same time. Therefore, it could be stated that:

- H1a.* Highly innovative managers and less innovative managers will differ in their entry mode strategies. The former will prefer high-risk entry modes, while the latter will prefer low-risk entry modes.

Second, regarding proactiveness, previous works (Ripollés *et al.*, 2012; Datta *et al.*, 2009) support that taking initiative is most commonly done through high resource commitment entry modes. That is, if a firm has a proactive strategy, riskier entry modes will be pursued. The reason is that early internationalization is important when developing an international market orientation, especially when discovering newly (or even virgin) liberalized markets. Datta *et al.* (2009) referred to two groups, prospectors (preferring equity-based entry modes) and defenders (preferring non-equity-based entry modes). In their conclusions, they state that prospectors (managers exhibiting more initiative than their competitors) competencies often exist in the form of idiosyncratic organizational attributes that encourage equity-based (riskier) entry modes. For defenders, cost and efficiency are more important orientations, which leads to a greater tendency to use non-equity-based (less-risky) entry modes. Therefore:

- H1b.* Highly proactive managers and less proactive managers will differ in their entry mode strategies. The former will prefer high-risk entry modes, while the latter will prefer low-risk modes.

Finally, regarding risk-taking behavior, it is also evident that risk-taking firms will adopt riskier entry modes. Risk-taking not only includes financial commitments, but also a firm's willingness to venture into unknown territory. Datta *et al.* (2009) summarize that risk-taking

managers will favor uncertain endeavors such as product introduction and market exploration while seeking higher returns over an extended period of time. Equity modes, being the riskier entry modes, favor this attitude toward risk. As with innovativeness, and proactiveness, managers of firms with higher risk-taking characteristics will prefer these entry modes. To the contrary, managers that are unwilling to accept these levels of risks will prefer non-equity entry modes as a means curve the risks taken by their company. Datta *et al.* (2009) also clarify that firms can not only be risk-tolerable or intolerable, but also risk-seeking vs risk-averse. In sum, as risk-taking firms will accept these uncertainties, they are more likely to pursue riskier entry (equity-based) entry modes. Therefore:

*H1c.* Highly risk-taking managers and less risk-taking managers will differ in their entry mode strategies. The former will prefer high-risk entry modes, while the latter will prefer low-risk modes.

#### *EO and government affiliation level in a newly liberalized market*

To complete our proposal, a second characteristic of managers, and their firms, is included, that is, their preferred level of government affiliation. While all companies must meet governmental requirements set by law, some firms seek a competitive advantage to create, or maintain, a high level of government affiliation, especially when entering newly liberalized markets (Wang *et al.*, 2012).

The level of government affiliation refers to the hierarchical level of government where the relationship exists with the firm. That is, a manager may choose to have a relationship with a public government at a different level: state, provincial, city, or county. Sheth (2011) and Wang *et al.* (2012) indicate that firms with higher entrepreneurial-orientated managers will adopt strategies that rely more on their firm's internal capabilities rather than governmental affiliation. For example, increased proactiveness leads to the mentality that being ahead of competitors is of more importance than taking time to cultivate intense governmental affiliation. In a research conducted by Wang *et al.* (2012), it is shown that when managers rely excessively on political actors, entrepreneurial activities may decline. High EO managers will then be more self-reliant than managers exhibiting low EO.

In contrast, less entrepreneurial-oriented managers will be more likely to utilize governmental relationships in order to gain a competitive advantage. That is because they feel less secure in the existing strategic infrastructure, with incomplete managerial and operational plans. For these firms, creating strong relationships with the governing body is essential in order to curry favor, compete with local businesses ("favored sons"), and influence the development of new institutional mechanisms that go along with unfamiliar forms of governance (Sheth, 2011). Examples (of "favored sons") in newly liberalized markets include Gazprom (Russia), Petrobras (Brazil), CNOOC (China), and India Coal (India) among others (Sheth, 2011, p. 168). So, it can be stated that:

*H2.* Managers with a high EO (higher innovativeness, proactiveness, and risk-taking) and managers with a low EO will differ in their level of government affiliation strategies. The former will prefer low levels of affiliation, while the latter will prefer strong affiliation.

#### *EO and performance outcomes*

Lastly, several works (Lumpkin and Dess, 1996; Matsuno *et al.*, 2002; Miller and Camp, 1985; Miller, 2011; Rauch, 2009; Boso *et al.*, 2013; Zhang *et al.*, 2014; Lonial and Carter, 2015) have researched the relationship between EO and firm performance outcomes. As these authors explain, firms enter new markets to achieve success, and this will occur if they are managed following entrepreneurial principles. This is because earnings increase when new products and markets are discovered ahead of competitors.

In spite of this, although previous literature shows a relationship between EO and firm performance outcomes (Lonial and Carter, 2015), the link between both concepts might not occur. Recent research states that the context in which a firm operates can affect this relationship. Indeed Fadda and Sørensen (2017) underline that the attractiveness of the location in which a firm operates might moderate the EO-performance relationship. From this line of research, some environmental factors in newly liberalized markets could angulate the positive impact of EO on company performance outcomes. Thus, as the contingency theory states, a single organizational model with success in all contexts does not exist (Fadda and Sørensen, 2017).

However, we are interested in studying how firms perform in newly liberalized markets, which could be considered “attractive environments” for entrepreneurs. So, we could state that:

- H3.* Highly entrepreneurial-orientated managers (higher innovativeness, proactiveness, and risk-taking) and less entrepreneurial-orientated managers will differ, as will the performance levels of their firms. The first group will obtain better performance outcomes (results) than the second group.

## Methodology

### *Sample*

Within this framework, the EO of decision-making managers was measured; a total of 81 managers from firms within the USA that currently conduct business internationally and have an expressed desire to enter the Cuban market took part in our survey. No company had more than one manager surveyed. Firms headquartered outside of the US were not included in the population. US managers were chosen for our research because of their proximity to Cuba, which explains past business interactions between the nations many years ago (Perez-López, 2012), and a perceived opportunity for (and desire of) US business operations in Cuba (Hingtgen *et al.*, 2015) within the near future.

The majority of respondents were contacted personally via an event sponsored by the US Chamber of Commerce. The response rate was 68 percent (the questionnaires were sent to those who agreed to participate). Previous works interested in connecting EO to success have also used a similar sample size (89 firms in the study of Poon *et al.*, 2006; 94 firms in the study of Lumpkin and Dess, 2001). In order to validate the representative sample, this study assessed the effects of non-response (Huang, 2016). To this end, we compared the first round of responses (50 earlier respondents) with the second round (31 later respondents). We then used a *t*-test to find the key characteristics of early and late responses (such as age, gender, and industry). Based on a 5 percent significance level, the groups do not show significant differences. Furthermore, we would like to state that this is a convenience sample defined to achieve preliminary exploratory objectives.

All industry sectors were included with questionnaire invitations, with none being discriminated or favored. Companies with both B2B and B2C operations were included. Table II summarizes the sampling procedure and the profile of the respondents. Figure 1 reflects the various industry sectors represented by the respondents.

### *Analytical technique*

To test *H1*, the population was divided into two groups according to their EO level (high and low) following previous literature (Miller, 1983; Covin and Slevin, 1989). The median value was used to define the groups (Hult *et al.*, 2004).

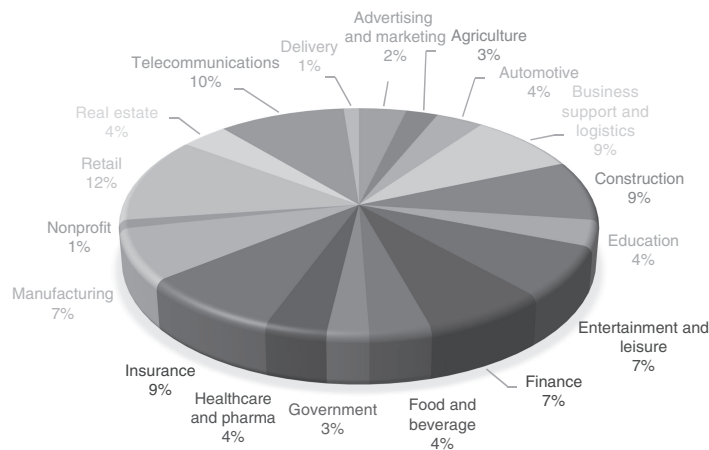
Then, several one-way ANOVA tests were done to compare both groups. Regarding their entry mode strategies, and as in previous works, the variables of innovativeness, proactiveness, and risk-taking acted as the three independent variables (Miller, 1983;



|                  | Age (%)   | Gender  | Number of employees (%)                                     | B2B, B2C, or both(%)           |
|------------------|---|---|---|--------------------------------|
| Total population | < 26: 5<br>26-29: 6<br>30-39: 16<br>40-49: 21<br>50-59: 30<br>60+: 22 | Masculine: <i>n</i> = 46 (57%)<br><br>Feminine: <i>n</i> = 35 (43%) | < 10: 15<br>10-19: 14<br>20-49: 12<br>50-99: 12<br>100+: 46 | B2B: 25<br>B2C: 20<br>Both: 55 |

- Total respondents: 81 US managers. Convenience sample
- Only firms within the USA, and with existing international business operations
- Marketing directors or general managers only, with one respondent per company
- The firms must have an interest in entering the Cuban market
- Online platform using Google Forms. No telephoning, or person-to-person interaction
- Social media and e-mail invitations used to encourage participation

**Table II.**  
Profile of the 81  
survey respondents



**Figure 1.**  
Summary of industry  
sectors represented by  
the total population

Covin and Slevin, 1989; Miller and Friesen, 1982; Matsuno *et al.*, 2002) and entry modes as the dependent variable.

Additionally, to test *H2* and *H3* a series of *t*-tests for independent samples were conducted. In both cases, a second-order factor (Matsuno *et al.*, 2002) of EO was applied. To this end:

- (1) The first-order factors (Matsuno *et al.*, 2002) of innovativeness, proactiveness, and risk-taking were first analyzed with participants having either low or high levels of each dimension (Miller, 1983; Covin and Slevin, 1989; Miller and Friesen, 1982; Matsuno *et al.*, 2002). Specifically, the means of these three factors were calculated to divide our sample into two different groups: high EO (46 managers) and low EO (35 managers). The chosen cut points were the means of each factor: 2.24 for innovativeness, 2.65 for proactiveness, and 1.83 for risk-taking. These cut points were chosen because, as previous authors have stated (Covin and Slevin, 1989; Miller and Friesen, 1982), the mean is an appropriate indicator for cut points.
- (2) Then, the mean for all three combined factors was calculated to be 1.36. In this case, those participants whose individual mean (the combination of all three dimensions) was below the population's mean were determined to have a "low EO." Contrary to this, those above the population's mean were classified as having "high EO."



To conclude, it must be added that four Cronbach's  $\alpha$  tests were done (one for each scale used in our study) to test the reliability of each scale with a generally accepted guideline of 0.70 (Nunnally and Bernstein, 1994).

#### *Scales used*

All items in the questionnaire were adapted from published works that were relevant to our study, as shown in Table III:

- To measure the three characteristics of EO, we used the work of Covin and Slevin (1989) and Miller and Friesen (1982) as a starting point. This proposal was actualized considering works such as the Lonial and Carter (2015) and Datta *et al.* (2009) (Table III).
- In order to create a scale for entry modes, the work of Agarwal and Ramaswami (1992), Dunning (1988), and Anderson (1997) were used. One multiple choice question asked the respondents to choose one of the four entry modes options as their preferred method when entering new markets. That is, the internationalization levels can vary from 1 (lowest level) to 4 (highest level): exporting, subsidiaries (opening commercial points), joint ventures, and other external alliances, and FDI firms.
- Regarding government affiliation, the works of Sheth (2011) and Wang *et al.* (2012) were followed and three questions were included in our questionnaire (Table III).
- When measuring firm performance items were included following the work of Boso *et al.* (2013) (Table III).

#### *Scale reliability*

As Table III shows, as a test of reliability, Cronbach's  $\alpha$  was used with a generally accepted guideline of 0.70 (Nunnally and Bernstein, 1994). The reliability of each dimension proved strong with innovativeness being 0.84, proactiveness 0.76, and risk-taking 0.71. Cronbach's  $\alpha$  measure for EO is 0.77, which is also above the generally accepted guideline of 0.80 (Nunnally and Bernstein, 1994).

### **Results**

#### *EO dimensions and entry modes*

As our results show in Table IV, hypothesis cannot be confirmed, because the group of firms with higher level of EO do not prefer riskier entry modes (joint ventures or FDI) than firms with lower levels of EO in a significant manner ( $F = 0.570$ ;  $p = 0.452$ ). Both groups do not differ significantly. The variance caused by interactions between both groups does not differ from the variance found inside values within each single group. This result does not follow previous works such as those of Goodnow and Hansz (1972), Agarwal and Ramaswami (1992), Anderson (1997), Datta *et al.* (2009), and Pan and Tse (2000); possibly due to the characteristics of Cuba as our chosen newly liberalized market.

To analyze the link between EO and entry mode selection more specifically, a different analysis was performed considering each EO factor separately (innovativeness, proactiveness, and risk-taking). Our analysis has shown the following results.

First, regarding innovativeness, our data cannot confirm *H1a* ( $F = 0.182$ ;  $p = 0.670$ ) as the statistics in Table IV illustrate. That is, managers with a high innovativeness characteristic are not more likely to favor risky entry modes compared to less innovative managers (innovative managers and non-innovative managers do not differ significantly in their entry mode strategy).

Second, regarding proactiveness, *H1b* cannot be confirmed ( $F = 0.753$ ;  $p = 0.388$ ). Again, our results show that highly proactive managers and less proactive managers do not differ

|  | Number<br>of items<br>( <i>n</i> ) | Mean  | Variance | Significance<br>level ( <i>p</i> ) | SD    | Cronbach's<br>reliability<br>( $\alpha$ ) |
|--|------------------------------------|-------|----------|------------------------------------|-------|---|
| <i>Managers' entrepreneurial orientation EO (H1)</i>   | <i>n</i> = 14                      | 30.91 | 54.06    | <i>p</i> = 0.000**                 | 7.35  | $\alpha$ = 0.77                           |
| Innovativeness ( <i>H1a</i> )  | <i>n</i> = 4                       | 8.98  | 15.90    | <i>p</i> = 0.25                    | 3.98  | $\alpha$ = 0.84                           |
| We are usually first-to-market with new products or services   |                                    | 2.10  |          |                                    | 1.15  |   |
| I encourage the development of innovative marketing strategies, knowing well that some will fail   |                                    | 2.30  |          |                                    | 1.22  |   |
| I value creative new solutions more than the solutions of conventional wisdom  |                                    | 2.33  |          |                                    | 1.14  |   |
| Our R&D team embraces new ideas and exemplifies technological leadership   |                                    | 2.25  |          |                                    | 1.32  |   |
| Proactiveness ( <i>H1b</i> )   | <i>n</i> = 4                       | 10.59 | 9.89     | <i>p</i> = 0.000**                 | 3.15  | $\alpha$ = 0.76                           |
| Play it safe   |                                    | 2.17  |          |                                    | 1.19  |   |
| Risk-reducing  |                                    | 2.19  |          |                                    | 1.09  |   |
| Debt seeking   |                                    | 1.86  |          |                                    | 1.08  |   |
| Uncertainty is not a priority for me   |                                    | 1.10  |          |                                    | 1.04  |   |
| Risk-taking ( <i>H1c</i> )   | <i>n</i> = 6                       | 11.35 | 9.28     | <i>p</i> = 0.000**                 | 3.05  | $\alpha$ = 0.71                           |
| I accept risks   |                                    | 2.58  |          |                                    | 0.92  |   |
| Lack of confidence   |                                    | 1.44  |          |                                    | 1.13  |   |
| I think that change creates opportunities  |                                    | 2.72  |          |                                    | 0.87  |   |
| I prefer opportunities over problems   |                                    | 2.19  |          |                                    | 1.14  |   |
| Introduce ahead of competition   |                                    | 2.91  |          |                                    | 1.06  |   |
| Anticipate future demand   |                                    | 2.78  |          |                                    | 1.03  |   |
| Importing current processes and operations used in other countries and adapting as needed  |                                    | 2.49  |          |                                    | 1.16  |   |
| Importing current processes and operations and forcing them to work in a new environment   |                                    | 2.15  |          |                                    | 1.28  |   |
| Adapting to (or creating) a local infrastructure through non-traditional channels  |                                    | 1.78  |          |                                    | 1.15  |   |
| <i>Government affiliation (H2)</i>   | <i>n</i> = 3                       |       | 4.275    | <i>p</i> = 0.5**                   |       | $\alpha$ = 0.70                           |
| When entering a newly liberalized market, which hierarchal level of government is the most important for you when establishing relationships?                        |                                    | 5.00  |          |                                    | 5.082 | $\alpha$ = 0.76                           |
| How intensive (closely integrated) will your relationship be with the level of government selected in the previous question? (1: least intensive, 5: most intensive) |                                    | 2.56  |          |                                    | 1.37  |   |
| When entering a newly liberalized market, how important is the government affiliation to your company's strategy?  |                                    | 2.44  |          |                                    | 1.28  |   |
| <i>Firm global performance: compared to your main competitors, mark your company's level of performance spanning the last three financial years (H3)</i>             | <i>n</i> = 14                      | 31.17 | 91.020   | <i>p</i> = 0.000**                 | 9.540 | $\alpha$ = 0.93                           |
| 1. Overseas markets  |                                    | 2.12  |          |                                    | 1.05  |   |
| 2. Revenue growth  |                                    | 2.32  |          |                                    | 1.11  |   |
| 3. Profitability   |                                    | 2.43  |          |                                    | 1.05  |   |

**Table III.**  
Reliability statistics  
for the scales  
(continued)

|                                 | Number<br>of items<br>( <i>n</i> ) | Mean | Variance | Significance<br>level ( <i>p</i> ) | SD   | Cronbach's<br>reliability<br>( $\alpha$ ) |
|---------------------------------|------------------------------------|------|----------|------------------------------------|------|---|
| 4. Overall performance          |                                    | 2.52 |          |                                    | 0.99 |   |
| 5. Profit to revenue ratio      |                                    | 2.46 |          |                                    | 0.92 |   |
| 6. Cash flow                    |                                    | 2.30 |          |                                    | 0.98 |   |
| 7. Net profit                   |                                    | 2.44 |          |                                    | 0.94 |   |
| 8. ROI                          |                                    | 2.51 |          |                                    | 0.91 |   |
| 9. ROA                          |                                    | 2.44 |          |                                    | 0.87 |   |
| 10. Market share gain           |                                    | 2.17 |          |                                    | 1.15 |   |
| 11. Service quality             |                                    | 2.48 |          |                                    | 0.99 |   |
| 12. Competitive profile         |                                    | 2.74 |          |                                    | 0.95 |   |
| 13. Growth estimate for 5 years |                                    | 2.23 |          |                                    | 1.00 |   |
| 14. Net profit                  |                                    | 2.44 |          |                                    | 0.94 |   |

**Notes:** Typical five-point Likert scales were used to measure each concept. EO (innovativeness; proactiveness, and risk-taking) (1 = totally disagree; 5 = totally agree). Government affiliation (1 = less intensive; 5 = most intensive) (1 = not important; 5 = critically important). Firm global performance (1 = much worse than my competitors; 5 = generally outperforming my competitors). \*\*Statistically significant at  $P \leq 0.001$

Table III.

|  | Sum of squares | df | Mean square | <i>F</i> | Sig.  | Hypothesis |
|--|----------------|----|-------------|----------|-------|------------|
| Entrepreneurial orientation and entry mode |                |    |             |          |       | <i>H1</i>  |
| Between groups                             | 70.785         | 1  | 0.785       | 0.570    | 0.452 | Rejected   |
| Within groups                              | 108.795        | 79 | 1.377       |          |       |            |
| Total                                      | 109.580        | 80 |             |          |       |            |
| Innovativeness and entry mode              |                |    |             |          |       | <i>H1a</i> |
| Between groups                             | 0.252          | 1  | 0.252       | 0.182    | 0.670 | Rejected   |
| Within groups                              | 109.328        | 79 | 1.384       |          |       |            |
| Total                                      | 109.580        | 80 |             |          |       |            |
| Proactiveness and entry mode               |                |    |             |          |       | <i>H1b</i> |
| Between groups                             | 1.034          | 1  | 1.034       | 0.753    | 0.388 | Rejected   |
| Within groups                              | 108.546        | 79 | 1.374       |          |       |            |
| Total                                      | 109.580        | 80 |             |          |       |            |
| Risk-taking and entry mode                 |                |    |             |          |       | <i>H1c</i> |
| Between groups                             | 0.537          | 1  | 0.537       | 0.389    | 0.535 | Rejected   |
| Within groups                              | 109.043        | 79 | 1.380       |          |       |            |
| Total                                      | 109.580        | 80 |             |          |       |            |

Table IV.  
Entrepreneurial  
orientation and  
entry mode

**Notes:** \* $p < 0.05$ ; \*\* $p < 0.001$

in their entry mode strategy (Table IV). That is, more proactive managers will not prefer riskier entry modes (joint ventures and FDI) when compared to reactive managers, which will not prefer less-risky entry modes (exporting and licensing).

Finally, regarding risk-taking behavior, our data do not allow us to confirm *H1c* ( $F = 0.389$ ;  $p = 0.535$ ). As Table IV shows, riskier managers will not prefer riskier entry modes, while reactive managers will not prefer less-risky entry modes. Both groups will enter newly liberalized markets following similar internationalization strategies.

In sum, EO is not related to entry mode selection. High EO firms and low EO firms act equally. Both groups prefer simple entry modes (such as exporting and licensing). Additionally, both groups avoid riskier entry modes (such as FDI). This result is consistent with the explanations provided by Ortega *et al.* (2016, p. 25), who remarked that “developing economies are characterized by high levels of uncertainty in business

environment; volatility and rapid developments in consumer demand; not always stable political systems; legal systems relatively weak; important role of social networks in exchange." Given the high risk of failure, this explains the preference for simple entry modes in both groups.

#### *EO and government affiliation*

Regarding government affiliation, and based on our results, *H2* cannot be confirmed ( $F = 0.098$ ;  $p = 0.755$ ). As the data in Table V show, the preferred level of government affiliation is almost identical between both EO levels. The means do not significantly differ between the groups. In sum, managers with a low EO level do not place more importance on government affiliation and do not favor a greater intensity of those relationships than managers with a high EO level, as stated in *H2*. Both groups of managers believe that a solid level of government affiliation is important for the company's strategy because, in line with Ortega *et al.* (2016, p. 25), "challenges stem from institutional voids (i.e. imperfect markets) and institutional uncertainty (i.e. changing rules, corruption). Institutional voids refer to imperfections in the market mechanisms caused by the lack of appropriate market supporting institutions, while institutional uncertainty is created by the expectation that the institutional rules governing businesses could change unpredictably."

#### *EO and firm performance*

Regarding the link between EO and global performance, *H3* can be confirmed based on our data ( $F = 1.593$ ;  $p = 0.093$ ). As Table VI shows, the means for managers with high EO levels report better performance results than managers with low EO levels in all categories (except for net profit). Therefore, it can be concluded that managers with a high EO level will perform better in newly liberalized markets.

Based on our previous results, entry mode strategies and governmental affiliation strategies cannot be used to explain the superior performance of North American firms entering Cuba. It is likely that high and low EO firms differ in other decisions that justify their performance differences. In short, three main points could explain why *H1* and *H2* could not be confirmed, that is, why US entrepreneurs in our sample are reluctant to undertake large investments and prefer a solid level of government affiliation:

- (1) Cuba is a new liberalized market with some particular properties (Ortega *et al.*, 2016, p. 25) toward which the American managers still show prudence because of the high risk of failure.

| Entrepreneurial orientation and government affiliation ( <i>H3</i> )   | <i>F</i> : 0.098 |          | <i>p</i> = 0.755 |       | <i>H2</i> | Rejected<br>SE mean |
|--|------------------|----------|------------------|-------|-----------|---------------------|
|  | EO               | <i>n</i> | Mean             | SD    | SD        |                     |
| When entering a newly liberalized market, which hierarchical level of government is the most important for you when establishing relationships?                      | Low EO           | 35       | 2.29             | 1.426 | 0.241     |                     |
|  | High EO          | 46       | 2.28             | 1.471 | 0.217     |                     |
| How intensive (closely integrated) will your relationship be with the level of government selected in the previous question? (1: least intensive, 5: most intensive) | Low EO           | 35       | 2.51             | 1.222 | 0.206     |                     |
|  | High EO          | 46       | 2.39             | 1.325 | 0.195     |                     |
| When entering a newly liberalized market, how important is the government affiliation to your company's strategy?  | Low EO           | 35       | 2.71             | 1.467 | 0.248     |                     |
|  | High EO          | 46       | 2.43             | 1.294 | 0.191     |                     |

Notes: \* $p < 0.05$ ; \*\* $p < 0.001$

**Table V.**  
Entrepreneurial  
orientation and  
government affiliation

**Table VI.**  
Entrepreneurial  
orientation (EO) and  
managerial  
performance

| EO and global results  |  | H3: accepted<br>F: 1.593 ( $p = 0.093$ ) |          |      |
|--|--|--|----------|------|
| Entrepreneurial orientation and global results (performance + financial) |  | EO                                       | <i>n</i> | Mean |
| Overseas markets   |  | Low EO                                   | 35       | 1.83 |
|  |  | High EO                                  | 46       | 2.35 |
| Revenue growth   |  | Low EO                                   | 35       | 1.94 |
|  |  | High EO                                  | 46       | 2.62 |
| Profitability  |  | Low EO                                   | 35       | 2.33 |
|  |  | High EO                                  | 46       | 2.52 |
| Overall performance  |  | Low EO                                   | 35       | 2.26 |
|  |  | High EO                                  | 46       | 2.72 |
| Profit to revenue ratio  |  | Low EO                                   | 35       | 2.40 |
|  |  | High EO                                  | 46       | 2.50 |
| Cash flow  |  | Low EO                                   | 35       | 2.20 |
|  |  | High EO                                  | 46       | 2.37 |
| Net profit   |  | Low EO                                   | 35       | 2.46 |
|  |  | High EO                                  | 46       | 2.43 |
| ROI  |  | Low EO                                   | 35       | 2.34 |
|  |  | High EO                                  | 46       | 2.63 |
| ROA  |  | Low EO                                   | 35       | 2.26 |
|  |  | High EO                                  | 46       | 2.39 |
| Market share gain  |  | Low EO                                   | 35       | 1.71 |
|  |  | High EO                                  | 46       | 2.52 |
| Service quality  |  | Low EO                                   | 35       | 2.20 |
|  |  | High EO                                  | 46       | 2.70 |
| Competitive profile  |  | Low EO                                   | 35       | 2.40 |
|  |  | High EO                                  | 46       | 3.00 |
| Growth estimate for 5 years  |  | Low EO                                   | 35       | 1.80 |
|  |  | High EO                                  | 46       | 2.57 |

- (2) The profile of our sample mainly includes managers from US firms of certain age (52 percent > 50 years old) preferring secure entry modes and traditional relations with the Cuban Government.
- (3) EO (innovativeness, proactiveness, and risk-taking) permits to explain why some firms performed better than others, even when adopting the same entry mode strategy and sharing a common government affiliation level.

### Conclusions, managerial implications, and limitations

First, our hypothesis stating that managers with a high EO will prefer riskier entry modes than managers with a low level of entrepreneurial has not been confirmed (*H1*). The subsequent sub-hypotheses referring to each of the three factors composing EO (innovativeness, proactiveness, and risk-taking) were also not confirmed based on our data. So, in our sample, entry modes and EO are unlinked terms. That is, managers from the USA entering the Cuban market with different EOs will not act differently when selecting their entry mode strategy. Riskier entry modes (such as joint ventures or FDI) will not be favored by more entrepreneurial-orientated managers. This finding refutes many published works including Agarwal and Ramaswami, (1992), Dunning (1988), and Anderson (1997). The profile of our sample population (managers from US firms) combined with the selected market (Cuba) may clarify this curious result. Specifically, the lack of participants in our sample preferring riskier entry modes when entering newly liberalized markets (i.e. joint ventures or direct manufacturing abroad) explains the absence of differences between our two groups. That is, the degree of internationalization is the same (low) for both groups of

managers (high and low EO levels). The conditions of the Cuban market can help to explain this result, given the past characteristics of the Cuban market as well as the relative unknowns within the current economy and political environments. These facets may justify the hesitation of entrepreneurs to undertake large investments during the initial phase of internationalization.

The second hypothesis stating that managers with a high EO will prefer lower levels of government affiliation than managers with a low level of EO was neither confirmed (*H2*). The means of these two groups was so close that a significant difference could not be determined. Both groups of managers prefer stronger levels of affiliation with the Cuban Government.

Lastly, a significant and positive link between EO level and firm performance was confirmed. Managers with high EO levels illustrated better firm performance measures (against their competitors) in 13 out of 14 categories of measurement. This states that managers with a high EO perform better than managers with a low EO. However, neither their entry mode strategies, nor their government affiliation strategies could be used to explain this success.

Our results are proof that US companies must consider their own EO when entering newly liberalized markets. So, some managerial implications will be recommended.

First, we recommend increasing the EO of firm managers to achieve success abroad. As our research has demonstrated, this characteristic is directly linked to higher firm performance. Whether becoming more innovative through R&D investment, more proactive by acting ahead of their competitors, or by growing their tolerance for risk-taking, firms must raise the level of their EO before deciding to enter Cuba. Some ways to improve the EO of the managers in charge of entering new markets could be to create "managerial terms" to establish focal points with clear goals. Also, designing the entry process in a collaborative way, sharing their points of view, and their responsibilities can spur innovativeness within a company. A crucial factor that managers must devise is a clear map of the opportunities and thoughts of the market to enter. First-hand knowledge can be attained by visiting or living for a period in the desired market in order to gain a better understanding of the culture and business landscape. With this in mind, we recommend incentivizing managers' international mobility.

Second, firms must select the correct form of entry mode. While our data do not show a link between entry mode and EO, it is still a crucial decision that must be carefully chosen. In this sense, we recommend to start with less-risky entry modes because, as our results have shown, managers in both samples tend to favor this strategy at the beginning of the internationalization process. Then, with time, it could be recommended to elevate operations in terms of riskier entry modes that involve a larger commitment of resources. So, a gradual entry mode strategy is recommended for firms of all EO levels.

Third, while government affiliation has been known to curry favor for certain companies, it must not be a focal point of firms when entering newly liberalized markets. This is a grey area when Cuba is the market being considered. The political climate is strict, but changing rapidly in the direction of a more open market. Because we find that government affiliation is not correlated with a high level of EO (or firm performance), we do not advocate it as a focal point. That being said, when entering the Cuban market, the circumstances change and political consideration must be given in some capacity. However, we would not recommend government affiliation as a top strategic priority.

Fourth, as our results have demonstrated, a likely method of improving performance is to be more innovative, proactive, and tolerant of risk. Therefore, to be more innovative, we would recommend investing more in R&D or placing more value on future demand rather than focusing on short-term demand. To be more proactive, companies could gain more knowledge of their competitors' activities and competences in order to spur competitiveness. This mentality must be maintained through a will to stay ahead in the market place.

A company's risk tolerance can grow through a willingness to take on debt and commit resources to new ventures in newly liberalized markets.

Finally, after comparing the literature review with the results of the conducted survey, it is evident that while EO is well researched, it is undervalued in the business community. With so many new analytics tools available today, firms can (and must) easily calculate their own EO scores and decipher a way to grow that number. In this sense, this paper recommends that US companies become smarter and better equipped with this knowledge when entering the Cuban market.

This study has some limitations that could inspire further research. First, the size of the sample is not large enough as only 81 managers took part in the survey. Second, as the information gathered was subjective, rather than objective, there is room for bias on the part of the managers. Additionally, personal opinions and a lack of knowledge of competitors may have created overvalued, or misleading, data. To overcome these limitations, future works could be developed using higher samples, objective data, and more cross-analyses (i.e. considering the existence of possible perceptual differences among general managers).

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