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Non-rational herding in reward-based crowdfunding: a field experiment

Conducta gregaria irracional en crowdfunding de recompensa: experimento de campo

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Abstract: reward-based crowdfunding is becoming a very attractive funding alternative for early-stage entrepreneurial initiatives. Among the factors that may facilitate the success of such campaigns is herd behavior, i.e., the tendency to imitate the funding decisions of previous sponsors. The herd effect has been shown to be robust in previous research works as a rational act that supports campaigns more likely to achieve the funding goal, i.e., to succeed. This paper goes beyond that empirical result from previous literature and analyzes whether herd behavior occurs in reward crowdfunding even without the rational factor, as a simple imitation of previous behavior, regardless of the rational motivation for project success. For this purpose, a field experiment is designed and executed in a real crowdfunding campaign for a cultural project on the Verkami platform, the most powerful platform for cultural projects in Spain. This field experiment is designed to analyze the causality between the decisions of previous sponsors on the color of a reward and the choices of subsequent sponsors. The results clearly show nonrational herd behavior in the choices of subsequent sponsors in reward crowdfunding, who mostly choose the same color as the initial contributions. Practical implications for campaign design and its possible consequences are discussed in the article.

Keywords: consumer behavior, crowdfunding, experiments, field experiment, herd behavior, peer effects, sharing economy, SME.

Resumen: El crowdfunding de recompensa es una interesante alternativa de financiación para iniciativas emprendedoras en su etapa inicial. Entre los factores que facilitan el éxito en dichas campañas destaca el comportamiento gregario, es decir, la tendencia a imitar las decisiones de financiación de los anteriores mecenas. El efecto gregario, o de rebaño, se ha demostrado robusto en investigaciones anteriores como un acto racional que apoya campañas con mayor probabilidad de conseguir el objetivo de financiación impuesto, su éxito. En este artículo se va más allá de ese resultado empírico de la literatura previa y se analiza si el comportamiento gregario se produce en el crowdfunding de recompensa incluso sin factor racional, como simple imitación de un comportamiento anterior, independientemente de la motivación racional del éxito del proyecto. Para ello, se diseña y ejecuta un experimento en una campaña real de financiación de un proyecto cultural en la plataforma Verkami, la más potente para proyectos culturales en España. Este experimento de campo permite analizar la causalidad entre las decisiones de los mecenas anteriores sobre el color de una recompensa y las elecciones de los mecenas siguientes. Los resultados muestran claramente un comportamiento gregario no racional en las elecciones de los siguientes mecenas en el crowdfunding de recompensa, que escogen mayoritariamente el mismo color que las aportaciones iniciales. El artículo confirma la importancia del componente no racional en la conducta gregaria en crowdfunding.

Palabras clave: comportamiento del consumidor, comportamiento gregario, crowdfunding, economía colaborativa, efectos de grupo, experimentos, experimento de campo, PYME.

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Introduction

In recent times, the progress in the use of online technologies has affected all corporate areas. One of these areas is funding, which can actually benefit from crowdfunding or micro-sponsoring. The crowdfunding differs from traditional funding methods in that a crowd of individuals, the sponsors, provide funds directly to the entrepreneurs, normally online; thus, the crowdfunding platforms acquire the role of a new type of intermediary that brings together online demanders of funds and an enormous crowd of small funds providers (Cosh *et al.*, 2009; Leboeuf and Schwienbacher, 2018).

Nevertheless, this crowd of small funds providers may exhibit particular biases in their behavior, that should be known before presenting a funding campaign. The herd behavior, i.e., the trend to imitate the funding decisions of previous sponsors, stands out among these biases (Huang, Chen, 2006; Drehmann *et al.*, 2007; Muchnik *et al.*, 2013; Van de Rijt *et al.*, 2014; Sasaki, 2019; Wessel *et al.*, 2019). The herd effect has been shown to be robust in previous research works as a rational act that supports campaigns more likely to achieve the funding goal, i.e., to succeed (Zhang, Liu, 2012; Kuppuswamy and Bayus, 2017; Zaggl and Block, 2019; Chan *et al.*, 2020; Comeig *et al.*, 2020).

However, it is important to know if it also occurs a nonrational herd effect in the crowdfunding, in addition to this rational herd behavior, and how it would help to know with more depth the possibilities of the total herd effect. This would help to improve the design of such funding campaigns. Due to the large extent of the herd behavior in crowdfunding, it is enormously important for early-stage entrepreneurial initiatives to understand the mechanisms that drive the herd effect.

Therefore, to learn how nonrationality may be integrated in the herd behavior is important for designing strategies for herd managing, so that entrepreneurial initiatives may learn and use such knowledge.

The previous empirical research works have not causally and separately analyzed rational and nonrational herd behavior in the reward-based

crowdfunding campaigns. The causality factor is important because, for example, it is possible that initiatives funded by a crowd of sponsors may have gotten their support due to a big attractive or, alternatively, that they became attractive because a crowd of sponsors were backing them. This empirical limitation may be overcome with the use of random economic experiments that enable to analyze causality, i.e., the effect of a variable on the decisions (Antonakis *et al.*, 2010).

This work intends to start covering that lack of empirical analyses, designing and executing a field experiment aimed at knowing the separate effect of nonrational herd behavior of sponsors in a reward-based crowdfunding campaign. In other words, as a behavior of simple imitation of a previous behavior, independently of the rational motivation of the success of the project. For this purpose, it is designed and executed an experiment in a real funding campaign of a cultural project in the Verkami platform, the most powerful platform for cultural projects in Spain.

This field experiment can be used to analyze the causality between the decisions of the previous sponsors about the color of a reward and the choices of subsequent sponsors. Thus, the experiment enables to analyze the influence of the nonrational herd behavior on decisions in a real crowdfunding campaign, with decision-makers under market conditions, and not in lab experimental conditions with subjects from university contexts. The results clearly show nonrational herd behavior in the choices of subsequent sponsors in reward-based crowdfunding, who mainly choose the same color as the initial contributions.

The contribution of the study to the literature about the behavior of sponsors in crowdfunding is double. On one hand, it was possible to separately analyze the nonrational component and the rational component in herd behavior. On the other hand, the use of an experimental field analysis enables to observe the causality in a real reward-based crowdfunding campaign with real diversified sponsors, and not the common group of university subjects. The paper is organized as follows. A general overview of the related literature is now presented. Section 2 describes the experimental design and procedures, i.e., the meth-

odology employed. Section 3 presents the results of the field experiment and section 4 concludes the paper presenting implications for the management of reward-based crowdfunding campaigns.

Background

Types of crowdfunding

Crowdfunding, or micro-sponsoring, refers to the fact of having a crowd of funders. A crowd of different people is called in an open manner through an online platform to observe the published features of a project, and decide if they take part of its funding and under which conditions. Nevertheless, crowdfunding includes types of funding calls with different objectives and motivations. The four main crowdfunding models that traditionally stand out in the literature (Mollick, 2014; Gierczak *et al.*, 2016; Cumming and Hornuf, 2018) are: (1) donation-based crowdfunding, in which funds are obtained as donation with nothing in return, due to the altruist motivation of funders; (2) crowdlending, or loans made by a crowd of moneylenders that expect a payment of interest charges and the return of the capital loaned; (3) equity crowdfunding, in which the multiple funders obtain an ownership of a small part of the funded company, and (4) reward-based crowdfunding, in which projects creators define a reward system and the associated prices, generally linked to the project, to attract sponsors; the presale of the product is a possible type of reward (Greenberg and Mollick, 2017).

These different types of crowdfunding, with different motivations and dynamics, make it very difficult to generalize behaviors among the different types of crowdfunding, as indicated by the empirical comparison by Dushnitsky and Fitza (2018). Thus, this work is focused on one of these types, the reward-based crowdfunding, because it is often used to fund early-stage entrepreneurial initiatives and is exhibiting a fast growth.¹ It is specially highlighted the growth in Europe

during 2020, year of the COVID-19 pandemics (Chekfoung *et al.*, 2021). This growth in the interest of micro-funders, or sponsors, was also observed in Peru and Mexico in the context of the economic contingency derived from COVID-19 (Gálvez-Mayo *et al.*, 2021; Segura-Mojica, 2021), specially towards projects that could help to generate jobs or preserve the ones already existing.

Herd behavior

In contexts with risk or uncertainty, it has been observed that humans tend to imitate the decisions of the group, i.e., tend to the herd behavior (Anderson, Holt, 1997; Vismara, 2016). This behavior is considered rational when the decisions of the group observed are appropriately used by an individual to improve his/her own decisions (Banerjee, 1992; Bikhchandani *et al.*, 1992). Specifically, this behavior has been observed empirically in financial decision-making contexts and particularly in crowdfunding contexts (Huang and Chen, 2006; Drehmann *et al.*, 2007; Muchnik *et al.*, 2013; Van de Rijt *et al.*, 2014; Colombo *et al.*, 2015; Sasaki, 2019; Wessel *et al.*, 2019).

In crowdfunding, herd behavior refers to the fact that the initial contributions stimulate the subsequent contributions. Thus, when this behavior is used to back campaigns more likely to achieve the funding objective, i.e., to succeed, and not back those campaigns that seem to have more difficulty to succeed, it is considered a rational herd behavior; this has been widely observed empirically (Zhang and Liu, 2012; Kuppuswamy and Bayus, 2017; Zaggi and Block, 2019; Chan *et al.*, 2020; Comeig *et al.*, 2020). The theoretical explanation of this rational herd behavior is that the observed behavior reveals information that, otherwise, would not be available for the decision-maker; this information reduces the uncertainty. Nevertheless, none of these empirical works in reward-based crowdfunding has studied the causality, separating rational and nonrational (the one that is not related with the success of the campaign) herd behavior.

1 This fast growth in Europe is clearly observed in the Statista.com platform of statistical analyses, in the graph about Transactions (in millions of US dollars) of reward-based crowdfunding in Europe (excluding UK) in 2013-2020, based on data from the Cambridge Judge Business School, and which can be found in: bit.ly/3EGOALCC

Methodology: materials and field experiment

This empirical work has been motivated by the interest of knowing if herd behavior occurs in reward-based crowdfunding, even without a rational factor, as a simple imitation of a previous behavior, independently of the rational motivation of project success. For this purpose, it is designed and executed a field experiment that enables to deepen in the causal relationship between a choice of the color of the shirt (changing the color does not affect the amount of funding provided) and subsequent contributions. The causality may be studied by means of random economic experiments (Antonakis *et al.*, 2010).

Thus, the aim of this experiment has been to separate rational herd behavior, from herd behavior that is not motivated by rational issues (the color of the shirt). Therefore, a field experiment is carried out in a real campaign of a cultural project in the Verkami platform, with a random choice of the color of the shirt to which it is contributed a funding corresponding to 9 % of the objective at the early stages of the reward-based crowdfunding campaign.

Choosing a field experiment for the empirical analysis enables to analyze the causality in the decisions and, at the same time, to observe the dynamics of the funding reactions after the intervention. The data collection took place in a period of six weeks (from March 14 to April 23, 2021). Every two days, data was collected from the Verkami platform (one of the most important

in Spain for funding creative projects, <https://www.verkami.com>); this data included information about the total amount of funds collected, the choices of the sponsors (type of reward chosen) and the number of different sponsors that were funding the project.

This campaign is based on the musical project of the singer/songwriter Álvaro Julián, whose objective was to fund the recording of his music “Mi mundo interior”, to further upload it in professional platforms such as Spotify or YouTube. To obtain such funding, 2000 euros, a reward-based crowdfunding campaign was designed in the Verkami platform, which can be observed in the link of the crowdfunding platform: bit.ly/3Kd3I7g. Figure 1 shows one of the images of such reward-based crowdfunding campaign, in which the sponsors receive musical products from Álvaro Julián, either the music recording or related products/services. Table 1 presents the rewards offered and their prices.

As it is observed in table 1, the rewards of white shirt or black shirt have the same price, 15 euros each, and the last option, of 30 euros, has the same cost choosing either black or white shirt. Moreover, with the purpose of showing balanced images between the two shirt colors, in the campaign the author is shown with a black shirt, but there is a final logo similar to the one of the white shirt, as can be seen in the link to the campaign: bit.ly/3Kd3I7g. Like in all campaigns of the Verkami platform, if the funding objective is not achieved the money contributed by the sponsors is reimbursed, and the campaign is left as without funding (all or nothing model).

Figure 1
Reward-based crowdfunding campaign “Mi mundo interior” Verkami

The screenshot shows a crowdfunding campaign interface. At the top, it states 'Proyecto crowdfundado el 23 Abril 2021'. Below this, there are statistics: '0 SEGUNDOS', '97 APORTACIONES', and '2.170€ DE 2.000€'. There are social media icons for GitHub, Twitter, and Facebook, along with a 'Seguir' button showing 76 followers and an 'Aporta al proyecto' button. The main image shows a person from behind, carrying an acoustic guitar, standing in a snowy field with evergreen trees. To the right, two reward options are listed, both priced at 15€:

- Camiseta blanca**: 26 MECENAS. Description: 'Camiseta blanca con el logo del disco en el corazón'. Includes shipping to national territory. Estimated delivery: May 2021.
- Camiseta negra**: 8 MECENAS. Description: 'ESE RITMO LOCO QUE ME LLEVA HASTA EL FIN'.

Note. Verkami.com in: bit.ly/3Kd3I7g

At last, an interesting feature of this platform is that the number of contributions made in each type of reward is directly visible for the rest of the investors; without this feature, it would not be possible to test the effect that the initial sponsors may have. Following the lessons of previous works which indicate the percentages that may give rise to a herd behavior in funding (Comeig *et al.*, 2020), i.e., rational herd behavior, a 9 % of

the total funding objective is purchased in the first three days of the campaign, through one of the two options of 15 euros: this has been randomly chosen by tossing a coin, and resulted in the white shirt. It was not informed to any of the participants that this campaign was going to be the subject of an experiment, and the reward to be funded as part of the experiment was kept as a secret for the collaborator artist.

Table 1
Rewards of the campaign “Mi mundo interior” in Verkami

Price	Content of the pack
10 €	Altruist donation (without associated reward)
15 €	Black Shirt
15 €	White Shirt
20 €	Album “Mi mundo interior”
30 €	Shirt to choose, album, magnet and ticket for a future concert

Therefore, the intervention consisted in making eight contributions to the white shirt, the one chosen randomly, during the first three hours of the campaign, and four additional contributions (for a total of 12 contributions) along the next two days. Thus, the white shirt, a 15 euros option, received from the experiment designers a funding of 9 % in the first three days, i.e., 12 contributions, corresponding to a total of 180 euros. No other intervention was made by the experiment designers until the end of the crowdfunding campaign.

As it was indicated above, the purpose of this field experiment is to analyze the causality relation between the existence of initial sponsors during the early days of the campaign, and the appearance of subsequent sponsors imitating the decisions of the initial sponsors, even in issues that do not affect the success of the campaign. In other words, the objective is to examine the herd behavior not derived from rational aspects. For this reason, rather than only focusing in determining if the initial decisions have influence on the success of the campaign, as it has been demonstrated in other empirical works, it is intended to prove if they have influence on the selection of the reward.

Hypotheses

Therefore, this field experiment enables to test three hypotheses, the first two observed in previous empirical works, and the third, referred to the causality of the herd effect, even without a rational component.

The first two hypotheses refer to the rationality of the herd behavior, i.e., that early contributions affect the beliefs of the funders about the success of the campaign:

Hypothesis 1 (H1): After achieving the objective, i.e., the success of the campaign, the funding rate decreases.

Hypothesis 2 (H2): The presence of early sponsors that contribute almost a 10 % or more of the funding is related to a higher probability of achieving the funding objective, due to the rational component of herd behavior.

In contrast, the third hypothesis makes reference to the causality of the herd effect, even without a rational component:

Hypothesis 3 (H3): The presence of early sponsors in the reward of a particular color increases the possibilities that subsequent sponsors choose the same color.

Results

In the first place, it was observed the dynamics of the support to the project along the time during which the reward-based crowdfunding campaign is open. Figure 2 presents the total contributions from the start of the campaign on March 14, to the last day, April 23. In line with recent empirical results from the literature, such as the large-scale analysis by Kuppuswamy and Bayus (2017) in the Kickstarter platform, it is observed that the motivation of the sponsors to invest in the project is greater before the funding objective is achieved, 2000 euros in the experiment. Such funding objective is achieved one week after launching the campaign, and since then, during the five subsequent weeks the funding only increases from 2000 to 2170 euros, i.e., only a 7.83 % of the total funding. This result in the field exper-

periment is also in line with the results achieved in the large-scale work by Kuppuswamy and Bayus (2017), who observe that, in the behavior dynamics in the reward-based crowdfunding, the projects that achieve their funding objective, exceed it with a margin smaller than 10%. This result confirms H1.

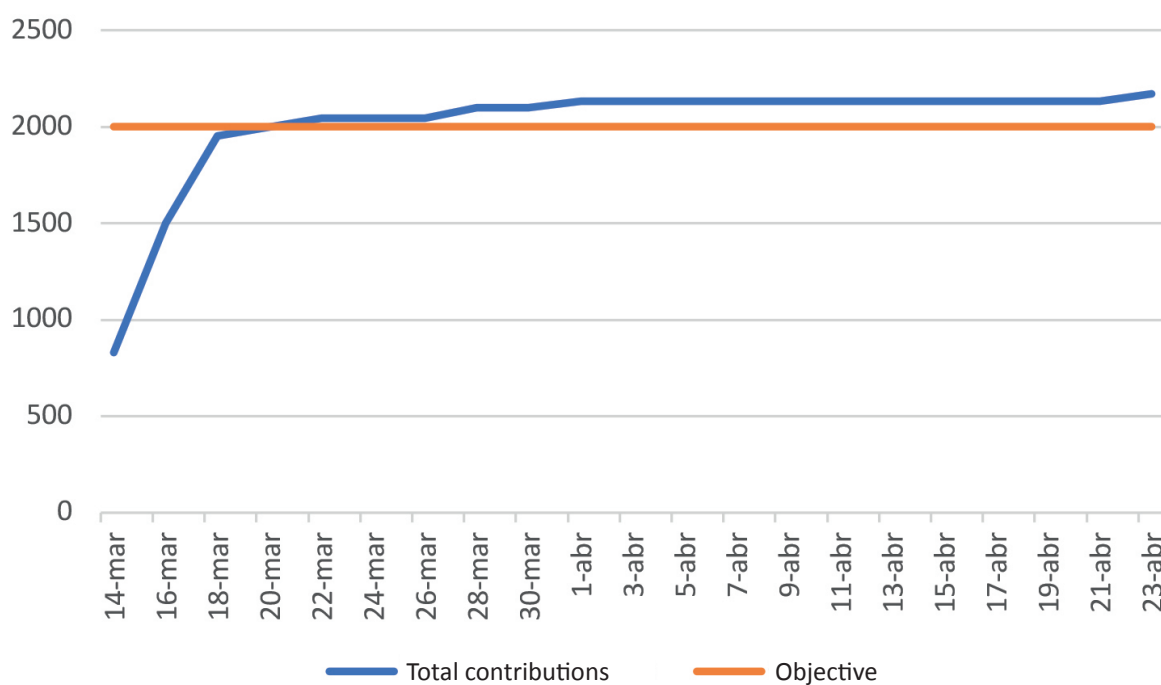
On the other hand, another of the empirical results generally observed in the previous literature (Comeig *et al.*, 2020) is reproduced here: The campaign has a higher probability of achieving its objective, i.e., of succeeding, if a percentage of contributions close to 10% is obtained at the beginning, since this sends a signal about the

probable success of the campaign and encourages subsequent sponsors to get into the funding campaign (rational herd behavior).

As it is observed in figure 2, which shows the evolution of the contributions in the “Mi mundo interior” campaign, such 10% funding margin was surpassed the first day and the campaign ended with success, above its initial objective. Specifically, a funding of little more than 800 euros was obtained from the sponsors in the first day of the campaign, i.e., more than 40% of the total funding necessary for the project. This result supports H2.

Figure 2

Total contributions along the duration of the campaign



Finally, table 2 shows the results of the specific selections made by the sponsors. It should be remarked that the option that was mostly cho-

sen, “Complete pack with shirt to choose (30€)”, makes further available a private form where the sponsor individually chooses the shirt color.

Table 2
Distribution of the contributions according to the reward chosen

Reward	Number of contributions	Funding contributed to the total	Percentage of funding
Altruist donation (10€)	8	80€	3.7 %
Black shirt (15€)	8	120€	5.5 %
White shirt (15€)	26	390€	18.0 %
Pack with album (20€)	7	140€	6.4 %
Complete pack with shirt to choose (30€)	48	1440€	66.4 %
Total	97	2170€	100 %

Table 3 specifically focuses on the subject of study of this field experiment, the number of white and black shirts chosen by the sponsors after the intervention of the experiment designers. This table 3 includes the shirts chosen privately in the form of the “Complete pack with shirt to choose

(30€)”, and the ones chosen in the only shirt options, which can be seen by subsequent sponsors. It is important to remark that table 3 does not include the 12 white shirts corresponding to the intervention of the experiment designers; it only includes the subsequent decisions of sponsors.

Table 3
Distribution of the shirts chosen by the sponsors. Statistical test for proportions

	Reward	White shirt	Black shirt	Total
<i>P</i> = 0.939 <i>Test for proportions*</i>	Only shirt	14 63.64 %	8 36.36 %	22 100 %
	Complete pack	31 64.58 %	17 35.42 %	48 100 %
	Total	45 64.29 %	25 35.71 %	70 100 %

*Two-sample parametric test for proportions.

As can be seen in table 3 when comparing the selections made by the sponsors regarding the shirt color, white shirt compared to black shirt, it is verified the existence of a nonrational herd behavior, Hypothesis 3 (H3): in total, after the intervention the sponsors chose 45 white shirts compared with only 25 black shirts, which represents a large difference in the selections: a 64 % of the selections of the sponsors corresponded to white shirt.

On the other hand, this majoritarian selection of white shirts occurs in the “only shirt” type of reward as well as in the “complete pack” reward, as indicated by the nonsignificant result of the Test for proportions, with a $p = 0.939$. This test was carried out to analyze if the majoritarian selection of white shirts occurred similarly, with no

significant differences, among the two rewards, i.e., “shirt” and “complete pack”.

The results presented in table 3 confirm the hypothesis H3 of nonrational herd behavior.

Conclusions and discussion

With the objective of causally analyzing if herd behavior occurs in reward-based crowdfunding even without rational factor, as a simple imitation of a previous behavior, independently of the rational motivation for the success of the project, a field experiment has been designed and implemented. This field experiment was especially designed to be able to separate the nonrational component of herd behavior from its rational

factor (i.e., that the campaign achieves its funding objective). The results of the experiment have confirmed the importance of the nonrational component in the herd behavior in reward-based crowdfunding, quantifying in this experiment a difference of 28.6 percent between the option corresponding to the intervention compared to the not chosen one.

This field experiment has enabled to test three hypotheses, the first two observed in previous empirical works, regarding rational herd behavior (early contributions affect the beliefs of the funders about the success probability of the campaign) and the third, a novel one, referred only to the causality of the herd effect without rational component. The results of this experiment confirm the three hypotheses: H1, H2 and H3.

The third hypothesis makes reference to the causality of the herd effect in reward-based crowdfunding without rational component. The fact that H3 has been confirmed by these results highlights the value of rewards design and to which of them are the early contributions directed, in the creation of an emotional (nonrational) herd factor of connection with the campaign. Previous works about the psychological consequences of the participation as sponsors in crowdfunding, have remarked that reward-based crowdfunding is not only useful to obtain funding but also to create a connection with the basis of clients/funders (Bitterl and Schreier, 2018). The results of the field experiment presented confirm such capability of the crowdfunding to connect in a nonrational way with the sponsors, possible further clients.

Thus, the results of this field experiment remark the importance of the design of the campaign rewards regarding also the qualitative features, and the interventions of the context of the demander of the funding in the early stages of the campaign, since they may create a herd behavior in those bonds with clients/funders. Therefore, it is important to take into account the two components, rational and nonrational, of herd behavior.

Future research works might examine the duration of this bond created with the client/funder, generated in qualitative aspects by this herd ef-

fect. For example, this could be done designing a subsequent campaign in which a percentage of the sponsors of the previous campaign could participate. It would also be recommended to replicate similar experiments in other countries and campaigns. On the other hand, an interesting line to deepen in this type of research in crowdfunding in Latin America, and since the behavior of the sponsors might be affected by lack of knowledge, distrust and the risk of the operations (Sánchez Fontana and Tonon Ordóñez, 2020; Comeig *et al.*, 2022; Gómez *et al.*, 2022; Pérez-Martínez and Rodríguez-Fernández, 2022; Gamboa-Salinas *et al.*, 2023), would be to consider individual attitudes towards the risk when making this type of decisions.

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Behaviors chosen or forced to choose: Norms and values assumed by executives

Conductas elegidas o forzadas a elegir: normas y valores asumidos por los

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Abstract: this research describes some of the values and norms that business executives use to choose their behaviors in work, social and family environments. Using qualitative methodology, data collection was conducted with the support of the projective technique called "life history". The coding and analysis of the applied technique allowed reporting norms and values used by executives. Fifty-three executives from companies from different sectors participated in this research. The analyses show that the executives follow and adapt their behaviors to norms and values that demonstrate their memberships with the groups. These guidelines have positive and negative effects for themselves, their family, their co-workers and their friends. Among the first, it stands out that executives seek to demonstrate and demand the profitable use of time, achieve their development and growth of the organization, and achieve leadership positions. Frames of reference for their behaviors with non-positive or ambiguous effects are also observed. It is shown that executives present as norms and values being willing to sacrifice their family time for the company's objectives, tolerating conditions of mistreatment, and staying on the sidelines or getting involved as little as possible with the people with whom they work. In this study we describe some NV followed by the executives to demonstrate their membership to the group. This demanding nature makes them rationalize and transfer the responsibility for the consequences of their behaviors abroad.

Keywords: norms, values, decision making, organizational behavior, group membership, group behavior, rationalization, psychological tests.

Resumen: Esta investigación describe algunos de los valores y las normas que los ejecutivos de empresas utilizan para elegir sus conductas en los entornos laborales, sociales y familiares. Usando metodología cualitativa, la recolección de datos se realizó con el apoyo de la técnica proyectiva denominada "historia de vida". La codificación y análisis de la técnica aplicada permitió el reporte de normas y valores que se encuentran en uso por los ejecutivos. En esta investigación participaron cincuenta y tres ejecutivos de empresas de distintos sectores. Los análisis muestran que los ejecutivos siguen y alinean sus conductas a normas y valores que demuestran sus membresías con los grupos. Estos lineamientos tienen efectos positivos y, en otros, negativos para sí mismos, su familia, sus compañeros de trabajo y sus amigos. Entre los primeros, los ejecutivos buscan demostrar y exigir el uso rentable del tiempo, lograr el desarrollo y crecimiento organizacional y alcanzar posiciones de liderazgo. También se observan marcos de referencia para sus conductas con efectos no positivos o ambiguos. Entre estos se muestra que los ejecutivos presentan como normas y valores el estar dispuestos a sacrificar su tiempo familiar por los objetivos de la empresa, tolerar condiciones de maltrato y maltratar, y mantenerse al margen o involucrarse lo menos posible con las personas con las que trabajan. Lo descrito en el estudio podría permitir proponer que los ejecutivos siguen las normas y valores (NV) que perciben como propias y determinantes para demostrar su membresía. Este carácter de exigencia hace que racionalicen y transfieran al exterior la responsabilidad de las consecuencias a sus conductas.

Palabras clave: normas, valores, toma de decisiones, comportamiento organizacional, membresía a grupos, comportamiento grupal, racionalización, test psicológico.

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Introduction

Addressing the issue of norms and values of business executives is always a dynamic and controversial task. Research in this regard seeks to uncover a part of these issues, increasing their complexity (Ibarra-Colado *et al.*, 2006; Molthan-Hill, 2014; Zeytinoglu *et al.*, 2012). Rather than pursuing this theoretical complexity that could be paralyzing, this study focuses on the empirical exploration of the norms and values that executives express in their discourses or in their actions in the contexts of work, family, and social groups.

Norms and values often play a utilitarian role; however, adaptation to certain contexts reduces this role, i.e., although individuals usually choose behaviors that give them benefits and avoid harm or risk, group membership could make them act contrary to their interests because of what is required (Welsh *et al.*, 2015; White *et al.*, 2009). Even the expression of norms and values chosen could be different or contrary, depending on each context or group in which they are (Reynoso, 2018). Bicchieri (2010) shows that norms are followed after a conscious analysis of the context, thus determining the evaluation and choice of behaviors to be expressed. These choices of norms and values do not necessarily imply individual or selfish ends, but are signs of conformity to what is demanded by the environment (Bicchieri and Chavez, 2010). Schuh *et al.* (2021) describes that identifying with the organization directly influences the intention to perform behaviors. They further suggest that norms may even engage in unethical practices in favor of the organization if the group supports them (Schuh *et al.*, 2021).

The norms and values that exist in any group are guided by their regularity and the power they have to limit behaviors in the group. These repetitions allow defining and transforming the norms and values that distinguish and classify the members of a group (Barreto and Ellemers, 2000). As for members of the “executives” group, they adopt norms and values specific to the context of business organizations. The expression of their membership is independent of their location (a manager acts as a manager in the office or in the operation). Even when they are not in the same

context, they make the decision to act according to the norms and values of the group in which they are classified (Bicchieri and Chavez, 2010).

From another perspective, the behaviors accepted or rejected by norms and values depend on each group. They do not necessarily follow broad social parameters (Bruhn, 2009), hence, some behaviors will be accepted in some contexts, even if they are socially rejected in others (Earle *et al.*, 2010). An example of the latter is the extreme case of legitimized corruption circles, where the person offering the money and the person receiving it assume that what they are doing is standard practice for doing business and benefits them in the short term, but at the same time they know that it is a socially censored and punishable practice from the point of view of broader norms and values (Hauk and Saez-Marti, 2002).

This research explores and describes the norms and values common to a group of executives. These are analyzed through behavioral accounts following a qualitative methodology. The method followed made it possible to structure the analysis of the texts, from which the norms and values disseminated among the executives are described. These respond to the search for individual conformity with the group in order to reach achievements in their work, family and friendship contexts. The analysis shows that the executives follow norms and values, although these have positive and negative effects.

Chosen behaviors or forced to choose

Individuals who are members of a group have internalized their roles and adjust their decision making to their membership (Pozzi *et al.*, 2014). From this perspective, group membership shapes behaviors, giving people unique (specific) meanings and validity for the group in which they belong (Barsade and Gibson, 2007). Individuals who wish to belong must adopt the dynamics of group interactions and lose part of their “individual feature” to show conformity to the conditions of the environment (Reynoso, 2021). Thus, in their decision making, they adapt and accommodate the frames of reference of their behaviors to demonstrate their belonging to the group (Hardy

and Clegg, 2006). Cialdini *et al.* (2021) show that empowered executives in organizations can set the NVs for other executives. Depending on their level of influence, executives can promote conditioning behaviors that show their memberships (Cialdini *et al.*, 2021).

Group membership could involve regulating behaviors and even, in some cases, following or obeying them by coercing them (Bicchieri and Chavez, 2010). Adherence to these group norms and values helps individuals to identify with and demonstrate their memberships (Verhezen, 2010). The experience of belonging to various groups increases the set of norms and values to which decisions made to express certain behaviors are accommodated (Gillespie and Cornish, 2010). The success of interactions will be related to the number of positive effects that these norms and values give them and those around them (Bicchieri, 2002; Bicchieri and Chavez, 2010). If the individual fails to recognize norms and values, he or she may no longer belong or may be excluded (Barreto and Ellemers, 2000).

Other research shows that executives rationalize their behaviors, even when these are unethical (Lian *et al.*, 2020a; Liu *et al.*, 2020b). According to Lian *et al.* (2020), unethical leadership could be explained by the interpretation of the consequences or outcomes of these behaviors. Even if they exceed social morality, they could be accepted if they are positive for the group. Some of these rationalized behaviors in the organizational context are explored under the definition of unethical pro-organizational behaviors (Lian *et al.*, 2020; Umphress *et al.*, 2010).

Tang *et al.* (2020) state that executives' behaviors in the organizational context generate paradoxical responses in them. They may feel guilty on a personal level for performing a behavior, but proud on a group level because of the effect or representativeness it has for others (Tang *et al.*, 2020). In addition, Hsieh *et al.* (2020) say that group membership in organizations plays moderating roles in performing behaviors. Also, the research explains that membership in some contexts is expressed by explicit engagement with valid NVs in the group (Hsieh *et al.*, 2020).

Group norms

In the strict sense, the word norm designates the rules and guidelines that guide the behavior of individuals in a specific context. They originate in social interaction, are relatively stable and play articulating and modulating roles (Reynoso, 2021). Individuals assimilate them to choose, initiate, adjust or restrict their behaviors. In organizations, formal norms are usually defined in documents such as the labor contract or the functions manual, and the informal norms are constructed in the interrelations with other members (Weber, 2014).

Most of the norms that originate in organizational groups are implicit, and are accepted due to their use, frequency, custom and the endorsement given by members (Reynoso, 2018). These norms also express a cognitive component that involves decision making. These decisions may agree with what is desired by the individual or adjust to the environment. Usually the adjustment will prevail, because it guarantees membership and acting without considering them could imply exclusion (Copeland and Potwarka, 2016).

Individuals who join an organization must adapt to this context the norms they built in other referential spaces such as family, friends and education (Ashforth and Kreiner, 2002). All these norms are linked to decision making that regulate their behavior and are modified or expanded according to the groups to which they belong and the demands of the social environment (Barsade and Gibson, 2007; Copeland and Potwarka, 2016; Reynoso, 2018).

Values in groups

Values are higher-order personal qualities that motivate certain behaviors and discourage others (Albanese *et al.*, 2016). These are abstract mandates or beliefs that guide the individual (Castro Solano and Nader, 2006). Most of these are acquired vicariously in the socialization process with a group (Wood and Bandura, 1989).

The values that regulate the behaviors of individuals in a group could be in conflict or in agreement with the values it has adopted in

other groups (Daniel *et al.*, 2015). Unlike norms, not having the same values as the group does not necessarily imply social punishment; some researchers show that in many cases the values expressed verbally by an individual may contrast with his or her actions in the environment (Gelbrich *et al.*, 2016).

Groups differentiate the values they promote and their hierarchy to guide their behaviors. These values can have an individualistic, collectivist or mixed orientation. Finally, values fulfill their role of filter and hierarchy in the decisions made to choose the expression of a behavior among other possible ones (Albanese *et al.*, 2016; Daniel *et al.*, 2015).

The main components of identity are the set of norms and values that allow describing, characterizing the behavior of its members and differentiating the members of the group (Maldonado and Oliva, 2010). Individuals who want to be part of the group should assume these characteristics, mix them and exercise them in their behaviors to show their membership and identification (Ellemers *et al.*, 2013).

It is important to say that the values and norms that form group identity are contextually dependent and specific to the historical moment, hence they can change due to environmental pressures and paradigm shifts (Ellemers *et al.*, 2013). In addition to these factors, individuals have a strong impact on the conduction of these changes. Individuals make decisions about the guidelines that indicate the relevance and capacity of norms and values to set behaviors that are valid for the group (Melucci and Massolo, 1995).

The identity constructed with the set of norms and values of the different groups to which they belong has a complex and fragmented feature, which is complex because individuals must respond differently in each space, sometimes even in a contradictory way (for example: an aggressive manager could be a spouse on the receiving end of aggression). On the other hand, it is fragmented because each space to which the individual adapts brings to it a small component that is expressed in other contexts, i.e., the individual who is a member of a family expresses part of his/her family norms and values at work or in

his/her friendship groups, and vice versa (Wood and Bandura, 1989).

Method

The chosen research method is qualitative phenomenological (Miles *et al.*, 1994). The object of study is in the field of what is shared at the intersubjective level by executives (Gillespie and Cornish, 2010; Reynoso, 2021). In addition, some of the NV are not recognized by the executives. Therefore, a projective technique was chosen for their research, which allowed both a group analysis and an indirect access to these NVs.

The instrument and technique chosen for the research came from the field of psychology. The projective technique called "life history" (Portuondo, 1979) was used. This technique consists of asking the study collaborator to freely write part of his or her personal history. The participants wrote their stories on an average of two sheets of paper. This projective technique allows the indirect description of the values and norms with which the executives of organizations interact at work, with their families and with their friends. With this objective in mind, participants were asked to focus their stories about their work and professional life. In these stories they expressed their experiences in professional development and established interpersonal relationships.

The collaborators in the study belonged to different organizations, all of them members, in contact with the structure of values and norms of the Peruvian executives group. Fifty-three executives enrolled in an MBA program participated in the study and gave their consent for using this material for the research.

Data processing

The documents were processed using the qualitative text analysis software Atlas Ti, in which the participants' answers were coded in two phases of constant coding. In the first phase of the analysis, the expressions in the texts were coded to differentiate the norms and values according to the environment in which they are expressed: family, social and organizational, which were

coded. The second analysis of the coded texts made it possible to identify information on common norms and values expressed in the organizational context. In this way, information was gathered on the norms and values that guide the behaviors of the group of Peruvian executives participating in the study.

Results

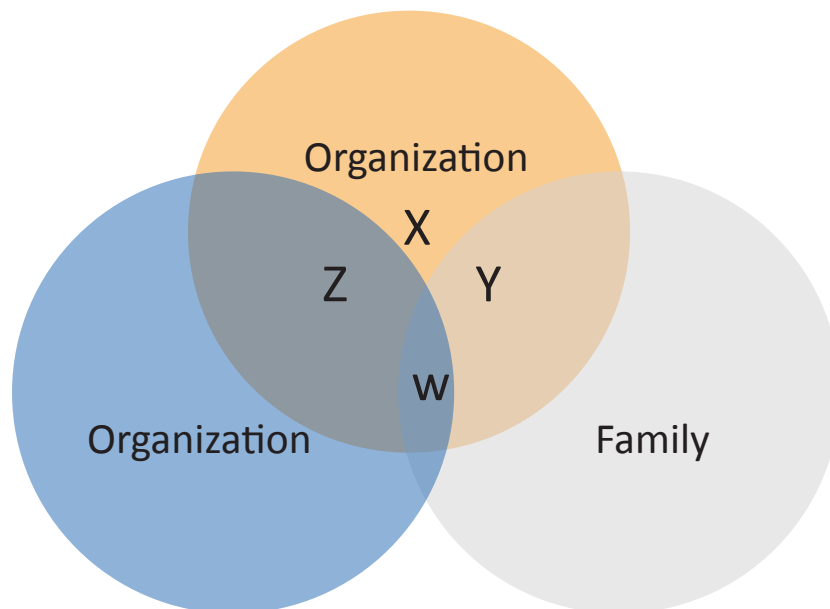
The analysis of the texts showed the existence of norms and values that underlie the behaviors of the group of executives. There are some norms and values in the analyzed texts that are common among the research collaborators, representing the unconscious framework expressed from their decision making. In the analyzed texts, the executives describe that their behaviors do fit the

context. In addition, they state that their decision making varies by the perception of their position in the group they are in. The groups described are family, friends and organizational groups. The common norms and values among these groups support behaviors aimed at generating positive outcomes, but in addition, they have others aimed at achieving negative outcomes. In other words, they make decisions about behaviors that are openly chosen, even if these have negative results.

Figure 1 shows a diagram of the contextual fields analyzed in the texts and the interaction between them. It represents the existence of norms and values that are used only in one context and others that can be expressed in more than one. The circles in the graph represent these groups and the society that contains them is represented by a box.

Figure 1
Validity of executive NVs

Society



The groups to which executives belong in organizations are represented. These have an impact on the NVs they have with their family, friends and the organization. The context of the organization validates the NVs represented in the X, Y, W and Z fields.

The data for the analysis were collected by applying the projective technique "life stories".

In the first analysis of these texts, 355 quotations referring to decision making for behaviors and their norms and values were coded. A second analysis of the quotations allowed the norms and values (NV) expressed in the contexts of the organization, the family group and in the friendship group. Table 1 shows the number of quotations in each of the fields.

Table 1
Number of quotations in each field

Fields	Field description	% of quotes
X Field: Organization	NV for exclusive use in the organization	44.8 %
y Field: Organization - Family	NV of use in the organization and group families	25.1 %
Z Field: Organization-Friends	NV of use in the organization and friends	5.6 %
W Field: Organization-Family-Friends	NV of use in the organization and the family	24.5 %

The results of the second analysis show that the greatest number of quotes refer to NVs that regulate executive behaviors in the organization (44.8 %). In second place are those referring to NVs shown both in the organization and in the family group (25.1 %). In third place (24.5 %), are the NVs expressed in all three fields. In last place, only 5.6 % of the quotes refer to NVs that guide the behavior of individuals in the organization and in friends. The following paragraphs will present the NV collected from the analysis of the sample texts, with at least three cases of repetition in the documents examined with their example quotations.

Differentiated organizational norms and values

The norms and values (NV) that are in the "X" field of Figure 1 guide the behaviors chosen to be expressed in the organization. These differ from those in other fields in the way that they do not make reference to or justify their behaviors in family or friendship and work contexts at the same time. Some of these expressed NV have a positive or constructive orientation and others are negative or harmful to the individual, their bosses, peers and subordinates.

One of the first behavioral guidelines is related to the effort they must show in their daily work. Executives must demonstrate to others the profitable use of their time in the company; manage their tasks in order, solve problems of their functions, manage their time for the fulfillment of all their tasks and assume the challenges, and make others aware of all this.

In my workplace I always strived to be the best or one of the best, which led me to be promoted

to other positions and therefore to obtain the recognition of my bosses and at the same time be proud of myself.

Secondly, executives strive for organizational development and growth in order to achieve a better position in the organization in recognition of their efforts.

(...) I started the position a year ago and this promotion was also a recognition of my performance and the support I provided to the Financial Management.

Thirdly, they show that they should take advantage of their professional experiences in previous positions within the organization or before it to develop or enhance their skills and knowledge about the work.

(...) I went through three jobs, one of which I consider to be the most important because it helped me to develop professionally and to acquire a lot of knowledge and experience.

Fourth, executives in the organization are oriented to occupy leadership positions, which implies for them to organize their collaborators into balanced teams, orient their tasks, deal with their differences and maintain a balanced work environment in the team.

...the most important thing for a good leader is to be able to create a united team and a pleasant work environment. In the end, it is not all about earning a good salary, obviously it is very important, but it is not everything.

When facing a situation of uncertainty, executives consider that they should be attentive and willing to change or start looking for a position appropriate to their status. They are also willing

to resign from their job if the payment conditions and responsibilities do not meet their expectations.

I also understood that my destiny was not to continue working for someone else, that I could not be so selfish and let my father deal with all problems, that my mother could not stay in Buenos Aires to wait for any job, that Peru was getting better, and I wanted to be part of that progress. I dreamed of having a big company and giving job opportunities. I resigned and started from scratch.

Behavioral guidelines have been described to maximize the benefit to oneself or to the organization. In the following paragraphs we will describe the norms and values that have different purposes. These NVs do not have noble effects for the executives, their peers, subordinates, bosses or the organization, but are nevertheless presented as NVs specific to the executive group.

The norms and values of the group of executives direct their behaviors to the achievement of short-term goals to demonstrate their capabilities and justify the position they have assumed. The fulfillment of the goals forces them to be creative in order to work with the right resources and even below what is necessary.

(...) It was a very big sacrifice since I worked far away from society with very hard work routines and the stress of reaching the established production goals. I formed a very good human group with people recently graduated from the city with different talents, but we all formed a synergy that helped us achieving the established objectives.

Linked to the previous norm and value, it can be observed that the group of executives assume the organization's objectives at a very personal level. Therefore, they force themselves to seek additional resources or make sacrifices in order to achieve these objectives. In addition, they tend to demand this type of sacrifices from the people around them, such as, for example, demanding additional hours of work, taking on tasks above and beyond their roles, among others.

That year and a half was very hard, I slept four hours a day, I worked Sundays, but the work

was going very well, the people in charge of the project were satisfied with my work...

Thirdly, those who are starting their professional life must follow a set of tough demands from senior members as NV. The aim of these demands is for people to earn the right to be members of the groups. These are NVs that those starting out in their working life know they must go through and that are rationalized.

I had a family, so I had to endure and persevere through the cold, the early mornings, the fatigue and the abuse of employers, little by little I was demonstrating with work and dedication, and always with a smile, and the doors began to open...

They also suggest that the work should be oriented in such a way as to ensure one's own goals, even if these are not necessarily interrelated with others.

...there were many bosses, all of them ordered in their own style and for their own well being, and because of their position they took advantage of whatever they could.

Norms and values in the organization and family group

This field places the NVs that model the decision making of executives in organizations and family environments. The explored NVs are part of the unconscious framework of their eligible behaviors in the organizational and family context.

The NVs socialized in the family have an impact on the way the executive performs in the organization and, in turn, those acquired by belonging to the group of executives of the organizations that impact the family group. The accommodation of these NVs, sustained by their attitudes and strengthened by their experience in the social environment, makes it possible for the executive to adapt to both groups.

The first NV found in this field is described in the executives' affirmation that the work they do should allow them to have personal spaces to

develop their family and personal life in a profitable way, so that they can fulfill their roles in the family and in the organization in a balanced way.

...to get a stable managerial position in a private and recognized company, which will allow me to be financially secure, and to be able to enjoy my family, travel with them or with my friends...

Second, executives try to link work with their personal goals. Executives seek to ensure that their membership in the company allows them to achieve their personal goals. They relate the effort invested with the income obtained in return; they translate their professional success with the resources they obtain for it.

Everything was going very well for me on a work and personal level, but I decided not to renew my contract with (name of company) despite my boss's refusal to accept my retirement, explaining that I was leaving the company for family reasons.

Thirdly, they assume as NV that the job is a responsibility and represents the trust that someone else has placed in them, for which they must respond and be reciprocal.

...to repay the trust they place in me by performing high quality work that contributes to the achievement of the company's objectives.

It is also possible to observe the existence of NV with non-positive purposes for the executives. One of these NV described in the executives' behaviors shows that they are willing to make overexertion and personal and family sacrifices. These are made with the objective that in the future they will be able to get back what they have invested, with a better position or better income.

...in the future I will have more freedom to enjoy more time with my family, time that I am sacrificing at the moment in order to be able to harvest later. In the future I will be able to give my family the necessary tools so that they can better serve society and be good people...

Norms and values for the organization and the friendship group

In this field, NVs are part of the framework that regulates decision making on the behavioral expressions of executives in the friendly environments and the organization. As in the previous fields, there are guidelines that orient executives in the organization and at the same time have an impact on their friendship contexts.

Among these NVs, there are behavioral guides that orient and organize their work experiences to achieve changes in the dynamics of their group and their responsibility with their environment. These NVs guide them to relate with others to form alliances, share their knowledge and improve their social image in the groups they are part of.

Professionally I will use the knowledge and experiences to develop personal ventures, if I have the chance I want to teach young people and adults to share my experiences and contribute to the development of people, the training I am receiving will help to achieve that goal.

Secondly, they are oriented to achieve the collaboration of people, of the members in the projects entrusted on the basis of being attentive to them, with an image of empathy to seek and achieve the commitment, their realization and that of others.

I consider that my simplicity and way of being has allowed me to have a good number of friends and friendships. Collaboration and empathy are part of my daily work and in the main decisions that correspond to my office and position.

Thirdly, some NVs are to be responsible for the fulfillment of the objectives and for the people under their responsibilities. These NVs guide them to assume both the success and the failure resulting from their executions. This responsibility is related to the commitment they show both to the work and to the people.

...responsible, proactive, dedicated and always looking to generate spaces for improvement for each of the collaborators of my organization.

On the other hand, there are also some NVs that negatively influence their behavior and orient them in a way that could cause discomfort to others, since they try not to be involved with what happens to the people they work with, especially when they do not consider them as members of their friendship groups. Even when their responsibility is direct, they try to stay out, showing the reduced commitment to those they do not consider friends; they try to keep the relationship at the level of work relationships.

I learned not to trust people and those who are acquaintances are not your friends. I learned, injustice, the double faces, hierarchical abuse, i.e., the true face of competitiveness. I learned that ignorance and wickedness can destroy a human being.

Norms and values in the organization, family and friendship group

The NVs in this field (“w” in Figure 1) organize decision-making on the behaviors that executives can express in organizations and that also have an impact on family and friends. These NVs organize their professional life and their interaction with friends and family groups.

Among the first NVs, it is observed that the commitments accepted with the family, work and friends must be assumed with responsibility, and that their interaction has an impact on each one. In other words, responsibility and commitment should be reflected in the organization, family, friends and society.

To educate my children well, to share time with them and my wife. I believe that the most valuable contribution to society is the seriousness to raise future generations.

In the second place, the interpretation of constancy and perseverance behaviors as NV is raised, justifying their efforts in front of their family and friends and is also necessary to achieve the following goals.

...I learned that with perseverance, effort and discipline one can achieve everything set out to do for one’s personal and professional development...

On the other hand, NVs guide behaviors that have positive effects in one context and possible negative effects in others. For example, one of these NVs orients them to take almost any job, as long as it ensures sufficient income and, in addition, provides an adequate or relevant social image for them.

That year and a half was very hard, I slept four hours a day, I worked Sundays, but the work was going very well, the people in charge of the project were satisfied with my work and there were economic benefits (...).

In conclusion, the texts analyzed show that executives share some norms and values expressed in their behaviors within their roles in the organization, as well as in the groups, such as family and friends.

Discussions and conclusions

The theoretical model proposed shows two main areas of analysis. The first states that in order to belong to and self-categorize as a member of the group of executives, an individual adapts to the norms and values of the organizational contexts of his or her society. The second axis of analysis indicates that executives, like any individual, belong at the same time to other groups that have intersection points in their Norms and Values (NV), such as the family and friendship groups presented in the study. In other words, the group of executives has norms and values that guide part of their behaviors in an organization, which in turn can be guided or oriented by the NV of the family and friends, belonging to a specific society.

Group members may perceive that certain behaviors are inappropriate or differ from their personal values, but they will follow them because they are part of the guidelines of the group’s identity (Bicchieri, 2002; Bicchieri and Xiao, 2009). Therefore, values and norms may be different or contradictory between groups and even with

society in general, but they are valid for them and are the basis for constructing their identity (Gelbrich *et al.*, 2016).

The analyses carried out show the existence of some NVs that have social acceptance or group recognition. At the same time, they demonstrate others verbalized, used and legitimized by the group, but are not necessarily socially approved. In the group examined, phenomena arise with their own laws irreducible to the psychology of its members (Reynoso, 2018). The group generates an identity that differentiates them from others and allows people to categorize themselves in it and find support for these norms and values, even if they have negative effects for other groups, as observed in this study. These descriptions are consistent with previous findings (Hsieh *et al.*, 2020; Romero, 2011; Tang *et al.*, 2020).

The contributors of the study mention these NVs as common characteristics of the group of executives; these are emergent NVs from their expressions in their professional life histories. They are said to have an emergent character for the group because it is easier to observe them in people's interaction. Due to these conditions, the choice of the qualitative projective method used facilitated the collection of information on these social phenomena in organizations; thus, demonstrating the usefulness of projective methods (Portuondo, 1979). However, the nature of the method only allows the description of the NV of the participants. Although the objective is not to generalize these findings, this study gives us indications that there are NVs that are emergent to the social group category that we call "Peruvian executives".

In this group, the NVs, when perceived as belonging to and determining the group, are also considered as a means of belonging. This perceived requirement means that responsibilities on others are transferred to the outside. In the Peruvian context, being an executive is related to the achievement of social repositioning and promotion to a social group of a higher status than those of the operative positions in the organizations. The achievement of this social promotion does not concentrate in the improvements obtained with respect to the conditions of their previous

positions, but rather they make an unconscious comparison of the disadvantages to which they are not exposed because they no longer belong to the previous group.

The study has found other NV of the group of Peruvian executives that did not reach the saturation level to be included in the list, but which show that Peruvian executives tend to be oriented in an individualistic way to increase their status in the organization. These practices do not necessarily seek to increase the qualities of their position, but rather to defend or maintain the conditions that establish status distances with subordinates, family and friends. These results are consistent with Barreto *et al.* (2000).

On the other hand, it is observed that some executives expect their employees to be willing to accept these difficult working conditions and link this support or endurance with commitment to the organization. In some contexts, these conditions are treated with the euphemism of "floor fee", which is a form of rationalization usually presented for accepting and maintaining these difficult working conditions. These results are consistent with theoretical frameworks developed in other research (Andrés Guzmán *et al.*, 2007; Brown, 2015, 2011).

The chosen methodology and instrument used allows exploring a group phenomenon that is difficult to access directly. Future research could use the projective "life history" technique to address sensitive topics indirectly, especially topics related to ethics or corruption in companies. In this regard, this research can complement what is being done on "unethical business practices in favor of the organization" (Graham *et al.*, 2020; Lian *et al.*, 2020; Umphress *et al.*, 2010).

Due to the nature of the study, the results described are limited to the participant group and its context. Other studies could also include the difference by gender and by industry sector and compare these results. Some previous studies indicate that there are differences by gender in management style (Beji *et al.*, 2020; Cambrea *et al.*, 2019). Expected roles, according to gender or industry of origin, could directly affect the NVs of these executives.

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The relationship between the psychological distress derived from COVID-19 and the loss aversion is modulated by the alexithymia trait

La relación entre el distrés psicológico derivado del COVID-19 y la aversión a las pérdidas es modulada por el rasgo de alexitimia

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Abstract: studies on stress and decision-making usually address acute and artificial stressors. However, COVID-19 outbreak set the perfect scenario to address how decision-making, and specifically loss aversion, could be affected by a real and persistent stressor, able to promote a significant psychological distress. In parallel, alexithymia has been identified as a potential moderator of the loss aversion expression, since it could impair the incorporation of emotional information when making a decision, leading to "cold" decisions. Through a within-subjects design (N = 70), our aim was to study the relationship between the psychological distress caused by the pandemic context and the loss aversion changes, considering alexithymia as a moderating factor. Our results show a significant increment in both psychological distress and loss aversion, merely one month after the confinement's onset. Moreover, both variables were positively associated only when alexithymia was low, i.e., the alexithymia buffered the effect of psychological distress on decision-making: a higher alexithymia implied a lower loss aversion increase.

Keywords: decision-making, cognitive bias, loss aversion, alexithymia, psychological distress, COVID-19, confinement, stress.

Resumen: los estudios sobre estrés y toma de decisiones suelen abordar estresores agudos y artificiales. Sin embargo, el brote de COVID-19 creó el escenario perfecto para abordar cómo la toma de decisiones, y específicamente la aversión a las pérdidas, podría verse afectada por un estresor real y persistente, capaz de promover un distrés psicológico significativo. Paralelamente, la alexitimia ha sido identificada como un potencial moderador de la expresión de la aversión a las pérdidas, ya que podría perjudicar la incorporación de información emocional a la hora de decidir, conduciendo a decisiones "frías". Mediante un diseño intrasujeto (N = 70), nuestro objetivo fue estudiar la relación entre el malestar psicológico derivado del contexto pandémico y los cambios en la aversión a las pérdidas, considerando la alexitimia como factor moderador. Nuestros resultados muestran un incremento significativo tanto del malestar psicológico como de la aversión a las pérdidas, tan solo un mes después del inicio del confinamiento. Además, ambas variables se asociaron positivamente solamente cuando la alexitimia era baja; es decir, la alexitimia amortiguaba el efecto del distrés psicológico en la toma de decisiones: cuanto mayor era la alexitimia, menor era el aumento de la aversión a las pérdidas.

Palabras clave: toma de decisiones, sesgo cognitivo, aversión a las pérdidas, alexitimia, distrés psicológico, COVID-19, confinamiento, estrés.

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Introduction

Decision-making is a complex and heterogeneous executive function, which is often studied within different contexts and conditions, breaking it down into more analyzable pieces (Starcke and Brand, 2012, 2016). One of the most studied scenarios are risky contexts, where the decision options or prospects are well defined, and the outcomes' probabilities are known (Volz and Gigerenzer, 2012). Here, it can be assessed whether people use more logical and rule-based strategies, such as utility maximization (Camerer, 2003; Starcke and Brand, 2016), or conversely, they are more prone to be affected by emotional phenomena, such as loss aversion (Kahneman, 2003; Kahneman *et al.*, 1991; Sokol-Hessner and Rutledge, 2019).

Loss aversion, the principle that "losses loom larger than gains" (Kahneman and Tversky, 1979, p. 279), is one of the most studied biases in decision-making, because of its important influence in shifting the balance in favor of risk avoidance. So, for example, potential gains should be at least twice as large as potential losses for someone to risk on a bet (Sokol-Hessner and Rutledge, 2019). It is often considered a generalizable and fundamental principle (Gal and Rucker, 2018), or even a stable behavioral trait (Hadlaczky *et al.*, 2018). However, the current position is that a more contextualized view of loss aversion should be considered, since it could be moderated by several factors (Gal and Rucker, 2018; Mrkva *et al.*, 2020).

Many studies are focusing on the contextual factors that could influence loss aversion, from the most stable, such as culture (Wang *et al.*, 2017); to the more situational, such as repulsive odors (Stancak *et al.*, 2015) or even oxygen saturation in the environment (Pighin *et al.*, 2014). Since stress has increased alarmingly in the last two decades (Ward *et al.*, 2020) and many of our decisions are made under stress, this factor is receiving substantial attention (Starcke and Brand, 2012, 2016).

Although a few evidence did not show significant effects on loss aversion (Metz *et al.*, 2020; Sokol-Hessner *et al.*, 2016), most studies report that stress reduce its manifestation (Margittai *et al.*, 2018; Molins *et al.*, 2021; Pighin *et al.*, 2014). These results could be supported by the 'align-

ment hypothesis' (Margittai *et al.*, 2018), i.e., stress triggers additional reward salience by enhancing the firing rate of dopaminergic neurons in key centers of the reward system, such as the ventral striatum (Mather and Lighthall, 2012), thereby balancing the weight of losses and gains and reducing loss aversion (Margittai *et al.*, 2018; Metz *et al.*, 2020). Nevertheless, the stress response is heterogenous, and it could depend on the nature, duration and intensity of the stressor (Hidalgo *et al.*, 2019). A frequent feature in most studies is that they involve acute and artificial laboratory stressors (e.g., stressful video; Molins *et al.*, 2021) ranging from 5 to 15 minutes, and loss aversion is usually assessed when the stressor is already gone or, at most, during an unconscious stressful condition (e.g., hypoxia; Pighin *et al.*, 2014). In fact, some stressors only affected at a physiological level, without inducing subjective stress or changes in the mood (Margittai *et al.*, 2018; Pighin *et al.*, 2014). Rarely, however, it can be studied how loss aversion is influenced by a real, persistent stressor (still present during the decision-making assessment), which promotes significant psychological distress. This opportunity was provided by the COVID-19 pandemic context.

On 30 January 2020, COVID-19 outbreak was proclaimed a public health emergency of international concern by the World Health Organization (Mahase, 2020), and several countries, such as Spain, were responding through confinement strategies. Confinement involves loss of freedom, social isolation, boredom, routine detriment, sleep disturbances, among many other factors which, along with the fear or concern about the virus contagion itself, were disrupting normal psychosocial life and promoting an important psychological distress, characterized by poorer mood and symptoms of anxiety and depression (Brooks *et al.*, 2020; Ingram *et al.*, 2020; Liang *et al.*, 2020; Pierce *et al.*, 2020; Shuja *et al.*, 2020).

Other fear-related stressors which led to psychological distress have been associated with the salience-network interconnectivity (Hermans *et al.*, 2014; Hermans *et al.*, 2011), enhancing key nodes of the loss aversion neural bases, such as the amygdala (Sokol-Hessner and Rutledge, 2019). Thus, in line with the 'salience-of-losses

hypothesis' (Margittai *et al.*, 2018), hypervigilance to losses could be increased and, with it, behavioral loss aversion. Complementarily, survivors of other catastrophes such as the Fukushima Daiichi Nuclear Disaster, who also experienced severe psychological distress, reported higher levels of loss aversion (Iwasaki and Sawada, 2015). Finally, an elevated level of this phenomenon is usually observed in patients with anxiety and depression (Baek *et al.*, 2017; Sip *et al.*, 2018). Based on the above, it could be expected that the distressing situation arisen from COVID-19 context were increasing loss aversion.

However, it should be noted that loss aversion is an emotional response to the 'pain of losses' (Hintze *et al.*, 2015; Sokol-Hessner and Rutledge, 2019). From an intrapersonal level, therefore, how sensitive a person is to his or her own emotions should also be considered, as this variable could moderate the degree to which emotions such as loss aversion influence decision-making. In this line, recent studies underline the important role of alexithymia, which is considered a personality trait characterized by difficulties identifying, describing and regulating one's emotions (Patwardhan *et al.*, 2019; Shah *et al.*, 2016; Walker *et al.*, 2011). In the decision-making field, it has been found that alexithymia impairs the incorporation of emotional information when deciding, leading to "cold" decisions (Kano *et al.*, 2011; Shah *et al.*, 2016). Indeed, other emotional phenomena closely linked to loss aversion, such as framing effect, were diminished when the alexithymia was high (Manzoor *et al.*, 2021; Shah *et al.*, 2016). Consequently, the influence of COVID-19-derived stress on loss aversion might be moderated by alexithymia, although this has not been tested to date.

In this study, we were able to assess the loss aversion level of a Spanish population sample one month after the confinement onset and compare it to the level they had before this safety measure was implemented. We hypothesize that, in comparison to pre-confinement measurements, individuals will display a higher psychological distress with increased symptoms of depression and anxiety, as well as higher loss aversion during the confinement. Moreover, considering the mod-

erating role that alexithymia could play on the loss aversion expression, we also hypothesize that alexithymia will buffer the expected increase in loss aversion during confinement. So, the higher alexithymia, the lower increment in loss aversion will be found. Finally, we hypothesize that psychological distress will be associated with the loss aversion increase, but this relation will also depend on the alexithymia level. With this study we aim to contribute to a better understanding of COVID-19 pandemic's impact on mental health and behavior, specifically on decision-making.

Material and methods

Participants

An *a priori* power analysis using G*Power indicated a pre-requisite of 15-20 participants to find a medium effect size ($d = 0.50$, power = 80 %, $\alpha = 0.05$) when performing a repeated-measures ANOVA testing for differences in loss aversion, pre- and during-confinement, including the alexithymia's interaction. 85 Spanish participants, all of them students of Psychology from the University of Valencia, were recruited pre-confinement by asking them if they wanted to participate in exchange for academic credits. However, 15 participants did not answer during-confinement and could not be compared. So, a total of 70 participants (women: 71.4 %, and men: 28.6 %) were finally included in the study. They filled out a self-administered questionnaire to confirm they met the following inclusion criteria when first contacted: not having neurological or psychiatric diseases; not consuming drugs regularly; not consuming more than 5 cigarettes a day and not having experienced a highly stressful event in the last month.

Procedure

This research was approved by the Ethics Research Committee of the University of Valencia in accordance with the ethical standards of the 1969 Declaration of Helsinki. Participants were first recruited in February 2020 to participate in another study not reported here. They read and

signed informed consent and completed the first battery of questionnaires, which included biometric and socio-economic questions, as well as the pre-confinement measurements of psychological distress and loss aversion. We contacted the participants telematically for the second assessment one month after the declaration of the state of alarm in Spain. Participants were informed about the study's objectives, signed a new consent, and completed a new battery of questionnaires. It was focused on their current level of psychological distress and loss aversion, but also addressed their alexithymia trait and several informative variables about confinement.

Questionnaires

Socio-economic questions were developed *ad hoc* for the research purpose and gathered information about age, gender, and socio-economic status. The latter using a 10-point Likert scale where 0 is the worst socioeconomic situation and 100 the best, taking as a reference the socioeconomic situation in Spain.

For psychological distress, pre- and during-confinement, we used the Spanish version of the General Health Questionnaire (GHQ, $\alpha = .86$) (Rocha *et al.*, 2011). GHQ is a self-report measure extensively recommended and administered in epidemiological surveys (Gnambs and Staufenbiel, 2018). Its short form with 12 items (in a Likert-scale ranging from 0 - not at all, to 3 - much more than usual), allows a screening of psychological distress during the last month and the risk of developing psychiatric disorders (Gnambs and Staufenbiel, 2018; Puustinen *et al.*, 2011). GHQ-12 has a two-dimensional structure: 8 items corresponding to depression symptoms and 4 to anxiety symptoms, where higher scores indicate the manifestation of more symptoms. In our sample the Cronbach's alpha pre-confinement was .88, and during-confinement .85, i.e. GHQ had a high reliability.

An *ad hoc* Spanish translation of the Lottery Choice Task (Gächter *et al.*, 2007) was employed to measure loss aversion pre- and during-confinement. In this task, participants had to decide along six lotteries whether they would accept or

reject the bet. In each lottery the gain was fixed at 6 € and the loss varied through bets (ranging from 2 to 7 €), yielding a successively decreasing expected value for each lottery. Following Hadlaczky *et al.* (2018), loss aversion is defined as the inverse of the highest accepted gamble, thus providing a continuous variable ranging from 0 to 6, where higher scores indicate higher loss aversion, since the ratio gains/losses would be higher. This ratio would show how big the potential gain must be in relation to the potential loss for the bet to be accepted.

For alexithymia, the Spanish version of the Toronto Alexithymia Scale (TAS-20, $\alpha = .78$) (Martínez, 1996) allowed the extraction of a general alexithymia factor by adding the scores of all items together. The higher the total score, the greater the alexithymia trait. Nevertheless, only scores above 60 indicate clinical alexithymia. The questionnaire is composed by 20 items in a Likert-scale, ranging from 1 – total agreement, to 5 – total disagreement. In our sample, the Cronbach's alfa was .80, indicating a high reliability of the questionnaire.

Finally, during confinement, we also asked whether the participants or their families had been infected, as well as with whom they lived during this situation.

Statistical analyses

Kolmogorov-Smirnov test with Lilliefors correction and Q-Q plots were used to check for normality. Psychological distress and loss aversion measurements were contrasted in a within-subjects design (pre- vs during-confinement) through repeated-measures ANOVAs (controlling for the alexithymia interaction when addressing loss aversion). In addition, to further explore how alexithymia was moderating the evolution of loss aversion, we carried out a moderation analysis for Two-Instance Repeated-Measures designs and followed the Johnson-Neyman procedure and the simple-slopes method with the recently developed MEMORE macro for SPSS (Montoya, 2019). Johnson-Neyman method selects a continuum of hypothetical values for the moderator variable (in this case, alexithymia) and identifies impor-

tant transition or critical points (JN) where this moderator's effect over Y (changes in loss aversion), shifts from significant to non-significant, or vice versa (see Montoya, 2019 for a detailed explanation). The simple-slopes method is similar to the previous one, but instead of selecting a continuum of values for the moderator variable, it chooses three of them that represent, regarding this variable, a low, intermediate and high level based on the mean (M) and plus/minus one SD from the mean. Thus, it is possible to see the conditional change of "Y" at each of the three levels of one or more moderators (again, see Montoya, 2019 for more details). In every analysis, the α significance level was set at .05 and partial eta square (η^2p) represents the effect size. They were carried out with IBM SPSS Statistics 25.

Results

Sample description

A description of the sample and its status during confinement is shown below. Participants were young people (age: $M = 22.56$, $SD = 2.58$), all of them psychology students at the University of Valencia (Spain), with a BMI ($M = 23.14$, $SD = 3.39$) within normal range (18.5-24.9), and with

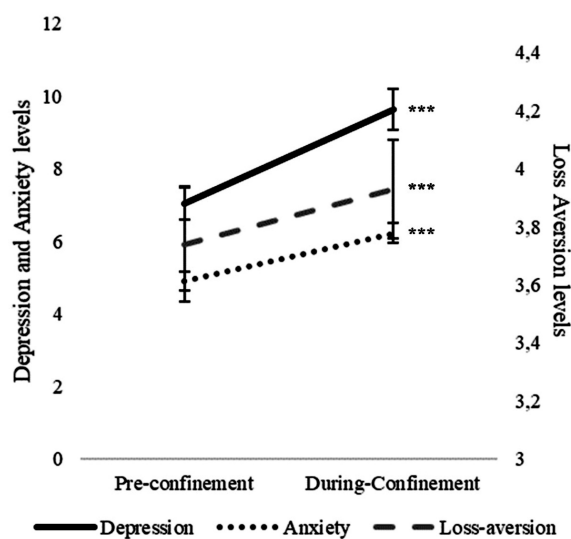
an intermediate socio-economic status ($M = 60.30$, $SD = 10.15$). Moreover, their alexithymia level ($M = 42.50$, $SD = 8.94$) significantly differed from the established score (60 points) that identifies clinical alexithymia, $t(69) = -19.33$, $p < .001$. Besides, it must be noted that neither of the participants, nor their loved ones were infected by COVID-19, plus they were not alone during confinement: 75.7 % of them were living with their family; 12.9 % with their (romantic) partner; and 11.4 % with friends or flatmates.

Psychological distress

To test whether the COVID-19 context was increasing psychological distress, pre- and post-confinement symptoms of anxiety and depression assessed with GHQ-12 were compared through repeated-measures ANOVAs. Significant differences were found in both variables, showing higher levels during confinement (see Figure 1). So, the pre-confinement depressive symptoms average was 7.05 ($SD = 3.7$), and during-confinement 9.69 ($SD = 4.7$), $F(1.68) = 9.01$, $p = .004$, $\eta^2p = .12$; while the pre-confinement anxiety symptoms average was 4.89 ($SD = 2.21$), and during-confinement 6.23 ($SD = 2.28$), $F(1.68) = 8.03$, $p = .006$, $\eta^2p = .17$.

Figure 1

Depression symptoms, anxiety symptoms (with GHQ-12) and loss aversion levels, pre-confinement, and one-month after the confinement onset



Loss aversion and the moderating role of alexithymia

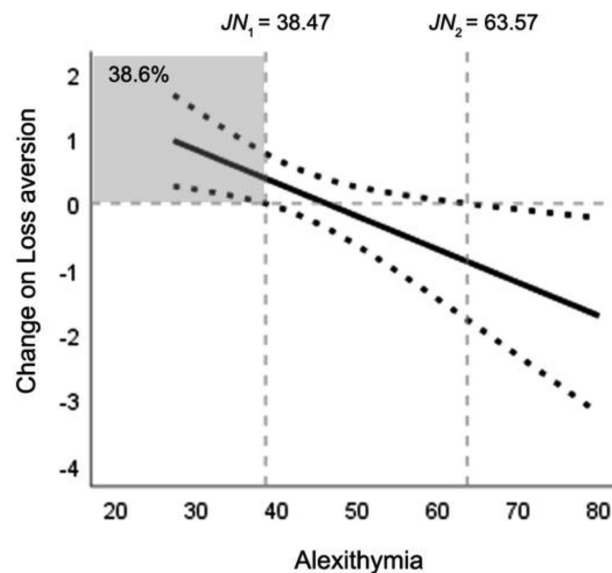
The aim of this study was to test whether loss aversion grew during the distressful context, as well as whether alexithymia was moderating this increase. Hence, we performed a repeated-measures ANOVA controlling for alexithymia. A significant increment was found during-confinement (see Figure 1). Loss aversion average pre-confinement was 3.74 (SD = 1.6), whereas during-confinement it was 3.91 (SD = 1.4), $F(1.68) = 7.52$, $p = .008$, $\eta^2_p = .10$. Moreover, a significant alexithymia*moment interaction was also found, $F(1.68) = 6.72$, $p = .012$, $\eta^2_p = .10$, which highlighted that alexithymia was influencing the evolution of loss aversion.

To further explore the direction of these results, we carried out a moderation analysis on repeated-measures. The resulting regression equation was $\hat{Y}_{\text{post}} - \hat{Y}_{\text{pre}} = \hat{Y}_D = 2.33 - .05W_i$, indi-

cating that during-confinement, it was expected an increment of 2.33 units on loss aversion since pre-confinement, $t(69) = 2.7$, $p = .007$. However, for each unit of alexithymia (W_i), there was a .05 unit decrease in the difference in loss aversion, $t(69) = -2.5$, $p = .01$. Following the Johnson-Neyman procedure, we found two critical points in alexithymia levels (see Figure 2). Alexithymia scores lower than 38.47 suffered a significant increase in loss aversion during-confinement, but scores greater than 63.57, which indicate clinical alexithymia, experienced the opposite. Nevertheless, the latter point is outside of our data's range and methodologists do not recommend interpreting those results (Montoya, 2019). Finally, scores ranging between both critical points did not show a significant change in their loss aversion level. Therefore, the increase in loss aversion was only significant when alexithymia level was low (below 38.47 points).

Figure 2

Graph of the conditional change on Loss aversion as a function of Alexithymia



Note: A JN point is where the confidence interval around the condition effect intersects zero on the y-axis. Thus, the shaded quadrant is the region of significance, i.e., those values of alexithymia for which the change in loss aversion is significant. As can be seen, these changes are only significant for low values of alexithymia. This quadrant includes the actual percentage of participants who fall within these alexithymia scores. Finally, another region of significance is observed that has not been shaded (for high values of alexithymia), this is because none of our participants have such high alexithymia scores and methodologist recommend to not interpret these results.

Complementarily, to explore whether changes in psychological distress were associated with significant changes in loss aversion, and whether alexithymia moderated this association, we conducted a repeated-measures moderation analysis that included as outcome ($\hat{Y}_{\text{post}} - \hat{Y}_{\text{pre}} = \hat{Y}_D$) the change in loss aversion and, as moderators, both the level of alexithymia and the change in anxiety / depression symptoms (i.e. the level during-confinement minus pre-confinement level). To our knowledge, and as the MEMORE macro specifies, “Johnson-Neyman procedure is not available for models with more than one moderator”, nonetheless, the simple-slopes method is. Using this method, three levels of each moderator (lower, medium, and high) were selected based on the mean value and plus / minus one SD from the mean. Results from this analysis revealed that the increase on anxiety symptoms was only associated with a significant increase on loss aversion when the alexithymia was low and the anxiety increase was either medium ($t(67) = 2.47$, $p = .016$) or high ($t(67) = 2.24$, $p = .02$). For lower levels of anxiety increase and medium or high alexithymia levels, no significant changes in loss aversion were observed. However, the increase on depression symptoms was associated with the significant increase on loss aversion at all levels of change in depression: low ($t(67) = 2.25$, $p = .02$), moderate ($t(67) = 2.59$, $p = .011$) and high ($t(67) = 1.94$, $p = .04$), as long as alexithymia level was low. Otherwise, no significant changes in loss aversion were found for any level of change in depression symptoms.

To sum up, psychological distress (anxiety and depression symptoms) was associated with significant increments on loss aversion when the level of alexithymia was low. Contrarily, for moderate or higher alexithymia levels, even if psychological distress worsened, no significant changes in loss aversion were found.

Conclusions and discussion

Previous studies addressed how stress influences decision-making and, specifically, the psychological impact of losses or loss aversion. However, most utilized acute and artificial stres-

sors, many of which only affected at the physiological level but did not produce psychological distress (Margittai *et al.*, 2018; Pighin *et al.*, 2014). In our study, however, we had the opportunity to address a real and persistent stressor, derived from the pandemic situation experienced with COVID-19. Our results, obtained through a within-subjects design, indicated that this stressful context produced a significant increase in psychological distress, and, as expected, a higher level of loss aversion only one month after the confinement onset. Moreover, alexithymia played an important moderating role by buffering the increase in loss aversion. These results will be discussed in depth below.

First, psychological distress was assessed using the GHQ-12 questionnaire, which provides information on symptoms of anxiety and depression. As expected, both depression and anxiety symptoms increased significantly from their pre-confinement measurement, which would evidence that the stressful pandemic context was producing a significant psychological distress. Thresholds for determining the symptomatology's significance can vary (Goldberg *et al.*, 1998), but a reference adapted from the original GHQ Manual (Goldberg and Williams, 1988) indicates 8 points for depressive symptoms, and 4 points for anxiety symptoms. On average, during confinement, our sample showed scores above these thresholds in both depression ($M = 9.69$, $SD = 4.7$) and anxiety ($M = 6.23$, $SD = 2.28$). But the most concerning aspect is that these levels were reached in just one month. Since GHQ-12 is a good predictor of developing psychiatric disorders (Gnambs and Staufenbiel, 2018), it is not surprising that, months later, various systematic reviews and meta-analyses highlighted that the prevalence of all forms of depression, anxiety, stress, sleep problems, and psychological distress in general population was higher during COVID-19 pandemic (Lakhan *et al.*, 2020; Salari *et al.*, 2020).

However, the main objective of this study was to analyze how this psychological distress affected the perception of economic losses and, therefore, decision-making. As hypothesized, and in line with previous evidence on survivors of other

distressing contexts (Iwasaki and Sawada, 2015), loss aversion increased during the COVID-19 outbreak. This would fit with the enhancing role that psychological distress is thought to exert on the salience network (Hermans *et al.*, 2014, 2011). So, this would promote increased activity in regions such as the amygdala or insula, which, in turn, constitute the main nodes of the neural loss aversion (Sokol-Hessner and Rutledge, 2019). Therefore, this context would promote an alert state that provides greater salience to losses and behavioral loss aversion (Margittai *et al.*, 2018).

It should be noted that greater loss aversion is not good or bad *per se* (Sokol-Hessner *et al.*, 2016). From the classical approach of economic rationality (Camerer, 2003), loss aversion is an emotional phenomenon that would hinder logical or rule-based decision-making. However, in line with the ecological rationality approach (Gigerenzer and Gaissmaier, 2011), loss aversion must be analyzed in terms of its context. So, given the concerning situation, an increase in loss aversion could be considered adaptive, leading to more cautious decisions. In fact, Presti *et al.* (2022) found that confinement adherence was mostly predicted by loss-averse attitudes. Nevertheless, since anxiety and depressive disorders use to be associated with higher levels of loss aversion (Baek *et al.*, 2017; Sip *et al.*, 2018), our results could also constitute further evidence of the mental health worsening. Thus, rather than cautious decisions, increments in loss aversion could represent the maladaptive decision-making commonly found on mood and anxiety disorders (Alexander *et al.*, 2017; Bishop and Gagne, 2018). Therefore, it would be important to deeper study whether loss aversion continued growing, as well as to obtain additional behavioral measurements, in order to explore whether this phenomenon was related only to risk avoidance or, on the contrary, was leading to procrastination, indecisiveness, and other maladaptive ways of deciding, typical in anxiety and depression (Alexander *et al.*, 2017; Bishop and Gagne, 2018; Pushkarskaya *et al.*, 2017).

One possible explanation is that the increase in loss aversion may be adaptive in the early stages of this pandemic context, but if psychological distress deteriorates over time, loss aversion

may eventually become very high and lead to maladaptive decisions. In fact, our data support that increased psychological distress at least partially predicted loss aversion increments. Consequently, higher levels of loss aversion could be found when mental health worsens even more. However, an important finding in our study is that alexithymia seems to play a key role in the evolution of loss aversion. The lower alexithymia was associated with the higher increment in loss aversion. Indeed, for levels of alexithymia greater than 38 points, no significant changes in loss aversion were found. This result would be in line with evidence that point out that alexithymia could difficult the incorporation of emotional states (such as the negative affect derived from the psychological distress) into the decisional process, leading to “cold” or rational decisions (Manzoor *et al.*, 2021; Shah *et al.*, 2016; Zhang *et al.*, 2017). Complementarily, our moderation analyses also showed that increased symptoms of anxiety and depression were only associated with a significant increase in loss aversion when levels of alexithymia were low.

An explanation could be drawn from neuroimaging studies. As explained before, the neural bases of loss aversion (Sokol-Hessner and Rutledge, 2019) involve an aversive system (mainly the amygdala and the insula) which reacts disproportionately to losses and sends the information to prefrontal cortex (mainly dorsolateral and ventromedial regions), where it would be synthesized and decisions would be determined. Under conditions of anxiety or depression (even subclinical), several studies showed an increased amygdala and insula reactivity (e.g. Klumpp *et al.*, 2012; Laeger *et al.*, 2012; Stein *et al.*, 2007). As these regions are the main hubs for loss aversion, this may explain why this phenomenon use to be high in these disorders (Alexander *et al.*, 2017; Bishop and Gagne, 2018). Yet, it has also been seen that alexithymia is characterized by hypoactivity of the ventromedial prefrontal cortex, as well as reduced connectivity between the latter region and the insula (Sutherland *et al.*, 2013). This has been proposed as the mechanism by which emotional responses are not adequately incorporated into the decisional process (Kano *et al.*, 2011; Zhang *et al.*, 2017). In this line, although symptoms of

anxiety and depression increase, and with it, the aversive system's activity, loss aversion could remain low since the emotional information may have difficulties reaching the prefrontal cortex when the alexithymia is high. Nonetheless, this is only speculation, and more research is needed to address the specific mechanisms that explain our results. Indeed, it should not be forgotten that the study's nature is correlational and not experimental, so explanations in the opposite direction may also be plausible. For example, it could be that there were increases in loss aversion, but only those with low alexithymia developed more symptoms of anxiety and depression. Thus, using objective neurophysiological or neuropsychological techniques to address these issues would be very helpful.

In fact, since this is a natural study and participants could not come to the laboratory to take that kind of measures, this is one of our main limitations. Moreover, given the abrupt situation, more pre-confinement variables that could have also been important to consider were not evaluated. In addition, our data must be interpreted based on our specific sample: young people, with middle socioeconomic status, and accompanied during confinement. It is likely that other factors, such as loneliness or a precarious economic condition, may show different results. It would be necessary to replicate our study in broader samples to test whether our results can be extrapolated beyond young psychology students. On the other hand, all analyses were replicated including the gender variable. Results were very similar, and the variable gender did not show significant main effects, nor interaction effects. However, the sample was disproportionate, and this conclusion should not be taken firmly, since analyses could be underpowered. In fact, there is evidence for gender influencing emotional responses to stress, being men less likely to develop psychological symptoms (e.g. Liu *et al.*, 2020; Moccia *et al.*, 2020). Thus, it would be necessary to incorporate a bigger and more balanced sample in the future.

Despite limitations, our study was a first step for understanding how the distressing context generated by COVID-19 was influencing deci-

sion-making, and specifically loss aversion. As seen, our data shows that the connection between psychological distress, alexithymia and loss aversion exists must be considered, beyond attending to the different variables separately or in pairs. So, psychological distress seems to enhance loss aversion as long as the level of alexithymia is low. Future lines of research should address whether increased loss aversion in a threatening context such as the COVID-19 outbreak should be understood as a protective factor or, on the contrary, as a manifestation of poorer mental health. Furthermore, alexithymia should be considered in future studies on decision-making and stress, as it seems to be an important factor in the decisional process.

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Risk aversion making economic decisions, certainty effect and probabilities estimation

Aversión al riesgo al tomar decisiones económicas, efecto certeza y estimación de probabilidades

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Abstract: it has been empirically observed that the principles of utility theory are frequently violated when making decisions in risky environments. This led to the formulation of the prospect theory, in which, besides taking into account the different consideration of gains and losses (losses loom larger than gains) as well as the risk posture of decision-makers (risk aversion for gains and risk seeking for losses), the certainty effect is framed. According to such effect, decision makers tend to underestimate payments that are merely probable, compared to those that are obtained with certainty. Allais showed the irrationality that occurs in decision making in this context. On the other hand, to make risky decisions it is necessary to know how probabilities work. An experimental study was designed to determine the relationships between risk aversion, certainty effect, and basic knowledge of probability theory. In this study it was verified, using a formulation based on the Allais paradox, that those who have more knowledge of the principles of probability show greater aversion to risk. However, the fact of incurring in the certainty effect is a circumstance that is not significantly affected by such knowledge.

Keywords: decision theory, rationality, risk aversion, behavioral economics, experiment, Allais paradox, certainty effect, prospect theory.

Resumen: se ha observado empíricamente que la violación de los principios de la teoría de la utilidad se produce con frecuencia en la toma de decisiones en entornos de riesgo. Esto llevó a la formulación de la teoría de las perspectivas en la que, además de tener en cuenta la diferente consideración de las pérdidas y las ganancias, así como la postura ante el riesgo de los decisores, mostrando aversión por el riesgo en las ganancias y amor por el riesgo en las pérdidas, se enmarca el efecto certeza. Según el efecto certeza, los decisores tienen tendencia a infravalorar los pagos que son meramente probables, en comparación con aquellos que se obtienen con certeza. Allais mostró la irracionalidad que se produce en la toma de decisiones en este contexto. Por otro lado, para tomar decisiones arriesgadas, es necesario conocer cómo funcionan las probabilidades. Con el objetivo de determinar las relaciones existentes entre la aversión al riesgo, el efecto certeza y el conocimiento básico de la teoría de las probabilidades, se diseñó un estudio experimental en el que se constató, utilizando una formulación basada en la paradoja de Allais, que quienes tienen mayores conocimientos de los principios de la probabilidad muestran una mayor aversión al riesgo, pero el hecho de incurrir en el efecto certeza, sin embargo, es una circunstancia que no se ve afectada significativamente por dicho conocimiento.

Palabras clave: teoría de la decisión, racionalidad, aversión al riesgo, economía conductual, experimento, paradoja de Allais, efecto certeza, teoría de las perspectivas.

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Introduction

The theory of expected utility, developed by Von Neumann and Morgenstern (1944), has been considered through decades as the regulatory model of rational choice in economic decision making in the presence of risk, assuming that the behavior of people would observe its axioms. Thereby, according to this model, the expected utility that an individual would get when facing a lottery would be calculated as the sum of the utilities of the different payments, multiplied by their corresponding probabilities, such that the decision maker would select the alternative with the highest expected utility. However, this statement was questioned since the formulation of the St. Petersburg paradox (Bernouilli, 1738), translated to English here (Bernouilli, 1954), since, among other reasons, it entailed an enormous difficulty to reasonably value those circumstances in which a particular event would offer an extremely high payment that could be obtained with an extremely small probability.

On the other hand, in front of the reiterated evidence found in decision-making processes observed in numerous empirical studies, in which those who have to conduct them systematically violate the principles on which the expected utility theory is based, it is easy to find in the specialized literature different models that have been developed in the attempt to get closer to the reality of the decisions made by individuals (Machina, 1987; Camerer, 1989; Tversky and Kahneman, 1992). The model that has had a greater impact, because it explains the main violations of the expected utility theory in contexts of selection with risk, is the prospect theory model (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986; Tversky and Kahneman, 1992), up to the point that the 1979 paper by both authors is the most-cited one in the field of business and economy (Merigó *et al.*, 2016). Indeed, the aforementioned St. Petersburg paradox has been reconsidered in light of prospect theory (Rieger and Wang, 2006).

Prospect theory

Prospect theory has been well studied and revised (Bendickson *et al.*, 2017), and has been recognized as the descriptive theory of decision making in front of the most relevant risk at present (Barberis, 2013; Starmer, 2000; Wakker, 2010). This theory has been applied in very different fields of decision making (Holmes *et al.*, 2011), such as in the analysis of decisions in real estate markets (Buisson, 2016), bets (Bouchouicha and Vieiden, 2017), insurance (Schmidt, 2016), profitability of shares by dividends (Barberis *et al.*, 2016), decision making related to migrating or remain living at the same place (Morrison and Clark, 2016; Clark and Lisowski, 2017), decisions about betting or not in different periods, in a dynamic context (Ebert and Strack, 2015), decisions about what amount of shares to optimally keep, making reference to the known “newspaper seller problem” (Long and Nasiry, 2015), the effects of bankruptcy laws on corporate aspirations (Estrin *et al.*, 2017), agricultural insurance coverage (Babcock, 2015), aspects related to the volatility and low profitability of investments (Bhootra and Hur, 2015), decisions about carrying out military actions (Niv-Solomon, 2016), international relations between countries (Feng and He, 2017; Stein, 2017), the assumption of risks by politicians (Linde and Vis, 2017), decisions made in the sports sector, concretely in American football (Bendickson *et al.*, 2017), the prediction of sport results (Pérez-Martínez and Rodríguez-Fernández, 2022), and portfolio optimization (Grishina *et al.*, 2017), among others.

In contrast with what occurs in the expected utility theory, in which the aversion or love to risk are solely determined by the profitability function of the individual, several additional factors come into play in prospect theory that affect the decision making process, beyond individual aspects such as the personality of decision-makers (Chávez-Santana *et al.*, 2021; López *et al.*, 2023) and other psychological variables that also have influence on decision making domains, such as game theory (López *et al.*, 2022). Indeed, in prospect theory, the utility function would be concave with respect to the reference point in the case of earnings, while it would be convex with respect to that same point

in the case of incurring losses. Thus, in the case of earnings as well in the case of losses, the impact of any change will be smaller when we are farther from the initial reference point (there is a decreasing sensitivity in front of the effects of a particular monetary variation experienced).

On the other hand, according to this model the slope of the function in the case of losses would be larger than in the case of earnings, thus indicating the existence of an aversion to losses; consequently, an asymmetry is observed as the loss of a particular amount of money has a larger impact on the utility level of the individual than an equivalent earning. At last, the utility is calculated using the monetary earnings or losses experienced, and not the final situation in which the individuals are when these earnings or losses are obtained, as it occurs in the expected utility theory (Tversky and Kahnemann, 1991).

Allais paradox and the certainty effect

The absence of linearity in the preferences that is collected from the statements by Kahneman and

$$\begin{array}{l}
 A = \begin{cases} 520000 \\ 0 \end{cases} \quad \begin{array}{l} p_1 = 0,61 \\ p_2 = 0,39 \end{array} \\
 \\
 C = \begin{cases} 520000 \\ 0 \end{cases} \quad \begin{array}{l} p_1 = 0,98 \\ p_2 = 0,02 \end{array}
 \end{array}
 \quad \text{vs.} \quad
 \begin{array}{l}
 B = \begin{cases} 500000 \\ 0 \end{cases} \quad \begin{array}{l} p_1 = 0,63 \\ p_2 = 0,37 \end{array} \\
 \\
 D = 500000
 \end{array}$$

For these two situations represented, in which either alternative A or alternative B should be chosen in the first occasion, and C or D in the second, most people chose the 520,000 lottery in the first dilemma (earn 520,000 with a probability of 0.61 compared to earning 500,000 with a probability of 0.63), while they choose alternative D in the dilemma of the lower part (choosing to earn 500,000 with certainty instead of earning 520,000 with a probability of 0.98). In this manner, the utility the-

Tversky was revealed several decades ago, in the middle of the past century. Indeed, Allais (1953) empirically showed in a scientific congress that the difference between probabilities of 99 % and 100 % have a larger impact on the preferences of the individuals than the difference between, for instance, 10 % and 11 % probability.

In the same line of the conclusions extracted by Maurice Allais, Kahneman and Tversky (1979) stated that decision-makers have a trend to underestimate the payments that are merely probable compared to those that are obtained with certainty; they called this "certainty effect". This trend contributes to the appearance of behaviors that exhibit aversion to risk in cases in which there is the possibility of obtaining a sure payment, while it would cause love for the risk in those other situations in which there are possibilities of sure losses.

The problem that Kahneman (2011) uses to illustrate, in a simplified manner, the dilemmas that enable to explain Allais paradox could be represented as follows:

ory is being violated, since the probability increase of 0.37 in the alternatives of the lower part with respect to the upper part would favor alternative C more than alternative D, because it increases the possibility of obtaining 520,000 in the first case, and of obtaining 500,000 in the second case. Therefore, a "certainty effect" occurs, according to which the results that are obtained almost with certainty are assigned a lower value than the one that would be justified by its probability.

Using the criterion of maximizing the expected monetary value, it is calculated and compared for each alternative:

$$\begin{aligned} \text{VEM}(A) &= 520000 \times 0,61 + 0 \times 0,39 = 317200 \\ \text{VEM}(B) &= 500000 \times 0,63 + 0 \times 0,37 = 315000 \\ \text{VEM}(C) &= 520000 \times 0,98 + 0 \times 0,02 = 509600 \\ \text{VEM}(D) &= 500000 \end{aligned}$$

Therefore, $\text{EMV}(A) > \text{EMV}(B)$ and $\text{EMV}(C) > \text{EMV}(D)$

The decision maker should, in this case, choose alternative A and alternative C instead of B and D, respectively. Nevertheless, there is no interest in comparing the expected earnings of the different alternatives, but the utility that the individual receives from such earnings.

Indeed, according to the Von Neuman-Morgenstern utility functions, if it is assumed that an individual prefers the first alternative instead of the second in the first decision problem, it is obtained that:

$$0,61 \times u(520) > 0,63 \times u(500)$$

On the other hand, in the case of a monotonically increasing utility function, it is evident that:

$$0,37 \times u(520) \geq 0,37 \times u(500)$$

Adding the two sides of the previous inequalities, it should hold that:

$$0,98 \times u(520) > 1 \times u(500)$$

Therefore, if a decision-maker chooses A instead of B, he/she should choose C instead of D.

In other words, alternative C should be chosen instead of alternative D, regardless if the decision-maker shows aversion or love for risk. Someone that chooses alternatives A and D would be violating the principles of expected utility; there is no utility function compatible with both

decisions. Therefore, this would be an irrational decision. Indeed, Daniel Kahneman acknowledges that one of the first objectives proposed when he started to work with Amos Tversky, was to find an appropriate psychological explanation of why Allais paradox is produced (Kahneman, 2011) and why, to this day, different versions of the Allais paradox are still used to study and analyze decision making of individuals in risk situations (Berlinger, 2015; Bruhin *et al.*, 2022).

As stated by Thaler (2016), people choose among different alternatives based on a set of expectations about the consequences of their decisions, as well as on different exogenous factors that may determine how all these variables will evolve in the future. In addition, economists traditionally assumed that such beliefs were free of biases and, at present, this idea is not generally shared; this can be seen in the existing literature, part of which has been referenced in the previous subsection.

Indeed, as pointed out by Slovic and Tversky (1974), in front of the observation and empirical confirmation of the violation of the axioms of rational decision theory, many decision theorists considered that those events should be treated as judgement errors due to oversights, absence of appropriate incentives, or simply errors in the understanding of the problems stated. However, the existence of numerous heuristics and cognitive biases in the behavior of individuals when making economic decisions in risk or uncertain environments has been profusely studied, as well as the contributions from economic psychology or behavioral economics, analyzing the existence of framing effect, provision effect, anchoring effect, possibility effect, certainty effect, etc., that have come to enrich knowledge about how such decision making process occurs and what factors affect such behavior.

On the other hand, there are very recent empirical studies which demonstrate that the preferences of individuals are not given in an immovable manner, but they are constructed on the go influenced by the context of decision making, and their recent experience in such context (Kusev *et al.*, 2020, 2022). Delving deeper in this line, this study will introduce a consideration that has not been generally contemplated in the

existing literature, which consists in finding the relationship that may exist between the level of understanding that the individuals have about the probability of occurrence of a particular event, with the stance that these individuals have in front of risk in situations favorable for the appearance of the certainty effect.

Indeed, basic mathematical knowledge about probabilities, which is often assumed in the aforementioned studies, seems to be relevant when someone faces a decision problem in which different results may be obtained based on particular events that may occur with a specific probability, such that the lack of knowledge of these basic principles of probability might somehow influence their decisions. Thus, even being aware that there are many different variables that influence decision making of individuals, the objective is to better understand the reasons that lead to different attitudes towards the risk, incorporating this new variable, i.e., the basic knowledge or lack of knowledge of the probability of occurrence of a particular event.

Methodology

In the context of the XXVI Jornada Internacional de Investigación de la Universidad Pedagógica y Tecnológica de Colombia, an experimental study was conducted in which a decision problem was

posed to the audience, as was done by Maurice Allis in Paris during a meeting to discuss about risk economy attended by economists such as Samuelson, Arrow, Friedman or the statistician Jimmie Savage. The problem was posed both to those who attended in-person and those who followed it remotely through virtual media, to minimize the possible bias that might appear as a result of the communication between participants when responding the questions. It was obtained 149 responses to the designed questionnaire, in which no information was requested that would enable to identify the respondents, so that they could respond freely and with absolute confidentiality.

After seeing the graphical representation of the problem shown in figure 1 in the questionnaire that they filled out, respondents had to choose between alternatives A and B based on their preferences. These alternatives would enable them to hypothetically obtain payments according to the following statement:

Imagine that you face a game as the one shown in the image. If you choose alternative A, you will earn 520,000 with a probability of 0.61 and will earn nothing with a probability of 0.39. Conversely, if you choose alternative B, you will earn 500,000 with a probability of 0.63 and will earn nothing with a probability of 0.37. Indicate below which alternative would you choose.

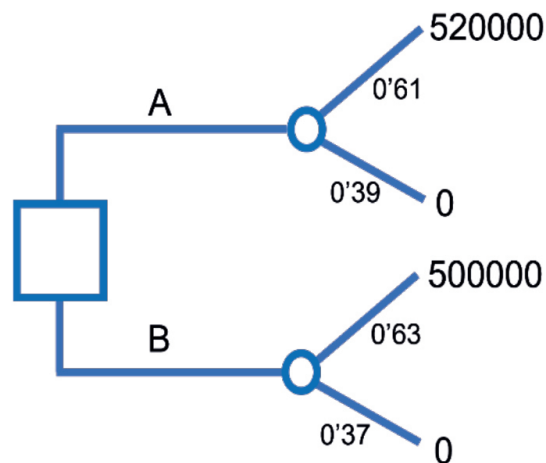


Figure 1

First problem of selection between two alternatives

With the purpose of knowing the degree of understanding that the participants in the study had about the probabilities of random events, the following problem was posed:

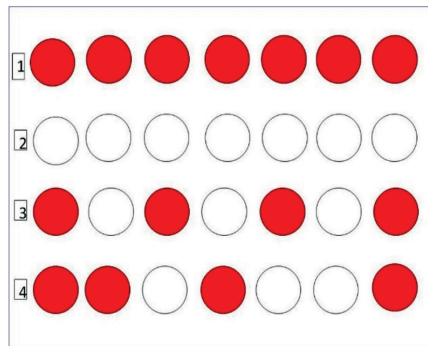
Imagine that a ball is randomly drawn from a bag that contains 50 red balls and 50 white balls. The

color of the ball drawn is registered, the ball is placed back in the bag, and the process is repeated up to 7 times. Indicate which of the following sequences you consider that is most probable to occur.

The sequences to which the statement makes reference are shown in figure 2.

Figure 2

Red and white balls



The possible responses presented in the questionnaire, according to the sequences shown in the image, were the following:

- red, red, red, red, red, red, red
- white, white, white, white, white, white, white
- red, white, red, white, red, white, red
- red, red, white, red, white, white, red
- all the above sequences have the same probability

The correct response is the last one, since all

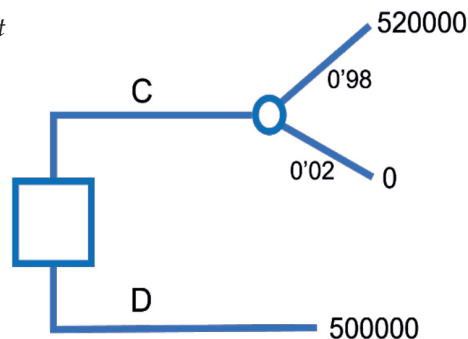
sequences have the same probability (1/128).

Afterwards, the participants in the study had to respond what alternative they would choose when the probabilities of obtaining the payments of the initial decision problem were modified, according to the problem represented in figure 3, which corresponded to the following statement:

Imagine that you face a game as the one shown in the image. If you choose alternative A, you will earn 520,000 with a probability of 0.98 and will earn nothing with a probability of 0.02. Conversely, if you choose alternative B, you will earn 500,000 with certainty. Indicate below which alternative would you choose.

Figure 3

Second problem of selection bet



When considering the responses given to both decision problems, the situation examined corresponds to the statement of “Allais paradox”, and attempts to show the inconsistency exhibited by some individuals in decision making, which leads them to violate the expected utility theory.

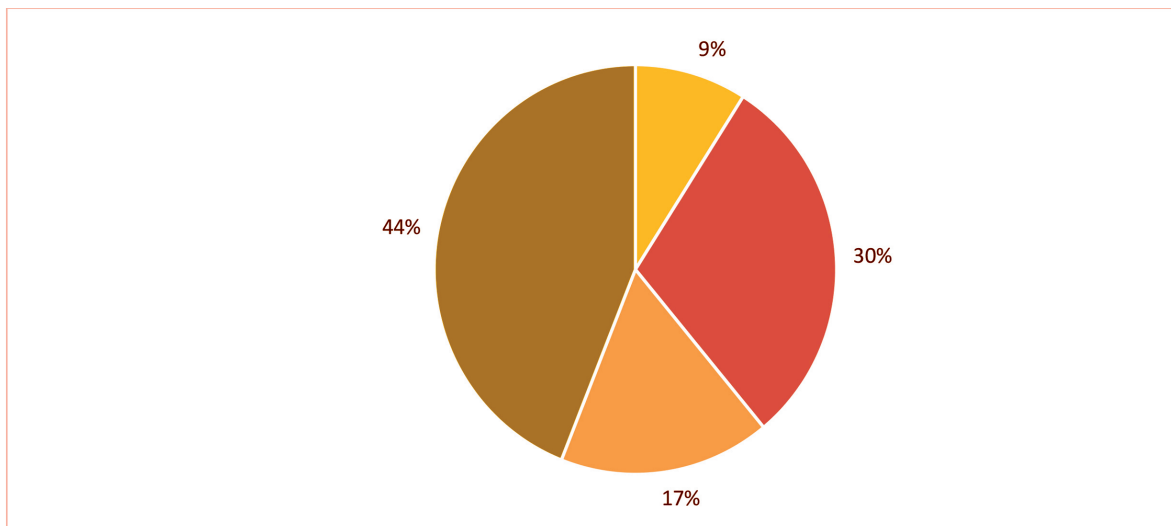
Indeed, a person who chooses alternative A in the first problem “should” also choose it in the second. This is the case because, in the second problem, the probability of obtaining a payment of 520,000 in alternative A has increased 37 % with respect to the initial problem, while in alternative B the probability of obtaining a payment of 500,000 has also increased 37 %.

Therefore, the expected earning of alternative A has increased 192,400, while the expected earning of alternative B has only increased 185,000; if alternative A is chosen in the first problem, with more reason it should be chosen in the second problem based on “economic rationality”.

Results

The 30 % of the participants in the study (see figure 4) incurred in the situation of underestimating the results that are merely probable compared with the results that are obtained with certainty, responding A and D in the two decision problems stated.

Figure 4
Response to the decision problems



The other three possible combinations of responses that were obtained are the following:

- AC (9 %) correspond to people attracted by the possibility of obtaining the highest payment of 520,000, and are consistent in their selections in the sense that they choose A in the first problem and also in the second.
- BC (17 %) correspond to people that show aversion to risk in the first statement because they choose the alternative with the smaller expected earning, but in which the probability of earning nothing is lower.

However, these people are attracted by the probability very close to 1 of obtaining the highest payment (520,000) in the second problem. It could be interpreted that initially both alternatives were very close to each other in the rating of the individual, with a slight advantage for alternative B, but the improvement experienced in the payment when going from alternative A to alternative C, which is greater than the one experienced when going from B to D, has imbalanced the scale in favor of the first alternative.

- BD (44 %) are people that show aversion to risk in both problems, choosing always the alternative with the higher probability of obtaining a payment.

Regarding the question that pursued to know to what extent the participants in the study had a basic knowledge of probabilities, only 50.34 % of the responses issued were correct, with the failures being distributed almost evenly among those who thought that the most likely sequence was alternating colors (red, white, red, white, red, etc.) and those who considered that the most likely sequence is “red, red, white, red, white, white, red”. It is not hard to explain that the responses of a rather high percentage of people were both erroneous.

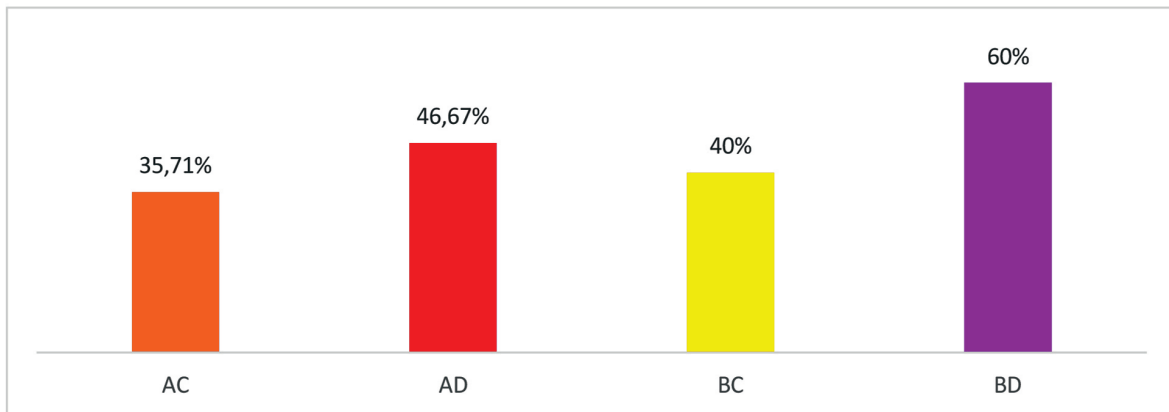
In the first case, since the color of each ball drawn may be red or white with equal probability, people may think that after drawing a ball of a particular color, red for instance, the following ball drawn “should be” white, and hence the subsequent should be red and then white and so forth, without realizing that the events are independent and that the experiment corresponds to a drawing with replacement; hence, at each stage

the probability of each color is equal to 0.5. On the other hand, in the second case the sequence does not follow any concrete pattern that may be easily recognized, and thus people may assume that it has a higher probability of occurrence than the others in which a clear sorting can be indeed observed. That is an error, because such specific sequence has the same probability of occurrence than, for instance, all balls drawn of the same color or alternating colors.

Now, the following analysis question arises given these data: is there any relationship between the people that responded correctly (or erroneously) to the question of red and white balls, and the responses given in the Allais paradox problem? To carry out this analysis, a graph has been made that shows the percentage of people that responded correctly to the question of red and white balls, relating it with the responses given in the Allais paradox problem. Thus, before relating these results with the ones obtained in the decision problem, a significant difference of correct responses is already seen in favor of those who responded BD, with 60 %, which is much greater than those who responded AC (35.71 %) and BC (40 %).

Figure 5

Percentage of correct responses to the question of probability estimation according to the groups of the Allais experiment



Conclusions and discussion

Over the course of history, it has been studied how individuals make economic decisions when

they face the problem of choosing among different alternatives, in which the results that they may obtain depend on different circumstances, which can have associated a probability of occurrence. The criterion of maximization of the monetary

expected value, which consists in choosing the alternative that has the greatest expected earnings after performing a weighted sum of the different payments multiplied by their corresponding probabilities, was surpassed when it was considered the stance in front of the risk using the utility functions (Von Neuman-Morgenstern, 1944).

However, many situations kept arising in which decision-makers systematically violated the utility theory principles. Thus, there is a wide consensus to admit that the fact of varying the way in which problems are presented (for example, in terms of earnings or losses), systematically leads to the expression of different preferences; this has been called the “framing effect”. Similarly, although in the economic analysis of decisions in risk and uncertain environments it is generally assumed the existence of risk aversion, there are circumstances in which decision-makers show love for the risk. For instance, this occurs when buying lottery. In the lottery, there is negligible probability of obtaining a very high prize, but if the monetary expected value of the lottery is calculated, by adding all possible payments multiplied by the probability of obtaining each of them (including the possibility of earning nothing), it is obviously obtained a result that is substantially lower than the price paid. It was also observed love for the risk, when there is an obligation to choose between incurring in a sure loss and obtaining a loss even greater, not certain, but that can occur with a high probability. The possibility of being able to avoid such loss, even with a very low probability, may result attractive if it is compared with the alternative of having a loss with certainty.

As it was demonstrated by Allais (1953) and has been explained in this paper, the existence of nonlinear preferences is another of the circumstances in which inconsistencies appear in the behavior of individuals in the process of making economic decisions, leading them to act in a way that can be described as “irrational” according to the postulates of utility theory. The existence of the certainty effect, which was suggested by Allais and which is explained in the prospect theory developed by Kahneman and Tversky (1992), is behind this irrationality.

As has been mentioned above, the probability of occurrence of the different events is a fundamental factor for decision making. Thus, it is assumed that the results that may be obtained as a consequence of the decisions made among different alternatives, will be conditioned by such probabilities. This involves some knowledge about probabilities, not the ones that affect the problem addressed, but the concept of probability in general. Otherwise, the aforementioned irrationalities would have an additional source based on the lack of knowledge or on the confusion.

Analyzing the data provided in the results section, it could be observed that the group of people that made selections in which they showed to be affected by the certainty effect in a clearer manner, i.e., those who responded alternative A and alternative D successively for the two decision problems that were stated, have a percentage of success in the question regarding probability (the one of the red and white balls) that is very close to the mean: 46.67 compared to 49.66. Therefore, based on the data of this study it is not possible to conclude that there is a relationship between the two events. Nevertheless, it should be remarked the percentage of people (60 %) that selected alternatives B and D in the Allais paradox problems (choosing those lotteries in which they had a larger probability of winning, even when the payment was smaller than the one offered by the other alternative, thus showing aversion to risk) and who simultaneously responded correctly to the question related to probabilities estimation (indicating that all sequences presented had the same probability of occurrence). Indeed, this percentage is 50 % greater than the corresponding to those who responded B and C to the two questions, and almost 70 % greater of those who chose alternative A in the first question and C in the second.

In the absence of more studies that verify the results with larger samples and considering additional factors, from the data of this work it may be concluded that there is a positive relationship between the appropriate understanding of the probabilities of occurrence of particular events with the fact of showing a greater level of risk aversion. Conversely, as the knowledge about

how probabilities work is smaller, it is more likely that individuals make risky decisions in which they may obtain losses that are rather high. In any context of decision making (public administration, corporate or particular private administration), it is necessary to understand which are the factors that affect people when they face situations of decision under risk or uncertainty, since results will partially depend on them. This study points out the convenience of reinforcing the mathematical study of probabilities, so that individuals are capable of making economic decisions (for instance, investment decisions) that are not penalized by the possibility of incurring in high risks as a consequence of a limited knowledge of probability theory.

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Fighting gender violence with behavioral public policy: scope and limitations

Combatiendo la violencia de género a través de políticas públicas conductuales: alcances y limitaciones

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Abstract: since the concept of “nudge” was introduced in 2008 by Thaler and Sunstein, proposing that small interventions based on changes in choice architectures can alter people’s behavior and make it easier for them to achieve their desired goals, the application in public policy of behavioral economics has gained significant attention. This has led to the emergence of different types of policies based on behavioral insights, which have been used in a variety of areas, including health or finance, with the goal of promoting well-being and addressing social and economic issues. After providing a basic theoretical background as a frame of reference to understand gender violence, this study explores the use of tools from the field of behavioral economics as it is applied in public policy. Regulatory (paternalistic) and non-regulatory (libertarian) interventions based on behavioral insights will be considered: nudges, boosts, shoves, nudges, or sludge audits, are examined as potential interventions to use in matters related to this type of violence. After evaluating these behavioral policy instruments and their potential effectiveness, the limitations of the behavioral perspective are recognized, and the need for a multifaceted approach to combating gender violence is acknowledged. The article concludes by arguing that public policies addressing gender violence should not only utilize behavioral tools but should also incorporate strategies related to education, legislation, and social norms.

Keywords: gender violence, nudge, public policy, libertarian paternalism, behavioral economics, nudges, shoves, education.

Resumen: desde que en 2008 se introdujera el concepto de nudge en el libro *Nudge*, que argumentaba que las pequeñas intervenciones basadas en cambios en la arquitectura de elección pueden alterar el comportamiento de las personas y facilitarles el logro de sus objetivos deseados, el uso de la economía del comportamiento en políticas públicas ha crecido significativamente, lo que ha llevado a la aparición de diferentes intervenciones basadas en conocimientos conductuales. Estas intervenciones se han aplicado en distintas áreas de políticas públicas y administrativas, incluyendo salud, finanzas, o medio ambiente, con el objetivo de promover el bienestar y abordar problemas sociales y económicos. El uso de estas aplicaciones en cuestiones relacionadas con la violencia de género ha sido con frecuencia ignorado. De este modo, el objetivo de este estudio es analizar el uso de herramientas de la economía del comportamiento en políticas públicas, como nudges, boosts o auditoría de sludges y su aplicación a asuntos relacionados con este tipo de violencia. Al mismo tiempo que se señalan los posibles beneficios de su uso, también se reconocen las limitaciones del enfoque conductual, apuntando a la necesidad de una aproximación multifacética para combatir dicha violencia. Así, las políticas públicas que traten con violencia de género deben incluir el uso de herramientas conductuales junto con otras estrategias relacionadas con la educación, la legislación y las normas sociales.

Palabras clave: violencia de género, pequeños empujones, políticas públicas, paternalismo libertario, economía conductual, estímulos, empujones, educación.

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Introduction

The field of behavioral economics has gained significant attention in recent years as a tool for improving public policy. The publication of *Nudge* (Thaler and Sunstein, 2009) served as a catalyst for the incorporation of behavioral approaches in policymaking, with the aim of influencing individuals' decision-making processes and addressing their bounded rationality in order to enhance their well-being and promote societal progress. Despite the proliferation of research and interventions in this area, there has been a notable lack of focus on the issue of gender violence. This study aims to address this gap by conducting a comprehensive analysis of the current literature on behavioral public policy and highlighting the various approaches employed across different domains. Furthermore, this study will explore potential applications of behavioral economics in the realm of gender violence, with the ultimate goal of reducing and ultimately eliminating instances of this pervasive problem.

The prevalence of gender violence is a significant public health and human rights concern, affecting individuals, families, and communities worldwide. Despite the efforts of governments, organizations, and advocates to address this issue, rates of gender violence remain alarmingly high. Some authors have argued that "interventions should support men to take responsibility for their own behavior" (Devaney, 2014, p. 480), while others are asking to review the warrantless domestic violence arrest laws (Chin and Cunningham, 2019) or approach the problem from other perspectives. Behavioral economics, with its focus on understanding and influencing decision-making processes, has the potential to offer new and innovative solutions to this complex problem. However, as previously stated, the current research and interventions in the field of behavioral economics have largely neglected the issue of gender violence. Therefore, this study, while reviewing current literature, it also addresses the application of behavioral economics to reduce and eliminate gender violence, filling this gap in the research and contributing to the ongoing efforts to address this critical issue.

Herbert Simon published *Administrative Behavior* (1947), criticizing the ideal approach of classical and neo-classical economics and administration theory when describing rational processes (Hortal, 2017). Simon's contributions to behavioral economics were largely centered around the idea of bounded rationality (Simon, 1957, 1982): people are not always able to process all the available information and make fully rational decisions. He argued that this is due to cognitive constraints such as limited attention, memory, and processing power, as well as the complexity of the decision-making environment. Simon asserted that people often rely on mental shortcuts or heuristics to make decisions (Simon, 1977), rather than carefully analyzing all the available information. He also suggested that people's preferences and values may be influenced by their context and how information is presented to them.

Likewise, Amos Tversky and Daniel Kahneman's research (1972, 1974, 1981) identified systematic deviations from classical standards of rationality that are predictable and result from the use of heuristic processes in our cognitive system. These heuristics can sometimes cause biases that distort our perception of reality and lead to irrational behavior. Tversky and Kahneman's work has significantly impacted our understanding of human decision-making and has had significant implications for fields such as economics, psychology, and political science. One of the major contributions of their research was prospect theory: a framework for understanding how people make decisions under uncertainty (Kahneman and Tversky, 1979). According to prospect theory, people do not always make decisions based on expected utility, as posited by classical economic theory. Instead, they are often affected by potential losses and gains, and they usually exhibit a preference for avoiding losses over acquiring gains. This theory has been influential in explaining a wide range of phenomena in decision-making, including risk aversion, framing effects, and the endowment effect. It has also had significant practical applications in fields such as marketing, finance, and policy-making.

It is in the field of policy-making where Rich-

ard Thaler (a usual collaborator of Kahneman), together with Cass Sunstein, considering the research mentioned above, developed an approach to interventions based on behavioral insights (taking into account the cognitive biases of our bounded rationality). In 2008 they published the book *Nudge*, examining how small interventions based on changes in choice architecture can alter people's behavior successfully. These nudges can make it easier for people to achieve their desired goals to have a happier and better life as judged by themselves (Gold *et al.*, 2020; Sunstein, 2020). Since people have a hard time (due to their cognitive limitations and bounded rationality) to achieve what they propose, policy-makers can help by organizing the choice environment making certain options more salient than others in a way where the best choice becomes the easiest choice. These nudges can also be used to make society better as a whole (environmental aspects, public health, organ donations, or even during pandemics (Martínez and Fernández, 2020).

After the publication of *Nudge* (Thaler and Sunstein, 2009), nudging became a framework to deploy efficient and evidence-based interventions (Hortal, 2020a) to improve people's well-being by organizing the choice environment. Behavioral sciences have increasingly been applied to public policy in recent years, leading to the emergence of various intervention approaches such as nudges (Oliver, 2013, 2018), boosts (Grüne-Yanoff and Hertwig, 2016; Hertwig and Grüne-Yanoff, 2017; Reijula *et al.*, 2018), nudge plus (Banerjee and John, 2021), meta-nudges (Dimant and Shalvi, 2022), virtue-nudges (Hortal, 2022), or shoves (Sunstein, 2013). While nudges are intended to promote well-being, the term "sludge" has been introduced to refer to intentional or unintentional interventions that utilize similar techniques but with the purpose of decreasing well-being. Thaler introduces the notion of sludge, referring to nudge-type interventions that would decrease people's wellness. In theory, while nudges are interventions designed to make lives better, "the same techniques for nudging can be used for less benevolent purposes" (Thaler, 2018).

This article aims at considering different ways in which the approaches mentioned above can

complement public policy initiatives to eliminate or reduce the cases of gender violence, mitigate its effects, and help in the prosecution of offenders. In this article, besides "gender violence," other concepts had to be considered, such as "intimate partner violence" or "domestic violence."

"Gender violence," "intimate partner violence," and "domestic violence" all refer to forms of violence or abuse that occur within relationships or households. These terms are often used interchangeably, and they can include physical, sexual, emotional, or financial abuse or coercion. "Gender violence" is a comprehensive concept that refers to any form of violence or abuse that is perpetrated against someone on the basis of their gender. This can include violence or abuse against women, men, or non-binary individuals. It is fundamental to highlight that not all violence in a relationship is domestic violence (Kuennen, 2020) and that domestic and gender violence are connected but distinct phenomena. "Intimate partner violence" refers explicitly to violence or abuse that occurs within intimate relationships, such as between spouses, dating partners, or domestic partners. It can include physical, sexual, emotional, or financial abuse or coercion. "Domestic violence" refers to violence or abuse that occurs within the home, typically between family members or household members. It can include physical, sexual, emotional, or financial abuse or coercion. All three terms encompass a range of behaviors and actions used to control, intimidate, or harm another person within a relationship or household setting. They are serious issues that can significantly negatively impact the physical and mental health of those who experience them.

Although these different notions of violence are not the same and do not refer to the same events, they share enough similarities to consider them jointly when referring to how behavioral public policy can be used to reduce the number of cases.

Selection criteria

When conducting this study on behavioral public policy and its possible application to gender vio-

lence, the following criteria were used to select relevant articles:

- **Relevance to the topic:** The articles should pertain to the intersection of behavioral public policy and gender violence, with a focus on reducing and eliminating instances of gender violence. The objective of the exploratory review was to identify relevant studies in the emerging area of behavioral public policy. The criteria for inclusion were based on various factors, such as publication date, number of citations, authorship, and journal. The review specifically sought to uncover studies that utilized behavioral interventions such as nudges or boosts. Given the limited nature of literature in this field, all relevant papers that met the predetermined criteria were included in the review.
- **Use of appropriate keywords:** The articles included keywords (from the field of behavioral public policy and behavioral economics): such as “behavioral public policy”, “nudge”, “libertarian paternalism”, and “behavioral economics”. The study also searched connections between the terms just mentioned and these other concepts: “gender violence”, “domestic violence”, “violence against women,” and “intimate partner violence”.
- **Date of publication:** The articles should be relatively recent, with a publication date within the last five to ten years.
- **Quality of the research:** The articles should be based on rigorous research methods and provide a thorough analysis of the topic.
- **The reputation of the journal:** The articles should be published in reputable journals within the field, such as Behavioral Public Policy, which is considered one of the main journals in the field of behavioral public policy.

By employing these criteria and Boolean operators “and”, “or” and “not” through the Google

Scholar academic search engine, this study was able to select a comprehensive and diverse set of articles that can provide an exploratory comprehension of the execution of behavioral public policy to various problems, while guiding the direction to recognize potential applications in gender violence by recognizing deficiencies in existing research and regions for future inquiry.

The review was exploratory (Stebbins, 2001) providing a broad approach to the area to highlight the lack of research that connects behavioral economics, public policy, and gender violence. The strategy for selection and synthesis of studies in this literature review on gender-based violence and behavioral public policies was carried out in a systematic and objective manner. The objective of the review was clear and precise, and focused on answering the specific research question regarding the need for an increase in behavioral approaches in the implementation of interventions that seek a reduction in gender violence. The studies were selected using clear inclusion and exclusion criteria, such as date of publication, methodology used (favoring studies that used randomized controlled trials but considering other approaches), and journal classification. The results and information obtained from the selected studies were then synthesized.

Debates about the status of the issue

Gender violence

Gender violence is a structural, social, political, and relational phenomenon that occurs systematically around the world (Ramírez Velásquez *et al.*, 2020) and is the result of a power imbalance between men and women (Jaramillo-Bolivar and Canaval-Eraza, 2020). According to Poggi (2019), for public policymakers to effectively address and reduce the prevalence of gender violence, it is important to have a clear and specific definition of the term within legislative and policy frameworks. The General Assembly of the United Nations (resolution 48/104 of 20 December 1993) proclaimed that “gender violence is a term that encompasses a range of harmful behaviors and

practices that are perpetuated on the basis of gender. This can include physical, sexual, or emotional abuse, as well as economic or social discrimination and coercion. It is defined as “means any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life.” Gender violence is often rooted in and perpetuated by societal gender norms and power imbalances between men and women. It is a global issue that cuts across all social and economic sectors and can occur in a variety of settings, including the home, community, and workplace (Hatch-Maillette and Scalora, 2002; Hatch-Maillette *et al.*, 2007), affecting women’s health and even self-esteem (Velarde *et al.*, 2022)

Klugman (2017) claims that gender-based violence is a widespread issue that affects one in three women at some point in their lives. Confinement policies related to COVID-19 have increased the number of cases (Lorente-Acosta, 2020; Ruiz-Pérez and Pastor-Moreno, 2021), hence international community has increasingly recognized the need to eradicate this type of violence. Accordingly, the United Nations’ Sustainable Development Goal 5 seeks to reach gender equality and empower all women and girls, not only ending all forms of discrimination against women and girls, but also eliminating violence against women and girls in both public and private spheres, eradicating harmful practices such as child marriage and female genital mutilation, identifying and appreciating unpaid care and domestic work, and ensuring women’s complete and useful participation in decision-making processes. Additionally, the goal includes providing universal access to sexual and reproductive health and rights, granting women equal rights to access and control over economic resources such as land and property, and utilizing technology to enhance women’s empowerment. Governments are urged to implement policies and legislation to achieve gender equality and empower all girls and women.

To reduce or eliminate gender violence, public policymakers have used legislative efforts based

on mandates and penalties (paternalistic). Governments and other institutions also rely on effective interventions (Hester and Westmarland, 2005) based on educational tools and information to create awareness, but all these interventions and approaches are not enough. In 2022, according to the UN (2022), “violence against women and girls continues to be amplified in digital spaces, particularly targeting those who are active in political and public life, exercising their freedoms of expression, peaceful assembly, and association”. The UN claims that, although gender violence is an across-the-board problem, few countries have made this type of violence a separate crime. Additionally, data on this issue is often incomplete and unreliable. The UN advises that to effectively address this matter, countries must invest in collecting comprehensive, reliable gender violence data, including information that is disaggregated by sex, age, and gender. This is a fundamental initial step that countries need to take to comprehend and tackle this concern. Policies that try to tackle gender violence “must be based on emerging evidence in developing economies (process evaluations, qualitative evaluations, and imperfectly designed impact evaluations) and on more rigorous impact evaluations from developed countries” (Morrison *et al.*, 2007, p. 25).

Most research in this regard tends to neglect the latest advances in behavioral sciences, which try to change behavior by taking into account people’s bounded rationality. The following sections will capture the different strategies that have been emerging within the field of behavioral public policy to review the current status of the issue exploring current uses of behavioral insights in gender violence. The paper will then discuss the different contributions to the issue and expand on these approaches as potential solutions to combat gender violence.

Behavioral Public Policy Tools

Nudges

Nudge theory, a concept developed at the intersection of behavioral economics, public policy, and psychology, proposes that slight alterations

to the environment or the presentation of options can influence individuals' decisions and behavior, making some options more salient than others. Some authors have already suggested that nudges should work consistently with other types of interventions and always with educational approaches (Hortal, 2020b). The objective of a nudge is to enhance decision-making and outcomes without limiting freedom or choice. Accordingly, nudges can be considered libertarian, since they do not remove choices, and paternalistic (Epstein, 2018; Hansen, 2016; Karpan and Urbaník, 2021), because they influence people's behavior. Regarding gender violence, these interventions often target victims, survivors, their friends and family, bystanders, or institutions in an effort to facilitate the desired behaviors (denounce, support, holding while waiting for a response on a helpline, attending trials, etc.). Recent changes in public policy have shifted "the focus from victims and perpetrators towards the community as a whole, with all community members sharing this responsibility" (Moreno Martín *et al.*, 2019, p. 876), even institutions like religious parishes (Boddé, 2014). A recent study summarizes the target groups and behaviors as follows:

Five different target groups for the prevention and reduction of violence against women are identified: (1) past and prospective perpetrators of violence, (2) victims of violence, (3) victim's relatives and friends, along with bystanders, (4) practitioners and relevant professionals (i.e., police officers, medical professionals, social workers, journalists, judges) and (5) the general public. (Almeida *et al.*, 2016, p. 7)

According to Kahan, "reformers might do even better with a 'gentle nudges' strategy, which over time would induce those decision-makers and members of the public at large to become less tolerant of domestic violence" (Kahan, 2000, p. 630). The behavioral approach to public policy acknowledges people's biases and bounded rationality and exploits it to increase the chances of successfully accomplishing the proposed goal. Therefore, nudges aim to simplify the attainment of the intended behavior, removing behavioral frictions and making some choices more salient.

For example, a report that sought recommen-

dations based on behavioral sciences to improve the lives of survivors (Garnelo *et al.*, 2019), highlighted possible interventions that would enhance the services survivor agencies provide, attempting to propose "interventions ideas, informed by a review of the behavioral science literature, that can be tailored to existing services and evaluated for impact" (Garnelo *et al.*, 2019, p. 5). Likewise, they summarized their objectives as follows: "i) emphasize confidentiality of support to minimize survivors' uncertainty aversion; ii) streamline processes to reduce decision fatigue among service providers; and iii) ease survivors' cognitive load during the referral process" (p. 6).

To help illustrate how behavioral public policy can address issues related to gender violence, the following points contain (from the previous report) a number of suggestions in the form of nudges. These nudges are recommendations for different types of service providers, including helplines, the criminal justice system, shelters, healthcare providers, and mental health professionals:

- For helplines (Taylor *et al.*, 2019), the report suggests minimizing the fear of retaliation by erasing call records from mobile phones.
- For the criminal justice system, it suggests providing feedback to staff on their social impact to overcome burnout and highlight the positive impact of their work on survivors.
- For shelters, it suggests leveraging social support from relatable individuals, such as former residents or friends and family, and providing supportive text messages to counter feelings of isolation. Others have even argued about using hotels during the COVID-19 pandemic (Mantler *et al.*, 2021)
- For healthcare providers, the report suggests emphasizing confidentiality and giving clear information on reporting requirements, introducing training and conditional screening protocols, and helping survivors realize their progress in addressing mental health conditions.

- Healthcare providers can also target communication patterns, since “the risk of experiencing violence in relationships is reduced if the communication patterns and conflict become the objects of intervention of professional’s healthcare” (Maria *et al.*, 2016, p. 1267)

There are a few ways that the nudging framework could be applied to promote gender equality (Waylen, 2018) and prevent violence with minor changes to the environment or the presentation of choices. For example, a workplace might use gender-neutral language in job descriptions or provide equal opportunities for career advancement for men and women. This could help to reduce the risk of gender-based violence by creating a more equal and respectful environment. Nudging can also encourage bystander intervention, which can be an important way to prevent gender violence. Nudges could be used to encourage bystander intervention, such as by providing information about how to intervene safely or by making it easier for people to report incidents of violence. Some studies have also explored the use of digital responses during the pandemic (Emezue, 2020)

Violent images can also be used as a nudge that re-frames cases and, thanks to “morbid curiosity,” images can be the clearest footprint of what has happened and may contribute to the credibility of the events they narrate, establishing undeniable truths and help to preserve the memory. The horror of violent images sometimes has the possibility of mobilizing the person who looks (Villanueva *et al.*, 2018, p. 18-19) or create awareness. Although images can sometimes trivialize and legitimize violence (Villanueva and Bayarri, 2021), they can also have the capacity to trigger a responsibility effect in the spectator (Belli and Villanueva, 2021, p. 7).

For example, considering that incidents such as sexual assault and harassment are becoming more prevalent in urban areas like Delhi, and women often find themselves unable to protect themselves in these situations for various reasons, some authors (Sehji and Banerjee, 2021) suggest the use of social nudges as a way to design visual

campaigns in public spaces to steer the intentions of those who may perpetrate it: “Graphic concepts were created to tap into the offender’s mind by redirecting the flow of thoughts while in public space” (Sehji and Banerjee, 2021, p. 339).

Other authors have considered the use of text messages to remind survivors, victims, and witnesses about trials, but some initial randomized controlled trials have not seen any improvements with the help of text messages (Cumberbatch and Barnes, 2018). The study found that text messages had a minimal effect on the presence of victims and witnesses in the three magistrates’ courts they studied. Nevertheless, the research did indicate that text messaging is a dependable, efficient, and cost-effective way of communicating with witnesses. A more recent study related to a different context (appearing in court as a defendant) has shown that behavioral nudges in the form of text messages and changes in the wording of the summons form can improve attendance in trials (Fishbane *et al.*, 2020).

Nudges can also backfire (Bolton *et al.*, 2018), showing paths to nudge the population better. For example, Busara, a research and advisory organization that uses behavioral science to design and evaluate interventions aimed at promoting social and economic development, was hired by the Oxford Policy Management group to conduct a survey in Zambia to test possible social nudges related to gender violence and awareness (Busara, 2018). The study found that a social nudge consisting in making explicit that the informational video had been shown to many people in the community has counterintuitive results: participants would be less likely to report a case of GBV against their neighbor, “possibly because of shared responsibility and the bystander effect” (Busara, 2018, p. 3).

Boosts

Since 2008, most behavioral public policy has emphasized nudging as the non-coercive non-monetary approach to altering people’s behavior. Besides nudges, there are other behavioral approaches to accomplish this goal. One of them is boosting (Hertwig and Ryall, 2020; van Roekel

et al., 2021), a libertarian non-monetary perspective that tries to “foster people’s competence to make their own choices—i.e., to exercise their own agency” (Hertwig and Grüne-Yanoff, 2017, p. 973). While nudges target behavior, boosts aim to change people’s competences “through changes in skills, knowledge, decision tools, or external environment” (p. 974). While both nudges and boosts recognize people’s bounded rationality, boosting acknowledges competences and a way to nurture them.

A boosting approach emphasizes the learning capability of individuals (Bradt, 2019; Sims and Müller, 2019) and designs interventions that stick even when the intervention is absent, or the choice architecture has changed. According to Ralph Hertwig, “If individuals lack the cognitive ability or motivation to acquire new skills or competences, then nudging is likely to be the more efficient intervention” (Hertwig, 2017, p. 149). In the same article, Hertwig emphasizes that boosting can be an efficient strategy when policymakers attempt to foster long-lasting behavioral change; in cases where governments do not act in the best interests of individuals or allow private companies to create harmful or manipulative choice environments (pp. 154-156).

Budges and Shoves

Other studies highlight the use of more paternalistic approaches. Budges and shoves (Mojašević and Nikolić, 2022; Oliver, 2018; Sunstein, 2013) use the insights of behavioral sciences to provide regulatory alternatives in public policy. Budges are regulatory interventions deployed by the public sector (Oliver, 2013) that are informed by behavioral economics and aimed at influencing the behavior of private corporations. These interventions are designed to address internalities or situations where the actions of private corporations have negative consequences for individuals or society as a whole. Shoves (Sætra, 2019; Shachar and Greenbaum, 2019), on the other hand, are regulatory measures that are also informed by behavioral economics but differ from nudges in that they involve more heavy-handed intervention and are typically more restrictive.

Shoves are often used to counter errors in individual behavior, such as present bias, and are intended to protect people from themselves. An example of a shove might be a ban on smoking, which is designed to protect individuals from the negative consequences of smoking and reduce the overall prevalence of smoking in society. This approach involves a greater degree of interference in personal lifestyle choices compared to libertarian paternalism, which seeks to influence behavior through nudges while still allowing individuals to make their own choices.

Nudges, Sludges, and Sludge Audits

While nudging encourages behaviors that increase people’s (and sometimes social) wellbeing, sludging discourages such behaviors (Hortal and Segoviano, 2023). Sludge refers to unnecessary or excessive (intentional or unintentional) friction that hinders people from accessing goods, opportunities, and services (Luo *et al.*, 2022; Madsen *et al.*, 2021; Newall, 2022; Shahab and Lades, 2021; Sunstein, 2021). These frictions can take many forms, such as paperwork burdens or other administrative requirements that waste time or financial resources, or maybe frustrating, stigmatizing, or humiliating. Sludge can have particularly harmful effects on vulnerable members of society, such as consumers, employees, or students, and can deprive them of access to important resources or opportunities. To address the issue of sludge, institutions and companies should regularly perform audits to identify sludge and catalog its costs, determining how to reduce it. Sludge audits (Sunstein, 2020) can help identify areas where sludge is causing harm and where it may be more beneficial to reduce or eliminate it. This can be particularly important in the context of gender violence, as sludge can disproportionately affect vulnerable groups and may contribute to barriers that prevent people from accessing support or resources. By conducting sludge audits and taking steps to reduce sludge, private and public institutions can help protect people from the harmful effects of unnecessary or excessive friction.

Contributions to the Status of the Issue

From a public policy standpoint, it is crucial to consider a range of options in addressing the issue of social and gender violence. Traditional policy tools such as mandates, laws, and informational campaigns can effectively raise awareness and promote change. To change entrenched behaviors in culture, it is not enough to modify laws or sanction behaviors that were once accepted. To change, it is necessary for the values that make up attitudes to be transformed (Moreno Martín *et al.*, 2019). Still, besides those mentioned above, there is also value in exploring newer strategies from the field of behavioral public policy. These approaches may offer additional tools that can be used in conjunction with more traditional interventions to reduce gender violence effectively. In the following pages, the article will examine these various approaches and consider their potential usefulness in addressing this pressing issue.

Nudges, as behavioral public policy tools, have many distinctions, and researchers have been classifying them with the goal of identifying their scope. It would be crucial to see how these distinctions might help in the fight against gender violence. Nudge Plus (Banerjee and John, 2021), for example, is a nudging type of intervention that has the capacity to include a deliberative element in the choice architecture. Self-nudges (Reijula and Hertwig, 2020) can make the recipient of the nudge also the choice architect, increasing the autonomy of the subject and the possibility of carrying the nudge to different contexts. Meta Nudges (Dimant and Shalvi, 2022) is an approach that suggests that rather than directly influencing end-users, it may be more effective to use “social influencers” as intermediaries to indirectly influence the behavior of end-users. These approaches are yet to be used in the fight against gender violence. Meta-nudges, for example, involves targeting individuals who have the ability to shape the behavior and norms of others, with the goal of ultimately changing the behavior of the end-users. This strategy may be more successful in achieving the desired outcomes compared to directly attempting to influence end-users. The

meta-nudging approach could potentially be applied to the issue of gender violence by targeting individuals who have the ability to shape the behavior and norms of others, with the goal of reducing instances of gender violence. This could involve working with social influencers such as community leaders, religious figures, or other individuals who have a strong influence within their communities to promote gender equality and non-violent behavior. Self-nudges can be used by practitioners to ensure compliance with current efforts in reducing cases. Nudge-plus can be added to interventions that are already nudging survivors (a nudge that keeps survivors in a helpline may add a deliberative component about the need to stay in the line or about the importance of showing up during judicial processes).

Virtue nudges are a type of intervention that seeks to affect people’s behavior to help them develop virtuous habits. According to Hortal (2022), virtue nudges are designed to help people become virtuous by habituating them to virtuous actions. In other words, virtue nudges are intended to encourage people to engage in behaviors that are considered virtuous or morally good, with the goal of helping them internalize these behaviors as habits. This can involve providing information or education about the benefits of virtuous behavior or making it easier for people to engage in virtuous actions. For example, a virtue nudge might involve setting up a system to facilitate donations to a charity that combats gender violence or volunteer their time in such organizations, in order to encourage them to engage in philanthropic behaviors. Another example might be providing information about the social benefits of reporting violent cases. Overall, virtue nudges seek to influence behavior in a way that helps people become more virtuous by habituating them to virtuous actions.

One issue that has been raised regarding nudge theory is the potential for its effects to dissipate when the choice architecture is no longer present. This concern suggests that the changes in behavior and decision-making that are brought about by nudge interventions may not be sustained over time. There is some evidence to support this concern. For example, a

study found that “for some, but not all behaviors, default nudges may have the potential to yield temporal spillover effects” (Van Rookhuijzen *et al.*, 2021, p. 1). However, it is vital to highlight that the sustainability of nudge interventions is an area of ongoing debate, and more studies are required to fully comprehend the long-term consequences of these interventions.

Non paternalistic interventions that focus on competences (instead of the choice environment) like boosting can also help in this matter. These types of interventions can target the competences of the general public or even of those working with victims and survivors. They can help people learn how to identify cases and report them. They can also increase the capacity to identify violent language or understand data and statistics about violent cases. For example, “A long-term boost of Bayesian reasoning [...] could foster people’s competence to actively translate any probabilities they encounter into frequencies and thereby simplify the Bayesian computations” (Hertwig and Grüne-Yanoff, 2017, p. 977).

Considering that libertarian approaches have their limitations, paternalistic interventions based on nudges and shoves could also potentially be used as part of a strategy to address gender violence. One way that nudges could be used to fight gender violence is by regulating the behavior of private corporations in a way that promotes gender equality and prevents violence against women. This could involve implementing policies and regulations that require companies to take steps to prevent and address gender-based violence within their workplaces, or to provide resources and help for employees who have suffered this type of violence. Shoves, on the other hand, could be used to address gender violence through more restrictive regulatory measures. For example, governments could implement laws or policies that ban certain behaviors that contribute to gender violence (vocabulary use, micro-aggressions, etc.). Other potential shoves might include mandatory training or education programs for individuals who have been convicted of gender-based violence offenses, or stricter penalties for those who engage in such behavior. Some research explores the use of virtual reality

in this type of education (Dolezal *et al.*, 2022).

Sludge audits, therefore, are a tool that can be used to identify and evaluate bureaucratic elements or procedures that may have negative effects on well-being, particularly for vulnerable populations such as victims and survivors of gender and domestic violence. A sludge audit involves a systematic examination of the choice architecture and decision-making processes within a particular policy or program, with the goal of identifying any potential barriers or disincentives that may hinder individuals from accessing the support or resources they need. For example, a sludge audit of a domestic violence shelter may identify that the shelter’s intake process is too complex or time-consuming, making it difficult for survivors to access the services they need. The audit may also identify that the shelter’s location is not easily accessible by public transportation, which may be a barrier for survivors who do not have access to a car. By identifying these barriers and disincentives, a sludge audit can help to identify ways to remove or mitigate them, facilitating survivors’ access to the support needed. Another example of how a sludge audit may be used to help survivors and victims of gender and domestic violence is by examining the choice architecture of a social welfare program. For example, a sludge audit of a program that provides financial assistance to survivors of domestic violence may identify that the application process is overly complicated, requiring extensive documentation and multiple visits to a local office. This may make it difficult for survivors to access the assistance they need, particularly if they are unable to leave their abuser or are experiencing trauma or other mental health issues. By identifying these barriers and disincentives, a sludge audit can help to identify ways to streamline the application process and make it easier for survivors to access the support they need.

Discussion and Concluding Remarks

Behavioral economics (Hartmann *et al.*, 2020) and behavioral public policy measures have the potential to effectively address gender-based violence,

according to research by Almeida *et al.* (2016, p. 8). These measures can target various groups, including perpetrators, victims, professionals working in the area of domestic and gender violence, and the general public, to reduce or stop violence from occurring, decrease recidivism, empower women (Alonso, 2018), and improve support for victims and survivors. Behavioral interventions can also help police, medical specialists, social workers, media, the judicial system (DeMichele *et al.*, 2018), and the public at large better support victims and survivors, change attitudes towards violence, encourage reporting cases, and speed up legal processes. Additionally, behavioral public policy measures can work to counteract the portrayal of violence as “passion crimes” and encourage participation in preventive initiatives.

As previously stated, the field of behavioral public policy involves the application of knowledge from behavioral sciences, such as behavioral economics and psychology, to create policies that impact human behavior (Oliver, 2017). We have seen how these interventions can take many forms, such as nudges, boosts, shoves, or other regulatory measures, and can be employed to handle a broad spectrum of problems related to gender violence. While behavioral public policy can be an effective instrument in the fight against gender violence, it is critical to identify the limits of this approach. Gender and domestic violence are complex issues with systemic roots in social and cultural norms, systems of power, and patterns of oppression. Contributing factors include gender inequality, patriarchy, power dynamics, and oppression. Addressing these root causes highlights the limitations of solely focusing on individual behavior. For example, a behavioral intervention may aim to encourage people to save more money by making it easier for them to do so, but it may not address the underlying reasons why people may not be saving, such as low wages or high cost of living. In this case, the intervention may not be sufficient to address the problem in a meaningful way.

Another limitation of behavioral public policy is that it may not be effective in addressing issues related to social, cultural norms, or systems of power. For example, interventions that

aim to address gender violence may be limited in their ability to challenge deeply entrenched gender roles and power dynamics that contribute to the problem. In these cases, more structural approaches, such as education, legislation, and social norms change, may be necessary to address the matter in a comprehensive manner.

When addressing the issue of gender violence, it is important to recognize that behavioral approaches assume that people are not always fully rational in their decision-making. This means that policymakers themselves may also exhibit bounded rationality when designing and implementing behavioral interventions. There is no single solution to this complex problem, and only a combination of various policy tools can effectively address the issue. Behavioral approaches should be considered as a key strategy among other tools, as experts in the field have found them to be effective in influencing behavior change. This is crucial for providing hope to victims, survivors, and the society as a whole.

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Why visiting lifestyle centers? Alternative variables of attraction through structural equation modeling

¿Por qué visitar lifestyle centers? Variables alternativas de atracción a través de un modelo de ecuaciones estructurales

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Abstract: this research analyzes the attraction factors applied to the new shopping center formats called lifestyle centers, which are created to satisfy the new lifestyle demands, with a greater variety of services and experiences that improve visitor loyalty, where there is still a scarce amount of research. For this purpose, an explanatory study was developed through a survey applied to 398 visitors. The statistical analysis was carried out by means of a factorial solution and a structural equation model to estimate the effects of nine latent variables on the dependent variable intention to visit. The results reveal the existence of the proposed factors (accessibility and convenience, variety of offerings, physical environment, permanent entertainment, perception of luxury, eco-natural environment, uses of technology, special events, and quality of service). The significant effects of each attraction factor and its ability to influence visitation intention are discussed. The conclusions point to greater relevance compared to other traditional latent variables of the physical environment, service quality, accessibility, events, and the presence of technology services, issues that had not been documented in previous studies; thus, this research contributes to the knowledge to improve the attractiveness of lifestyle centers.

Keywords: shopping center, lifestyle centers, attraction factors, special events, quality of service, technology, relationship with staff, structural equation modeling.

Resumen: esta investigación analiza los factores de atracción aplicados a los nuevos formatos de centros comerciales llamados *lifestyle centers*, que nacen para satisfacer las nuevas demandas de estilos de vida, con una mayor variedad de servicios y experiencias que mejoren la lealtad de visita, donde todavía existe un escaso número de investigaciones. Para tal efecto, se desarrolló un estudio de carácter explicativo a través de una encuesta aplicada a 398 visitantes. El análisis estadístico se realizó mediante una solución factorial y un modelo de ecuaciones estructurales para estimar los efectos de nueve variables latentes hacia la variable dependiente intención de visita. Los resultados revelan la existencia de los factores propuestos (accesibilidad y conveniencia, variedad de la oferta, ambiente físico, entretenimiento permanente, percepción de lujo, ambiente eco-natural, usos de tecnología, eventos especiales y calidad del servicio, complementando la literatura. Se discuten los efectos significativos de cada factor de atracción y su capacidad para influir en la intención de visita. Las conclusiones señalan una mayor relevancia frente a otras variables latentes tradicionales del ambiente físico, la calidad del servicio, la accesibilidad, realización de eventos, la presencia de servicios de tecnología, cuestiones que no habían sido documentadas en estudios previos, por lo que esta investigación contribuye al conocimiento para mejorar la capacidad de atracción de los lifestyle centers.

Palabras clave: centro comercial, lifestyle centers, factores de atracción, eventos especiales, calidad del servicio, tecnología, relación con el personal, modelo de ecuaciones estructurales.

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Introduction

In the quest to offer visitors a greater variety of experiences and services, malls have evolved into a new format called lifestyle centers or megamalls (Olonade *et al.*, 2021; Rosenbaum *et al.*, 2018), characterized by offering a convenient lifestyle option, bringing together desirable consumer elements in a unique, safe and comprehensible location (Olonade *et al.*, 2021), being an open-air retail environment composed of at least 50 000 square meters of retail space (Rosenbaum *et al.*, 2018), with enhanced entertainment offerings, visually more attractive physical layouts (Ameen *et al.*, 2021) and social interaction or leisure facilities (Tripathi *et al.*, 2020).

The research on these new shopping center formats is scarce in Latin America (Tripathi *et al.*, 2020; Elmashhara and Soares, 2019; Olonade *et al.*, 2021), compared to other countries, its increase and acceptance in emerging countries (BBC, 2017; America Retail, 2022), so investigating the competitive management of different variables that favor attraction to malls is an interesting topic for marketing and business (Pantano *et al.*, 2018). In this regard, the purpose of this research is to study the attraction factors of current lifestyle centers to favor the understanding of those aspects that are valuable for the current consumer; likewise, to examine their attractiveness by measuring the effect of visiting variables.

This paper begins with a review of the different attractiveness factors presented in the literature and their effect on visit intention. Subsequently, the hypotheses are presented in the context of the alternative attraction factors present in lifestyle centers. Finally, the methodology used and the results are described, ending with a discussion of the conclusions and an in-depth analysis of the state-of-art on the theoretical and practical implications for the competitive management of these new formats.

Literature review

Malls have an important role in the consumer's commercial relationship with brands and the architecture of modern cities, being places that

create consumer experiences (Diallo and Siquiera, 2017) enriched by new trends in physical and virtual commerce (Ameen *et al.*, 2021) to stimulate emotions and meet current consumer needs (Can *et al.*, 2016). In that sense, with the aim of amplifying the experience and emotional bonds with customers, lifestyle centers have emerged with modern upsized retail environments with a more attractive, multifaceted and pleasurable offer by containing a greater number of brands, services and entertainment (Olonade *et al.*, 2021; Tripathi *et al.*, 2020; Ameen *et al.*, 2021).

The marketing and business literature has investigated the attractiveness of shopping malls based on the proposal and existence of latent variables capable of affecting visitor behavior (Lucia-Palacios *et al.*, 2016), generally using CAT conceptual models (Cognitive-Appraisal-Theory: Lazarus, 1991), which study attraction factors as cognitive and emotional variables of the consumer, involving knowledge, affective states and judgments of convenience and image (in the face of location, offer, design, etc.) (Calvo and Lévy, 2018), which subsequently develop visitation behaviors (loyalty and recommendation) widely documented in the literature on shopping centers (Ahmad, 2012; De Juan and Rivera, 1999), which in the case of lifestyle centers allows contextualizing the influence of attraction factors and explaining behaviors on visitation intention (Lucia-Palacios *et al.*, 2016; Lecointre *et al.*, 2018).

For their part, attraction factors refer to a set of atmospheric, hedonic and entertainment aspects that motivate the intention to visit the shopping center (Munuera and Cuestas, 2006; Calvo and Calvo, 2013) considering that there is no convention of the type or variety of them, because each research obeys particular needs, contexts and objectives (González and Orozco, 2012; Thanasi-Boçe *et al.*, 2021), with greater focus on environmental topics, variety of supply and leisure (Gomes and Paula, 2017).

A literature review of attraction factors allows observing four aspects centered on convenience or accessibility, variety of stores, environmental design and entertainment due to the constant analysis in the empirical literature related to shopping centers (Rosenbaum *et al.*, 2018; Gomes and

Paula, 2017; González and Orozco, 2012). As for lifestyle centers, Ameen *et al.* (2021) and Rosenbaum and Contreras (2019) have reported that there is a scarcity of knowledge of the aspects that favor visitation, so they recommend checking those referred to in the literature, and proposing new alternative factors that understand and meet the new needs of visitors (Olonade *et al.*, 2021; Tripathi *et al.*, 2020; Rosenbaum *et al.*, 2018) in terms of specific offer options (e.g., luxury or gastronomic consumption), convenience of nature-based spaces, technology-driven services or resources, favorability of specific entertainment activities such as concerts, and the evaluation of the quality of service offered by partners that are conducive in the current lifestyle of visitors (Thanasi-Boçe *et al.*, 2021). Consequently, the proposed attraction variables with their definitions and hypotheses are addressed, starting with the dependent variable and continuing with the independent variables.

Intention of the visit

Consumers have different purposes for visiting a shopping mall, ranging from shopping to entertainment or socialization (González and Orozco, 2012), being this decision a holistic experience in terms of satisfying the consumption demands of various recreational, socialization, functional or convenience categories (Anselmsson, 2016). Consequently, visit intention can be seen as the emotional response and personal evaluation of the total set of experiences or expectations to be fulfilled in the shopping center (Lucia-Palacios *et al.*, 2016).

Hence, visit intention is defined as the desire to go to a shopping mall, combining three aspects: tendency to visit, frequency and pleasure (Ortegón and Royo, 2017), being analyzed from the positive perception when interacting with the atmospheric or design elements of the mall (El-Adly and Eid, 2015). Therefore, the intention to visit is proposed as the dependent variable, understood as the behavioral response to the effect of different factors that attract visitors to shopping malls (Calvo and Calvo, 2013; Lucia-Palacios *et al.*, 2016).

Accessibility and Convenience

The demand of modern life due to the consumer's feeling of lack of time motivates the valuation of easy and fast consumption, making shopping malls to be considered as convenient spaces for shopping (Lloyd *et al.*, 2014; Reimers and Chao, 2014). El-Adly and Eid (2015) state the importance of convenience as a determining factor of visitation, but establish that there is no conclusive definition, proposing it as the set of attributes spatially reduced in value of spatial and temporal proximity, synthesizing their study from a macro perspective of visitation due to time savings and convenience when using the services of the shopping center (Calvo and Calvo, 2013; Calvo and Lévy, 2018). In this regard, shopping environments by offering convenience to users in time reduction due to proximity and extended opening hours (Ahmad, 2012; El-Adly and Eid 2015), give way to accessibility defined by the location and arrangement of access roads (Munuera and Cuestas, 2006). Thus, to define the variable, people look for nearby shopping centers with easy and quick access, allowing the following hypothesis to be put forward:

H1: Accessibility and convenience positively influence visit intention.

Variety of the offer

Lloyd *et al.* (2014) consider the visit to a lifestyle center as a hedonic and utilitarian value activity, where visitors enjoy exploring or buying new products to escape boredom and for achieving a purchase goal or satisfying an intended service. Therefore, the variety of the offer is to incorporate various types of services or stores that can attract more consumers (El-Adly and Eid, 2015) and the choice for a shopping mall starts from including a specific service or brand (Ahmad, 2012).

Although a shopping center is an agglomeration of stores (Munuera and Cuestas, 2006), the attractiveness of a lifestyle center refers to the style, the specialty of the stores, the number of stores, as well as the brands available (Anselmsson, 2016), generating a determining image of

the shopping center (Ahmad, 2012). Finally, this variable refers to diversity of recognized stores, brands and services available in the mall (Calvo and Calvo, 2013; Ortigón and Royo, 2017), having to study how the multiplicity of establishments, especially of fashion items or hedonic products influence the intention visit (Santoso *et al.*, 2018). Therefore, previous research assumes an effect of the variety of offers that can also be expected in the context of lifestyle centers.

H2: Offer variety positively influences visit intention.

Physical environment

Interior design has been studied highlighting its relevance in the development of an attractive and harmonious shopping atmosphere, giving a visual distinctive to shopping centers (Afaq *et al.*, 2020) by including an appealing exterior appearance or interior design, cleanliness, decorations and interesting displays (Calvo and Lévy, 2018; Calvo and Calvo, 2013). Overall, environmental elements affect the visit experience, considering that consumers enjoy a spacious shopping environment, connecting design and circulation through stores (Reimers and Chao, 2014). Previous research suggests that the environment is a valuable aspect that influences permanence (Santoso *et al.*, 2018), indicating that aesthetics or design generate purchase reactions and frequency (Michon *et al.*, 2015; Lecointre *et al.*, 2018). Along these lines, the literature assumes traditional mall relationships, which are also susceptible to extrapolation to lifestyle centers.

H3: The physical environment positively influences visit intention.

Entertainment

Given the changes in the lifestyle of consumers and the increase in online shopping, shopping malls improve their attractiveness for visitors by positioning themselves as an option that combines their lifestyle with leisure activities or consumption of entertainment services (Calvo and

Lévy, 2018), turning entertainment into a main tool to increase revenues (Anselmsson, 2016; Tripathi *et al.*, 2020), positioning the mall as a place for family gathering and social enjoyment, even when not buying (Lucia-Palacios, 2016; Olonade *et al.*, 2021). Afaq *et al.* (2020), Elmashhara and Soares (2020) point out that the demand for hedonic aspects has increased in shopping malls due to the growing consumption in permanent entertainment services (food courts, playgrounds and cinemas).

Entertainment is considered as a relevant part of the attractiveness strategy, because it focuses efforts to improve entertainment services and directs resources to the addition of recreational facilities that meet consumer needs (Khare *et al.*, 2020). Therefore, we consider that it has effects not only in the shopping center context but also in lifestyle centers.

H4: Entertainment positively influences visit intention.

Perception of luxury

Luxury consumption encompasses categories of high fashion, accessories and brands with an image of exclusivity and idea of status, conferring shoppers with products for personal display, beyond functional attributes (Perry and Kyriakaki, 2014), whose economic importance represents a global market of billions (Bai *et al.*, 2022), justifying the constant investigation of the role of the perception of luxury in the lifestyles and behavior patterns of lifestyle center visitors (Perry and Kyriakaki, 2014). Therefore, shopping centers that aspire to a cutting-edge positioning depend on establishing how to attract consumers by properly studying the combination of fashion brands that denote them with luxury image and sophistication (Yu *et al.*, 2021, Bai *et al.*, 2022).

The literature has approached luxury from hedonic consumption, personality and perceived popularity of the retail environment, studying its impact of quality and exclusivity only on certain consumers (Michon *et al.*, 2015; Can *et al.*, 2016). Therefore, the influence and attractiveness of this attribute of shopping centers can be studied in the context of lifestyle centers (Yu *et al.*, 2021).

H5: The perceived luxury of stores positively influences visit intention.

Eco-friendly environment

A hallmark of lifestyle centers is the incorporation of eco-friendly environments to provide relaxing and comfortable states that facilitate the public's playful engagement and interaction with the space (Rosenbaum *et al.*, 2018). Several researchers suggest that eco-friendly environments influence shopping behaviors (Kumar *et al.*, 2020), generate positive, sensory and emotional effects on visitors to service spaces (Rosenbaum and Contreras, 2019). Summarizing, the use of forms, materials and elements that symbolize nature, serves as an eco-friendly marketing strategy to encourage the intention to visit (Ortegón and Royo, 2017). In this way, Kumar *et al.* (2020) recommend delving deeper into the responses and effects of aesthetics with green or nature environments on visitor behavior, so it is proposed:

H6: Perception and incorporation of eco-friendly environments positively influence visit intention.

Use of Technology

Shopping malls are fluid and changing spaces, which effectively combine commercial aspects, various technological resources and social practices (Lecointre *et al.*, 2018), constantly evolving to improve the shopping experience by optimizing the circulation and exposure to visitors of the goods or services they offer (Pantano *et al.*, 2018). In that sense, new digital tools complement the technological advances of retail spaces to meet experiential needs and influence visitor behavior (Pantano and Gandini, 2018), motivating the analysis of the strategic potential of technology and requiring further research on its effects (Willems *et al.*, 2017).

Willems *et al.* (2017) have suggested that available studies tend to focus on the utilitarian or hedonic benefits of specific technology tools, an issue supported by Pantano *et al.* (2018) who point out a neglect of the value of technology as a

tool that enhances the purchasing process from a holistic and interactive commercial atmosphere. Passavanti *et al.* (2020) propose that research on the experience and technological aspects has been conducted based on the use of digital platforms, mobile technologies and functional technologies in stores, so it is desirable to investigate it from a global perspective of available technology services in the mall. Consequently, it is interesting to assess the effect of this attraction factor, particularly in the context of lifestyle centers.

H7: Technology uses positively influence visit intention.

Special events

The literature has established the shopping mall visit as a hedonic experience belonging to an entertainment typology, which starts from an exciting shopping activity or interaction with a mix of complementary services (Sadachar and Fiore, 2018), emphasizing special events as a differential factor that affects visitors' behavior by enhancing the shopping experience and increasing permanence (Khare *et al.*, 2020), despite the fact that their effects are not homogeneous and may be experienced differently by consumers (Elmashhara and Soares, 2020; Ahmad, 2012).

Elmashhara and Soares (2020) argue to study the entertainment variable in two types: permanent entertainment, established as the inclusion of services, stores and permanent leisure spaces designed to entertain (Anselmsson, 2016), previously raised as study variable H4. And special event entertainment, being the offer of occasional or seasonal activities of the mall, such as product launches, thematic or social cause events, festivals and musicals (Khare *et al.*, 2020). Therefore, considering special events as an independent variable to permanent entertainment and its innovative nature of this research, it is established that lifestyle centers use various events to differentiate themselves and attract consumers (Khare *et al.*, 2020), determining the differential value of this variable to conduct studies that measure their visitors' behavior (Elmashhara and Soares, 2020), postulating that:

H8: Special events positively influence visit intention.

Quality of the service

Elmashhara and Soares (2019) describe that shopping for mall visitors is an immersive and emotional experience, becoming a holistic entertainment that involves buyer-seller social interaction. Previous research evidence that the relationship of shoppers with staff facilitates the shopping process (Anselmsson, 2016), improves the perception of service and significantly influences visit and purchase intentions (Ahmad, 2012). Therefore, service quality offers a differential value against online shopping by generating a process with higher quality against the emotional, hedonic and functional needs of the customer (Khare *et al.*, 2020).

Elmashhara and Soares (2019) have pointed out service quality as a component of attractiveness, based on the relationship of consumers with the staff of the shopping mall, therefore, there is an interest in measuring service quality against the importance given by consumers to empathy, responsiveness and interactions with the employees of the shopping center (Anselmsson, 2016), being able to extend such reasoning to the case of lifestyle centers and making it possible to propose:

H9: Service quality positively influences visit intention.

Materials and Method

This empirical study adopts a quantitative method to test a large number of hypotheses (Hernández *et al.*, 2014), applying a structured questionnaire for collecting responses to attitude or preference questions (Zmud, 2003) and as a tool recommended in previous studies to calculate the effects of attraction variables on visit intention (Santoso *et al.*, 2018).

Based on the literature review of the ten proposed variables, 56 items were delimited from the adaptation of the literature consulted. Subsequently, the items were validated by thematic experts (two academics with doctoral level and

a shopping center manager with more than ten years of experience), whose contributions allowed optimizing clarity, relevance and sufficiency of the questionnaire, allowing retaining 41 items in line with the recommendations of cultural adaptation exposed by the literature (Hernández *et al.*, 2014; De Juan and Rivera, 1999). Subsequently, they were analyzed by means of a pilot test with 30 effective surveys, obtaining a Cronbach's alpha $\alpha=.96$ considering as adequate the reliability of the instrument (Celina-Oviedo and Campo, 2005).

The questionnaire was applied to visitors of six lifestyle centers in a major Latin American city, which meet the ICSC (2019) classification of lifestyle centers or mega-malls: Santafé, Plaza Central, Plaza de las Américas, El Edén, Centro Mayor and Calima. Along these lines, 398 effective surveys were obtained complying with the recommendations of the literature by requiring five to ten surveys per item and exceeding the minimum sample ≥ 200 (Kline, 2011; Lloret-Segura *et al.*, 2014).

The statistical treatment of the data was performed in SPSS 22.0 and AMOS 23, specialized software to develop multivariate analyses and calculate the effects between proposed variables (Hair *et al.*, 2014). Subsequently, the analyses of results are shown, including the factorial solution, validity measures and relationship testing of the structural equation model.

Results

Based on the proposed objectives to estimate the variables and calculate the relationships or effects between variables, the parameters proposed by Hair *et al.* (2014) were used to collect and analyze the data, complying with tests, parameters, and coefficients that confirm the normality and validity of the data, giving way to the performance of inferential analysis with parametric tests. Consequently, Mardia's test was applied, proving a multivariate normal distribution of the data, being considered relevant for further parametric analysis (Kline, 2011). Subsequently, a factor analysis was performed (see Table 1), calculating the significant statistical correlation degree with Barlett sphericity test of $\chi^2= 1067.723/gf=487/$

$p < 0.000$, with sample adequacy measure index $KMO = 0.933$. A component extraction was performed with the maximum likelihood technique, finding that the 41 indicators are distributed in

nine latent factors, conserving 67.05 % of variance explained (Hair *et al.*, 2014), presenting relevant and significant loadings > 0.49 for most of the items (Lloret *et al.*, 2014).

Table 1
Factor analysis of attraction factors

Indicators		Factor								
		1	2	3	4	5	6	7	8	9
H1-AC1	H1-AC1 It is easy to access the mall, due to its location (car, public transport, bicycle or other means).	0,54	0,04	0,23	0,04	0,12	0,03	0,09	0,16	0,15
H1-AC2	The person visits the mall because of its proximity (it is close to work or place where he/she lives).	0,29	0,10	0,31	-0,12	0,17	0,11	0,01	0,02	0,13
H1-AC3	It is easy to go around the shopping center.	0,46	0,06	0,18	0,01	0,26	0,19	0,00	0,12	0,13
H1-AC4	The hours of the shopping center are convenient (broad).	0,58	0,13	0,20	0,32	0,12	-0,01	0,11	0,11	0,12
H2-VO1	The person can find all the products he/she is looking for in the mall	0,67	0,05	0,08	0,27	0,14	0,06	0,20	0,03	0,07
H2-VO2	The mall has a wide variety of warehouses and stores.	0,69	0,02	0,22	0,16	0,21	-0,08	0,08	0,13	0,13
H2-VO3	There is a wide range of services: Banking, insurance, real estate, clothing stores, etc.	0,63	0,07	0,10	0,26	0,16	-0,03	0,12	0,10	0,07
H2-VO4	The person finds the preferred brands.	0,65	-0,01	0,24	0,19	0,11	0,02	0,12	0,04	0,11
H3-AF1	The decoration and lighting are striking for him/her	0,41	0,05	0,23	0,19	0,27	0,02	0,06	0,05	0,59
H3-AF2	The shopping center is a nice place to visit.	0,44	0,09	0,32	0,20	0,23	0,09	-0,03	0,16	0,55
H3-AF3	The design and appearance of the shopping center are attractive	0,37	0,06	0,27	0,24	0,20	0,07	0,16	0,10	0,54
H3-AF4	The shopping center has free or large spaces	0,31	0,24	0,24	0,25	0,16	0,01	0,11	0,14	0,41
H4-OE1	There is a wide variety of restaurants and cafes.	0,36	0,05	0,27	0,22	0,49	-0,01	0,05	0,17	0,22
H4-OE2	It is important that the shopping center has a big food court.	0,40	0,08	0,22	0,20	0,53	-0,01	0,05	0,20	0,18
H4-OE3	There are entertainment spaces and cinemas in the mall.	0,29	0,04	0,17	0,15	0,85	0,05	0,12	0,13	0,17
H4-OE4	It is attractive that the mall has entertainment spaces and cinemas.	0,39	0,06	0,19	0,15	0,64	0,03	0,09	0,22	0,10
H4-OE5	The person visits this mall because it has a variety of entertainment activities to please everyone in the family	0,27	0,14	0,24	0,29	0,27	0,32	0,17	-0,03	0,05
H5-PL1	There are luxury brands in the shopping center	0,33	0,11	0,17	0,69	0,14	-0,06	0,14	0,10	0,16
H5-PL2	The shopping center has a recognition image.	0,40	0,14	0,17	0,55	0,13	-0,07	0,21	0,12	0,18
H5-PL3	The shopping center offers a feeling of prestige or luxury.	0,20	0,16	0,09	0,63	0,08	0,20	0,12	0,09	0,11
H5-PL4	Do you think that the people who buy in this mall have a prestigious style that identifies them.	0,01	0,26	0,06	0,33	-0,01	0,34	0,17	-0,02	0,12
H6-AE1	There are environments with vegetation in the shopping center	0,03	0,86	0,04	0,16	0,06	0,18	0,05	0,05	0,04

Indicadores		Factor								
		1	2	3	4	5	6	7	8	9
H6-AE2	There is use of resources or elements of nature in the architecture of the mall.	0,04	0,91	0,09	0,16	0,08	0,13	0,09	0,02	0,04
H6-AE3	The design and eco-friendly environment of the mall (presence of shrubs, areas and green walls) is attractive.	0,07	0,88	0,10	0,12	0,03	0,18	0,11	0,10	0,03
H6-AE4	The presence of natural spaces or scenarios makes people feel comfortable.	0,10	0,75	0,06	0,05	0,00	0,23	0,17	0,17	0,07
H7-PT1	The inclusion of technological advances in the mall is attractive (digital screens, elevators, escalators, digital calls for payment automation, location app, security elements in parking lots, etc.).	0,25	0,17	0,17	0,52	0,22	0,28	-0,02	0,16	0,10
H7-PT2	The mall offers technology (wifi, bluetooth, etc.) that facilitates the online search of stores, stores or products.	0,20	0,20	0,14	0,39	0,19	0,35	-0,06	0,04	-0,01
H7-PT3	The technological benefits help the choice of visiting, permanence and consumption in the mall. (digital screens, elevators, escalators, digital applications for payment automation, location app security elements in parking lots, wifi, etc.).	0,16	0,22	0,09	0,24	0,18	0,61	0,08	0,14	0,01
H7-PT4	The content of forums, blogs, website and social media, make it attractive to visit the mall	-0,08	0,27	0,08	0,03	-0,11	0,62	0,20	0,05	0,01
H8-EE1	The mall has an offer of special events or fun and varied programs.	0,20	0,16	0,26	0,08	0,10	0,19	0,56	0,11	0,01
H8-EE2	The incorporation of special events makes it attractive to visit the CC (events such as: concerts, bingos, artist presentations, sporting events, parades, seasonal decorations, etc.).	0,13	0,08	0,09	0,16	0,00	0,17	0,74	0,24	0,09
H8-EE3	In the mall people can escape routine and boredom.	0,21	0,14	0,33	0,33	0,10	0,27	0,31	0,15	0,03
H8-EE4	This mall is outstanding when it comes to special events.	0,18	0,21	0,14	0,10	0,12	0,20	0,55	-0,01	0,04
H9-SP1	The personalized attention of the sellers of the stores is important.	0,20	0,12	0,08	0,03	0,16	0,07	0,25	0,59	0,09
H9-SP2	The sellers in this shopping center are friendly.	0,16	0,14	0,33	0,18	0,22	0,15	0,03	0,65	0,06
H9-SP3	The sellers of this shopping center offer customers personalized attention.	0,20	0,13	0,31	0,18	0,13	0,18	0,14	0,51	0,08
H9-SP4	People choose to buy in a shopping center because customer service is better compared to other places.	-0,13	0,17	0,11	-0,02	-0,02	0,50	0,21	0,11	0,03
IntV1	This shopping center is a good place to visit.	0,26	0,06	0,65	0,11	0,17	0,14	0,17	0,21	0,18
IntV2	I would visit this shopping center again	0,34	0,06	0,68	0,16	0,23	0,04	0,16	0,13	0,13
IntV3	I would recommend this shopping center to other people	0,31	0,11	0,77	0,22	0,12	0,18	0,17	0,13	0,14
IntV4	Satisfaction of visiting the shopping center	0,25	0,10	0,75	0,25	0,12	0,12	0,15	0,18	0,15

Note. Factor analysis. Maximum likelihood method.

Validity measures and data consistency

The reliability of the data was verified with Cronbach's Alpha (CA) and composite reliability (CR), exceeding the criteria suggested by Hair *et al.* (2014). Following Martínez and Martínez (2009), different statistical validation procedures were applied to evaluate the convergent and discriminant validity from the variance extracted (AVE): When the variables were contrasted with Fornell and Larcker method (1981), H1 and H2 did not exceed the expected values, proceeding with the study correlations between Anderson

and Gerbing pair variables (1988) with confidence interval >95 % (± 1.96 for the correlation between variables and standard errors of covariances) that statistically justify the validity existence of all variables. Therefore, the convergent and discriminant validity is supported by the results of the factor analyses that show that the items of each variable are highly correlated among themselves, but due to the extensive bibliographic review to define the variables and the validity methods carried out, it is demonstrated that each variable differs from another for this study, allowing the application of structural equations (Table 2).

Table 2
Reliability, convergent validity and discriminant validity values

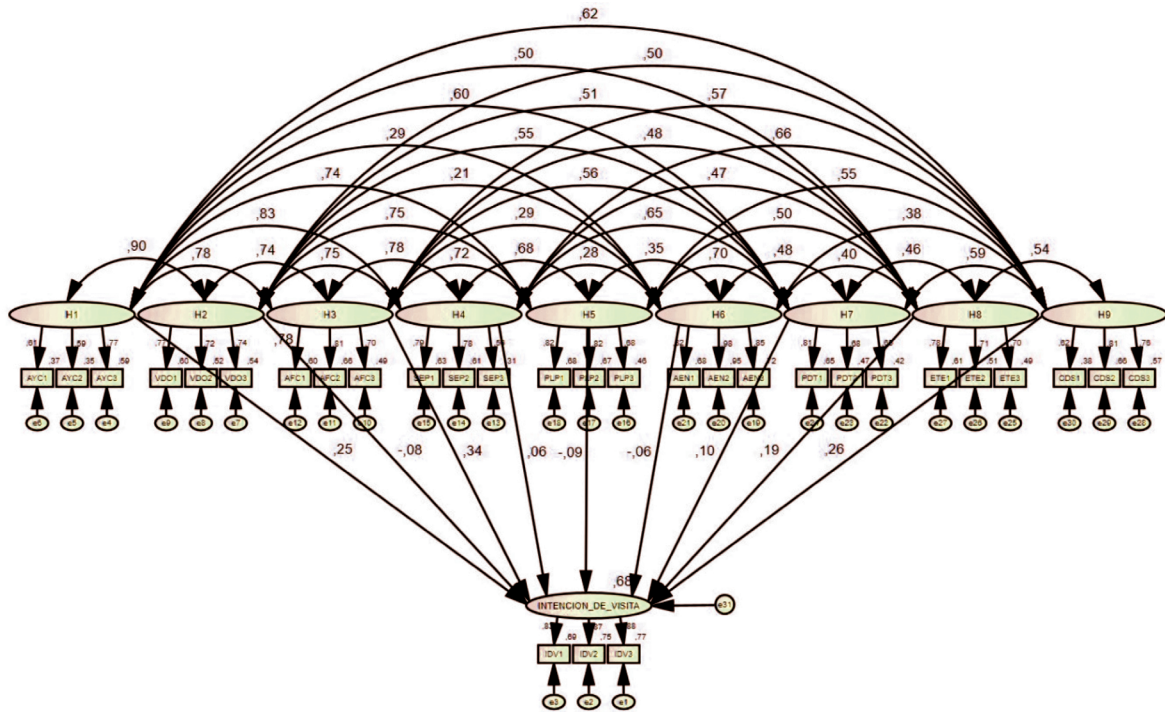
Factor	Cronbach Alpha (CA)	Composed reliability (CR)	Extracted average variance (AVE)	INTV	H1	H9	H8	H7	H6	H5	H4	H3	H2
INTV	.895	0,895	0,739	0,860									
H1	.694	0,697	0,438	0,716	0,66								
H9	.765	0,775	0,537	0,691	0,62	0,73							
H8	.773	0,776	0,537	0,575	0,50	0,54	0,73						
H7	.759	0,758	0,513	0,575	0,60	0,59	0,46	0,72					
H6	.910	0,920	0,794	0,298	0,30	0,39	0,42	0,50	0,89				
H5	.815	0,819	0,602	0,600	0,74	0,55	0,50	0,70	0,35	0,78			
H4	.720	0,763	0,521	0,720	0,72	0,67	0,48	0,66	0,29	0,69	0,83		
H3	.804	0,808	0,585	0,728	0,78	0,57	0,48	0,56	0,30	0,73	0,77	0,78	
H2	.785	0,788	0,554	0,636	0,90	0,50	0,51	0,55	0,22	0,75	0,76	0,74	0,74

Estimation of the structural equation model

The proposed model was based on the specification of the path graph with the nine exogenous variables and the dependent intention variable to visit (Figure 1). The adjustment was made by debugging items with low or high error coeffi-

cients and keeping three items per variable so as not to compromise the stability of each dimension, reaching an adequate adjustment (CMIN = 2. 239) with significant value (Pvalue=.000 for the whole model), achieving goodness-of-fit measures close to the values suggested by the literature GFI = .883, AGFI = .848, RMSEA = .056, CFI=.931, TLI=.917, PNFI=.731 (Escobedo *et al.*, 2016; Hair *et al.*, 2014).

Figure 1
Structural model



Note. Influence model of attraction factors on visit intention.

Table 3
Estimators and significance for endogenous and exogenous latent variables

Relations	Estimate	S.E.	C.R.	Pvalue	Path
IntV <--- H1	0,925	0,315	2,937	0,003	.25
IntV <--- H2	0,256	0,094	2,737	0,006	-.08
IntV <--- H3	0,408	0,118	3,455	***	.34
IntV <--- H4	0,463	0,112	4,151	***	.06
IntV <--- H5	0,085	0,092	0,922	0,356	-.09
IntV <--- H6	-0,046	0,04	-1,161	0,246	-.06
IntV <--- H7	0,206	0,068	3,018	0,003	.10
IntV <--- H8	0,261	0,067	3,898	***	.19
IntV <--- H9	0,461	0,076	6,104	***	.26

Note. ***es = >0.001 being a significant value ≤0.05.

The results of the different tests and fulfillment of criteria showed that the dimensions had factor loadings and discriminant values that prove the relevance of the nine factors (Lloret *et al.*, 2014).

Consequently, it is validated that six relationships out of the nine hypothesized reach significance values (Pvalue ≤ 0.05) and demonstrate positive effects (path coefficients ≥ 0.05) on the dependent

variable intention to visit (Escobedo *et al.*, 2016). In contrast, H2, H5 and H6 do not have a significant effect to visit intention, since the p-value of these three hypotheses exceeded the expected value of significance and present negative effects (see Table 3). Finally, the implications of each hypothesis are more discussed in the following section.

Conclusions and discussion

The progressive growth and evolution of the shopping center industry intensifies the competition to develop visitor attraction strategies (Santoso *et al.*, 2018), so it is important for shopping center managers to know which components make shopping centers more attractive to consumers (Tripathi *et al.*, 2020; Pantano *et al.*, 2018). This research has delved into the proposal and empirical testing of attraction factors in a recent type of large-scale shopping mall format called lifestyle center that has received little investigated. We reveal how attraction factors operate in this new context by demonstrating their effects on visitation intention, using the CAT paradigm (Lazarus, 1991) to enhance the understanding of the conceptual model. These results contribute to the literature in multiple ways.

First, the findings verify the presence of traditional latent variables in the literature (e.g., variety of offerings, physical environment, convenience of location and entertainment) as applied to the new concept of shopping malls called lifestyle centers. In addition, new attraction variables (e.g., perception of luxury, preference for eco-friendly physical environments, perception of technology services, special events and service quality) are tested, providing information to suggest managers the need to include and manage new factors that can improve the attractiveness and increase the visiting frequency to lifestyle centers (Tripathi *et al.*, 2020).

Second, the statistical analysis of the structural model revealed that most of the variables have a positive and significant effect on visitation intention (H1, H3, H4, H7, H8 and H9); however, when investigating the behavioral responses of visitors when interacting with the commercial

atmosphere, differences are found on the visitation intention of some of the factors (H2, H5 and H6). In this regard, the role and relevance of the attraction factors are discussed below along with the hypotheses obtained.

The influence of H1 towards visitation intention presented a high significant effect, being congruent with previous studies of the variable in traditional shopping centers that have shown that accessibility and convenience are significant to encourage visitation (Thanasi *et al.*, 2021; Calvo and Lévy, 2018), so this research manages to complement the literature of the category by positively extending the effects of proximity and easy travel to lifestyle centers. We consider that this finding can be further studied by allowing visitors to access entertainment services, the main factor of interest in these environments.

The values of H2 show a negative effect of the variety of offerings on the intention to visit lifestyle centers. In contrast to previous research suggesting that the attractiveness of a traditional shopping mall is positively influenced by the agglomeration of available brands and services (Anselmsson, 2016; El-Adly and Eid, 2015), our results support Ahmad (2012) who suggests that consumers' visit decision is strongly influenced by the variety of offers with the accessibility to services and especially by the emotional attachment to specific brands, thus Lecointre *et al.* (2018) and Diallo and Siquiera (2017) point out that the composition of services and brands present or absent can generate effects contrary to those expected. In similarity with Elmashhara and Soares (2019), it was found that the variety of the offer in correlation with leisure activities has a negative effect on visit attitudes, so as they are not considered attractive to the surveyed consumers, further research is suggested to contrast the type of effect on intentional measures of visitation.

The findings against H3 suggest that the physical environment of the lifestyle center is the latent variable with the largest positive effect towards visitation intention in harmony with previous studies (Lecointre *et al.*, 2018; Munuera and Cuestas, 2006; Calvo and Calvo, 2013) where spatial design and display with visual appeal seem to have an important effect for visitors. In line with

Afaq *et al.* (2020), the results suggest that harmony towards atmospheric design with visually appealing spaces and wide aisles generate the opportunity to be able to transit with companions, whose company induces higher consumption and visit frequency (Lucia-Palacios *et al.*, 2016) being potentiated by marketing activities to favor pleasant experiences (Muñoz-Querales *et al.*, 2020). We consider that these results can stimulate further research, maintaining the relevance in improving spatial designs to facilitate the transit of people and evaluating the emotional involvement of visitors in differentiating, preferring and recommending the physical environmental designs of each lifestyle center.

Regarding H4, the findings support a significant effect of the entertainment offered by the lifestyle center on visitation intention. As documented in the literature review by Khare *et al.* (2020), this variable has been essential to promote the visit to these new retail environments. Therefore, due to its essential value for social relationship as suggested by Lucia-Palacios *et al.* (2016) or Rosenbaum and Contreras (2019) a greater effect of the variable on visitors was expected, especially when extended to lifestyle centers whose main axis is the consumption of leisure services such as cinema or food and its adaptation possibilities to the different segments of shoppers in shopping centers (González and Orozco, 2012), also considered a marketing activity to improve the experience of visitors (Muñoz-Querales *et al.*, 2020). Consequently, testing its effects in the Latin American context implies new research possibilities so we encourage to deepen in the variety, specialty and differentiation of the offer of entertainment services aimed at different customer profiles in the case of lifestyle centers.

Regarding H5 based on the role of the perception of luxury in lifestyle centers in promoting visitation intention, there is a non-significant negative effect. Although some studies highlight that lifestyle centers are designed under the concept of luxury, prestige and fashion (Michon *et al.*, 2008), as pointed out by Perry and Kyriakaki (2014) and the results, the items that most influence the intention to visit from the luxury factor are the choice of type of stores and brand positioning

both of the shopping center and the retailer offer, so it is considered that the resulting effect is due to the fact that the perception and relevance of luxury is subjective when evaluating products, stores and design of the retail environment (Diallo and Siquiera, 2017). Therefore, it is recommended to deepen this result in Latin America and lifestyle centers, which use a greater variety of offerings for diverse visitor profiles, determining methodologies and levels of objective identification of luxury and prestige to increase the understanding of this phenomenon.

The resulting values for H6 show that there is no direct and significant effect of eco-friendly environmental design on visitation intention. We consider that the result is because some lifestyle center designs reward addressing more immediate consumer satisfaction concerns (e.g., shopping, eating, entertainment) over the incorporation of spaces with eco-friendly elements (e.g., fountains, gardens, green areas) (Rosenbaum *et al.*, 2018). In relation to Ortégón and Royo (2019), findings suggest that nature-centered environments possess an indirect effect on consumer behavior, similarly Rosenbaum *et al.* (2018) recommend considering the mediating effects of natural spaces on consumer emotions, so new research will have to examine the role or degree of influence of this variable in the relationships with emotional states and behavioral, permanence and social relationship variables within physical eco-friendly spaces in lifestyle centers.

This study shows positive and significant effects on the perception of technology in lifestyle centers on the intention to visit H7, so that the perception of technological services or spaces becomes a relevant factor to get the attention of consumers, responding to the current needs of interactivity with the space as a result of the combination of access to the store and the use of communication technologies (particularly social networks) (Pantano and Gandini, 2018; Lecointre *et al.*, 2018). Lifestyle centers have transcended in the category, moving exclusively from managing their physical environment to developing digital and omnichannel experiences that enhance their competitive differential (Ameen *et al.*, 2021) by being able to extend sensory marketing activities

through the stimulation of the senses (Cortázar and Rodríguez, 2016). In a practical perspective, new research will have to analyze the integration of physical and virtual sensory environments, examining the benefits of appropriating technology to streamline consumption processes that improve the perception of store owners, comparing the scope of technological spaces for display and customer relations.

For its part, H8 based on the role of special events, proved to be a variable that strongly promotes the intention to visit. Contrasting the literature and separating special events or differentiating them from permanent entertainment and leisure services (Elmashhara and Soares, 2020), specific activities in shopping centers such as parades, concerts or launches, and even seasonal decoration activities of the mall proved to be effective attractiveness strategies (Sadachar and Fiore, 2018; Can *et al.*, 2016). The results obtained in the case of lifestyle centers open new research topics, such as the individual analysis of the variable in behavioral studies or the analyses of the impact of these activities on the moods of visitors.

For H9, the significant and positive effect of service quality on visit intention is confirmed. Previous results in traditional shopping malls suggest that a more focused attention on meeting functional needs and interaction with retail environment collaborators can improve consumption and visit intention (Ameen *et al.*, 2021). Having demonstrated this relationship allows extending the degree of knowledge for service management and relevance, particularly as these new retail environments are oriented to captivate convenience and increase experiential attributes for the visitor. Although this study offers significant information, the findings will have to be complemented with new research adding conditions, stages and comparing the variable in virtual channels (for example, the evaluation of after-sales services in social networks to assess relationships with reputation and image measures).

In conclusion, the results obtained allow to extend the conceptual and empirical knowledge of attraction factors in the context of lifestyle centers through a structural model of relationships, however, based on previous studies, we

consider it important to clarify that in addition to identifying the effects of individual variables on consumers, it is required to have a holistic perspective of the stimuli capable of influencing visitors (Lucia-Palacios *et al.*, 2016; Calvo and Lévy, 2018). Hence, the attractiveness should also be examined through a joint and separate management of the factors capable of encouraging the visit to a lifestyle center.

On the other hand, in view of the current trends in technology services and the findings identified, it is necessary to recommend that lifestyle center managers encourage interactivity and the continuous renewal of commercial displays, allowing them to propose the creation of interesting interactive physical spaces (for example, with augmented reality or virtual showcases) to stimulate experiences. Also create or have virtual spaces of communication with the offer of stores or brands, which encourage commercial interaction, omnichannel and launches of new services or products. These premises complement the discussion of each hypothesis mentioned above.

Finally, this research acknowledges some limitations for future research. We consider that since there are differences in the design of each lifestyle center and the analysis was applied to a single city in Latin America with common customer profiles, the results imply limitations in the generalization of the findings. Therefore, future research should propose methodologies that consider the uniformity degree of the environmental designs of these new formats and compare the information obtained by customer profiles.

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Corporate Volunteering: definition and relationship with Corporate Social Responsibility

Voluntariado corporativo: definición y relación con la Responsabilidad Social Empresarial

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Abstract: the aim of this paper is to build a definition of corporate volunteering, which is useful to analyze how this concept can be linked to that of Corporate Social Responsibility. Bibliographical research was done by consulting various databases. A broad spectrum of theoretical interpretations and empirical research was analyzed, which served to identify each of the components of the proposed definition and to support that this definition is functional to define Corporate Social Responsibility. The definition combines specific characteristics of corporate volunteering, elements related to its management and a summary of the benefits that this activity generates for the stakeholders involved. This article contributes to the theoretical development of corporate volunteering, to the construction of useful tools for conducting empirical research, and to the development of management strategies and methodologies for implementing corporate volunteering programs that operate effectively as tools of Corporate Social Responsibility.

Keywords: corporate Volunteering, Corporate Social Responsibility, employees, volunteers, definition, terms, forms, activities.

Resumen: el objetivo de este trabajo es la construcción de una definición de voluntariado corporativo útil para analizar cómo este concepto puede vincularse con el de Responsabilidad Social Empresarial. Se recurrió a la investigación bibliográfica mediante la consulta de diversas bases de datos. Se analizó un amplio espectro de interpretaciones teóricas e investigaciones empíricas, lo que sirvió para identificar cada uno de los componentes de la definición propuesta y para fundamentar que esa definición es funcional a las principales formas de definir la Responsabilidad Social Empresarial. La definición combina características específicas del voluntariado corporativo, elementos relacionados a su gestión y una síntesis de los beneficios que esta actividad genera para los actores involucrados. Este trabajo contribuye al desarrollo teórico del voluntariado corporativo, a la construcción de herramientas útiles para realizar investigaciones empíricas y a la elaboración de estrategias y metodologías de gestión para la implementación de programas de voluntariado corporativo que funcionen efectivamente como herramientas de Responsabilidad Social Empresarial.

Palabras clave: Voluntariado corporativo, Responsabilidad Social Empresarial, empleados, voluntarios, definición, términos, formatos, actividades

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Introduction

Corporate Volunteering (CV) has become a tool on which many social organizations depend to carry out their mission, as it is currently used by companies of all types and sizes to implement their collaboration with these organizations. The CV is a tool that companies can use to generate a social impact and co-create value with civil society organizations. The academic production on this topic attests to its growing importance, and covers a wide range of topics, as: descriptive studies on the application of CV in different countries and contexts; research demonstrating the benefits that companies obtain from its application; studies on the needs that motivate volunteers to participate and work, considering the various positive impacts of its application for employees who practice it and for the communities where it is implemented. In much of this literature, the CV is proposed as an activity of Corporate Social Responsibility (CSR).

A close look at this literature allows observing that it has several theoretical limitations, among which are 1) different interpretations of the concepts of CV and CSR, sometimes these terms are used without making explicit the meaning provided by the authors, 2) much of the literature considers the CV as a tool to service CSR activities directed to communities, sometimes as support to actions of social marketing or corporate philanthropy, omitting a broader approach to the CV that also understands it as practice of Internal Social Responsibility (ISR) directed to employees (volunteers), 3) in general, it is not explained how they are connected from the theoretical point of view and both concepts; 4) some studies analyze CV exclusively from the perspective of Human Resources management or corporate philanthropy management, without connecting them with Social Responsibility. In sum, the academic production on CV assumes that there is a relationship between CSR and CV, but hardly ever goes deeper to interpret how this relationship works.

The aim of this paper is to propose a definition

of CV that allows linking this activity with CSR. Since there are different ways of interpreting and applying CSR, a good definition of CV should be based on concepts that can manifest differently, depending on the conceptual framework of CSR applied. That definition should combine a set of variables, capable of assuming different values depending on the CSR definition adopted. This is relevant for empirical research, but it is even more relevant for the application of CV, since its design must be aligned with CSR objectives that are sought to be achieved through this type of volunteering. The definition proposed in this document fulfills this requirement.

This document is conducted as follows. First, an analysis of the terminology used to refer to this type of volunteering is made. Then, the components of a set of definitions from the literature were identified and systematized. Later, the definition was formulated by discussing each of those components. Finally, it is argued about how this definition allows connecting the CV with CSR.

Corpus selection criteria

A literature review was used as methodology. Articles on these topics were searched in different catalogs (Ebsco, JStor, SAGE, Science Direct, Springer and Redalyc), without establishing a time, since much of the theoretical development on volunteering takes more than two decades. The following Spanish terms were used for the search: *volunteering*, *volunteers*, *corporate volunteering* and *employee volunteering*. The terms used were *volunteering*, *volunteers*, *corporate volunteering*, *employee volunteering*, *business support for employee volunteering*, *employee supported volunteering*, and *employee supported volunteerism*. For analyzing the relationship between CV and CSR, the search combined these terms with those of *Responsabilidad Social Empresarial* (Spanish) and *Corporate Social Responsibility* (English). Among the articles found, those considered relevant to the research were selected.

State of the art

The variety of names and definitions for corporate volunteering

Although there are publications related to the CV, the construction of theory and the accumulation of scientific knowledge on this topic are limited by two problems. The first one refers to the variety of terms used to designate it. For Tschirhart (2015, p.17), “the variety of terms used to discuss employee volunteering programs makes it difficult to compare the results of a research study.” Three expressions are used in the Anglo-Saxon literature: 1) Corporate Volunteering (Lee and Higgins, 2001; Peterson 2004, Herzig, 2006; Runté and Basil, 2011); 2) Employee Volunteering (Magalhães and Ferreira, 2014; Rodell *et al.*, 2016; Cycyota *et al.*, 2016); and 3) Business Support for Employee Volunteering (or similar expressions: Employer Supported Volunteering and Employer Supported Volunteerism) (Booth *et al.*, 2009; Basil *et al.*, 2011; Pajo and Lee, 2011; Hetesi and Csovcics, 2015). Gallardo Vázquez *et al.* (2010) argue that corporate volunteering is the most popular term, being also the most used in Spanish-speaking countries.

The second problem is even more important: the diversity of definitions of the concept. While volunteering is often interpreted as “activities that are freely undertaken, usually without payment, to benefit another individual, group or cause” (Chow *et al.*, 2021, p. 2), it is not enough to say that corporate volunteering is a form of volunteering that takes place within the company. It has been pointed out that research on this topic “is currently based on a variety of definitions and different operationalizations” (Rodell *et al.*, 2016, p. 55). Booth *et al.* (2009, p. 25) argue that CV “is a research area in desperate need of a theory,” as “a deeper and theoretical understanding of employee volunteering can help guide policies and practices.” Tschirhart (2005, p. 28) states that “rigorous scholarship is needed to improve the growing, but now largely theoretical, literature on employee volunteering.” This situation has been represented as a metaphor: “Corporate volun-

teering is a ‘big tent’, not so different to a circus, which presents a variety of acts simultaneously” (Allen *et al.*, 2011, p. 36).

Component identification of the definition

Table 1 presents several definitions of CV, observing that their differences, however, most of these definitions share similar ideas on certain topics. First, they make explicit that it is a voluntary and non-mandatory activity (to refer to it, expressions such as: volunteering, social work undertaken voluntarily, and actively beyond the specific description of their work, is performed voluntarily, voluntary efforts are used). Under no circumstances are there any references to any kind of compulsory nature. Second, they share references to the type of employee contribution (for example, donating time, effort, or skills, providing assistance). Third, the majority of definitions share a reference to the goals and /or targets of the CV (e.g. contributing to society, serving the community, contributing to social development, charitable organizations, local community, non-profit organizations, etc.). Fourth, what characterizes the group of volunteers is the fact that they are part of the same company. Fifth, companies play some kind of role, such as supporting, encouraging, incentivizing, inviting, promoting, implementing, providing opportunity, training, etc.

On the other hand, the content of these definitions, as well as other statements by the authors, allow to conclude that there are important differences in the various topics used to define the concept or to explain aspects related to its scope and application. These topics relate to 1) who takes the initiative, decides and manages; 2) the degree of formality of CV’s activities (how they are organized and planned); 3) whether the activities are in group or individual; 4) whether the activities take place during or outside working hours; and 5) whether, in addition to employees, other actors can participate as volunteers, (retirees, family members, etc.). Then, different proposals on these issues were identified and analyzed in the literature.

Initiative, decision-making and management. In

this topic, some authors argue that the company is the actor that exclusively has these powers, whether it is taking the initiative (Cook and Geldenhuys, 2018), choosing the causes and institutions where voluntary activities are channeled (Tschirhart, 2005; Peloza and Hassay, 2006) or managing these activities (Tschirhart, 2005; Peloza and Hassay, 2006; Nave and Paço, 2013). Other authors propose that these actions can be performed interchangeably by both actors, whether it is the initiative (Santos and Bittencourt, 2008; Pajo and Lee, 2011) or the choice of the institutions where the activities will be performed (Tschirhart, 2005; Pajo and Lee, 2011).

Degree of formality. Several authors state explicitly that the CV is a formal activity (organized, planned, etc.) (Zappalá and McLaren, 2004; Peterson, 2004; Krasnopolskaya *et al.*, 2015). Other authors propose that corporate volunteering can

have both formal and informal characteristics (Tschirhart, 2005; Nave and Paço, 2013).

Group or individual activities. Although some authors emphasize that VC is a group activity (Rodell *et al.*, 2016), others propose that VC programs can combine individual activities with group activities (Peterson, 2004).

Out of or within working hours. Several authors propose that CV companies allocate to volunteers a certain amount of hours of work for them to dedicate to volunteering. Some of them explicitly state that the CV combines the use of free time of volunteers with time set aside by companies (Tschirhart, 2005; Lorenz and Gentile, 2011; Gatignon-Turnau and Mignonac, 2015). Few authors propose that voluntary activities should be carried out only during working hours (Herzig, 2006; Magalhães and Ferreira, 2014).

Table 1

Terminology and definitions

Term used	Author	Definition
Corporate Volunteering (Voluntariado Corporativo in Spanish and Voluntariado Empresarial in Portuguese)	(Herzig, 2006, p. 53).	"Company grant employees permission during their normal work to enable them to participate in social work and similar tasks."
	Peterson (2004, p. 371)	"Any formal organized business support to employees and retirees who wish to volunteer their time and skills to serve the community."
	Krasnopolskaya <i>et al.</i> (2015, p. 643)	"Any formally organized support or encouragement that a company provides to employees wishing to volunteer their time and skills to serve the local, national or international community without any further compensation or remuneration."
	Nave and Paço (2013, p. 33)	"Practices and activities that a company may adopt to encourage and support voluntary activities, and subsequently apply them to social work undertaken voluntarily by its employees."
	Lorenz and Gentile (2011, p. 184)	"As an employer, a company invites its employees to engage voluntarily and actively beyond the specific description of their work in charitable endeavors, often in cooperation with non-profit organizations (NPOs), while possibly investing additional resources."
	Sekar and Dyaram (2017, p. 662)	"Encourage employees to engage in various social/community-related activities with active employer support, both for business- and employee-led programs."
	Sajardo and Serra (2008, p. 213)	"The set of actions implemented at the initiative of the company and its human capital designed to contribute to social, welfare, environmental, educational and cultural development involving people directly linked to the company (employees and retirees) or indirectly (family members and friends)".
	Santos and Bittencourt (2008, p. 4)	"The term corporate volunteering refers to the practices and actions of a company to encourage, support and apply social work that is performed voluntarily by its employees."

Corporate Volunteering (Voluntariado Corporativo in Spanish and Voluntariado Empresarial in Portuguese)	Goldberg (2001, p. (24)	"A set of actions taken by companies to encourage and support the involvement of their officials in community activities."
	(Voluntariado Corporativo in Spanish and Voluntariado Empresarial in Portuguese)	"A set of organized actions that the company develops to involve its employees in voluntary activities, motivating them to participate in them".
Employee Volunteering	Cyclota <i>et al.</i> (2016, p. 322)	"Active support, through a variety of means, for employees volunteering with charitable organizations."
	Peloza and Hassay. (2006, p. 360)	"Voluntary efforts made by employees within company-authorized programs on behalf of the causes/ organizations selected by their employer."
	Sheell and Vohra (2016, p.1376)	"Many organizations give employees the opportunity to volunteer in their CSR activities. This type of employee participation in CSR is known as corporate volunteering ... or employee volunteering."
	Tschirhart (2005, p. (16)	"It consists of formal and informal policies and practices that employer uses to encourage and help employees volunteer in community service activities."
	Rodell <i>et al.</i> (2016, p. 58)	'Employed people who donate time during a planned activity to an external non-profit organization or to a charity group or organization'.
	Zappalá and McLaren (2004, p. (41)	"A commitment by a business organization to encourage its staff to volunteer in the nonprofit sector."
Business Support for Employee Volunteering or Employer-Supported Volunteering/	Cook and Geldenhuys (2018, p. 3)	"Planned and managed efforts that seek to motivate and train employees to be effective volunteers under employer sponsorship and leadership, and are specifically designed to promote behaviors that seek to improve the social conditions of the communities in which a company operates."
	Gatignon-Turnau and Mignonac (2015, p.7)	"Encouragement of businesses or accommodation of employee volunteering activities during working hours and /or own time"
	Pajo and Lee (2011, p. 467)	"It allows employees to volunteer in the local community with the active support and encouragement of employers through formal and informal policies."

Audiences that can volunteer. Some authors point out that, in addition to employees, some CV programs include other actors: 1) former employees who are retired (Peterson, 2004; Sajardo and Serra, 2008); 2) family members or friends of employees (Sajardo and Serra, 2008); and 3) customers of the company (Ruizalba *et al.*, 2014).

The differences in the first topic are the most relevant for managing CV. Peloza and Hassay (2006) identified that there are three forms of CV, determined according to the main actor in terms of initiative, decisions and management. The extra-organizational volunteering is the one where the participation of the company is reduced to supporting the volunteer initiatives of its employees (financing activities, freeing time, etc.), without getting involved at all in the decisions or management. Conversely, in the intra-organizational volunteering the company participates actively in the initiative, the decisions and the

management of the CV, even reaching the monopoly of all this. Inter-organizational volunteering refers to CV activities carried out within the framework of the company and with some involvement of the company, but where leadership is exercised by the volunteers. In general, the term corporate volunteering is associated with intra-organizational volunteering and the term Business Support for Employee Volunteering is used by authors whose definition of CV matches the approach of inter-organizational volunteering. In addition, there is a broad consensus that extra-organizational volunteering is not a form of corporate volunteering.

Formats of corporate volunteering

Regarding activities of CV, the literature covers a wide spectrum, being classified in different ways and called in different forms: modalities

(Sajardo and Serra, 2008), domains (Santos and Bittencourt, 2008), types (Guardia Massó *et al.*, 2016), primary areas (Cycyota *et al.*, 2016), categories (Hetesi and Csovcics, 2015) or forms (Moreno, 2013; The Global Compact, 2016). Since none of these names was satisfactory, the use of

the term *CV formats* was chosen in this document. This term refers to the combination of the types of tasks volunteers do, when they do them, how and who organizes them, and how the company is involved. Table 2 provides a non-exhaustive list of formats identified in the literature.

Table 2
Formats of corporate volunteering activities

Format	Format Description
Matching giving	Money donation campaigns implemented by volunteers in which the company donates in return an amount similar or proportional to the amount raised.
Individual Matching	Volunteers propose specific activities to be undertaken by them at the individual level and the company supports them with some type of counterpart (money, resources, etc.).
Virtual Micro-Volunteering	A wide range of small tasks volunteers perform for social organizations during their working hours, using electronic media.
Campaigns	One-off activities organized by the company or volunteers, with a specific purpose and limited duration (collecting donations, arrangements in a school or a place, etc.).
Time Banks	Volunteers have a monthly number of working hours to volunteering activities they choose to do, inside or outside the company .
Solidarity <i>Out-door</i>	Group activities, usually carried out as a team, are organized and led by a social organization.
Volunteering	Activities where the main contribution of volunteers is based on the use of their professional knowledge and skills (counseling, training, tutoring, membership of the directory of social organizations, etc.).
Pro-Bond Services	Activities based on providing services at no cost to social organizations, in which the company's professionals act as volunteers.
Assignment of human capital	Activities in social organizations carried out by qualified volunteers (e.g. managers), for long periods of time (weeks or months), who are released from their responsibilities in the company. For example: advising an NGO in another country.
Managers or managers volunteering	Specific volunteering of directors and/or managers who in an honorary way form the boards of social organizations or spend time to advise them.

Contributions to the state of the art

Proposed definition

Based on the above, a definition of CV is proposed below, which can be considered as a flexible version of the extra-organizational volunteering concept (Peloza and Hassay, 2006). The definition interprets CV as an activity aligned with the strategy of the company. This requirement allows it to be managed as a CSR practice directed simultaneously towards the community and employees, as required by the application of the CV in the framework of some approaches to

CSR. Therefore, it is necessary that the company has a leading role (but not exclusive) in the initiative, decisions and management. Corporate volunteering was also chosen because it is the most used expression in Spanish language literature (Gallardo Vázquez *et al.*, 2010) and because it emphasizes the centrality granted to the company. CV is defined as:

Activities through which employees donate their time, knowledge and/or skills with various purposes: 1) contribute to a social cause or meet the needs of a sector of the community, 2) meet the needs of employees themselves, promote their personal development, promote skills development in them and 3) generate benefits for the company. They are activities that

have some degree of formality (organization, planning, etc.), which can support different formats, be timely or organized in programs, be held outside or within working hours, practiced individually or in groups and allow the participation of other actors in the role of volunteers (family members, retirees, clients, etc.). These activities arise at the initiative of companies or volunteers, but are chosen by companies based on predetermined objectives, and can give employees participation in their choice. It is managed by the company but can be shared with volunteers and targeted social organizations. The company always provides some kind of support (money, equipment, logistics, etc.). Employees' participation is neither paid (directly or indirectly) nor conditioned by any form of coercion.

Figure 1 illustrates this definition by showing the relationship between its components.

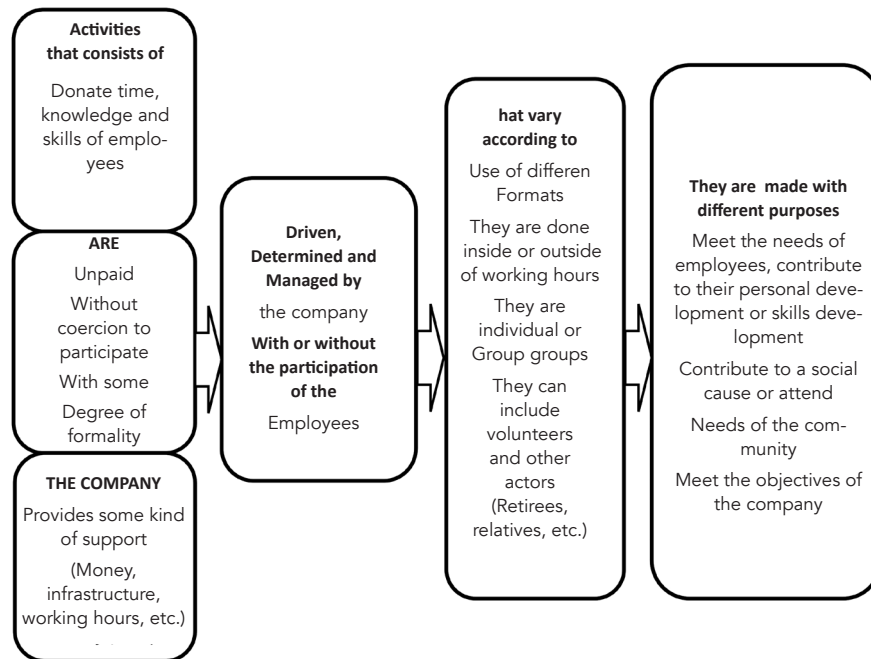
The aims of the CV regarding employees and the company

The *purpose* component of the definition proposes that the CV serves to generate benefits or positive impacts for the company and volunteers, in addition to those received by the community. In the case of volunteers, there is abundant research demonstrating that participation in CV activities: 1) satisfies a broad set of needs or motivations (Frisch and Gerrard, 1981; Clary *et al.*, 1998; Pajo and Lee, 2010; Chow *et al.*, 2021); 2) contributes to their personal development (Chow *et al.*, 2021) and solidarity (Cook and Geldenhuys, 2018) and 3) facilitates the development of various competences (Benjamin, 2001, Lee and Higgins, 2001, Cavalaro, 2006, Herzig, 2006, Booth *et al.*, 2009, Van Schie *et al.*, 2011, Chow *et al.*, 2021), particularly soft skills (Palacios *et al.*, 2021).

As for companies, it has been found that CV generates multiple benefits in at least three dimensions of management: the construction of organizational culture, human resources policies and the relationship with the community. In terms of contributing to the construction of organizational culture, CV serves as a tool to manage and strengthen that culture and to develop values consistent with it (Benjamin, 2001; Van Schie *et al.*, 2011; Bauman and Skitka, 2012). In terms of its contribution to improving the efficiency of HR policies, it has been shown that the CV: 1) increases employee satisfaction (Basil *et al.*, 2009; Ruizalba *et al.*, 2014); 2) promotes their identification with the company (Herzig, 2006; Bauman and Skitka, 2012); 3) develops pride in belonging to it (Jones, 2010); 4) improves employee motivation (Benjamin, 2001; Lee and Higgins, 2001, Herzig, 2006, Basil *et al.*, 2009, Gallardo *et al.*, 2010), 5) increases their commitment, develops organizational citizenship behaviors and a positive attitude towards work, while reducing laziness (Van Schie *et al.*, 2011), 6) promotes employee involvement and loyalty (Lee and Higgins, 2001, Herzig, 2006, Jones, 2010, Ruizalba 7) contributes to talent development (Dempsey-Brench and Shantz, 2021), 8) improves productivity (Basil *et al.*, 2009) and performance (Hu *et al.*, 2016), 9) favors the acquisition and /or retention of valuable people for the company (Jones, 2010; Van Schie *et al.*, 2011). As for the relationship with the community, several studies indicate that the CV serves to manage and improve their relationship with the communities in which they are embedded (Easwaramoorthy *et al.*, 2006; Gallardo *et al.*, 2010) and to strengthen the link with social institutions where they perform their CSR activities (Benjamin, 2001), strengthening alliances with them.

Figure 1

Diagram illustrating the definition of CV



The relationship between corporate volunteering and social responsibility

There is a tendency to associate CV with CSR in the literature. According to Mañas-Viñegra (2018), the CV has gained space within CSR programs. It has been pointed out that in the beginning, CV was associated with a corporate philanthropy of the welfare state type, but in recent decades it has evolved towards a value-added approach for the parties involved (something that is typical of CSR) (Gallardo *et al.*, 2010). In addition, the CV has become a more qualified and structured activity, through which the workers' solidarity impulse is articulated with the CSR policies of companies (Santos and Bittencour, 2008). In this regard, Runté and Basil (2011, p.134) state that CV is a "means of enactment of CSR that explicitly involves the employee stakeholder group". According to these authors, several studies conducted in Canada "identify that Canadian companies support volunteering to meet CSR expectations imposed on them by external stakeholders" (Runté and Basil, 2011, p.134). For their

part, Dreesbach-Bundy and Scheck (2017) concluded in their review of the literature of CV in the period 1990-2015, that it is evolving to approach CV as an independent phenomenon of CSR, to another in which it is integrated.

Given the different ways of interpreting the concept of CSR (Garriga and Melé, 2004, Dahlsrud, 2008, Carroll, 2015), the relationship between CV and CSR is conditioned by the way this concept is defined. Three approaches in which CV plays some role as part of CSR are highlighted. These approaches interpret CSR as: 1) engagement with society or philanthropy (corporate citizenship); 2) addressing stakeholder interests and needs; and 3) responsible management of the company's externalities on its stakeholders, society and the environment (Licandro *et al.*, 2019).

The first approach reduces CSR to the responsibility of the company with the community or society in which it operates, which virtually assimilates CSR to the concept of *corporate citizenship*. The idea is that, in addition to economic, moral and legal responsibilities, companies can take on a voluntary basis responsibilities called

“social” (Kok *et al.*, 2001, Kotler and Lee, 2005) or philanthropic (Carroll, 1991). Under this approach, the CV is part of the toolbox used to carry out actions of corporate citizenship, which also include social marketing, philanthropy, some forms of patronage and sponsorship (Kotler and Lee, 2005; Herzig, 2006; Nave and Paço, 2013). The CV relates the employees to support activities of the company to social causes (Vázquez-Parra *et al.*, 2020), for taking advantage of their talent and time “for social development and improvement of their environment” (Vázquez-Parra *et al.*, 2020, p. 429).

It should be noted that the community is the recipient of CV’s actions, while volunteers are considered a resource that the company uses to carry them out. Regarding the definition of CV, under this approach of CSR: 1) the initiative, the choice of causes and institutions, as well as the management of activities, are a prerogative of the company; 2) the formats of activities are determined almost exclusively in function of the service that the company intends to provide to the community and 3) the CV is used exclusively as a tool that supports the social actions of the company.

The second approach arises under the influence of the Stakeholder Theory. This theory led to a reformulation of the CSR concept, extending its scope to the relationship of the company with the whole of its *stakeholders*, in particular its shareholders, employees, customers and suppliers (Jones, 1980; Hopkins, 2003). Thus CSR “requires a simultaneous focus on the legitimate interests of all appropriate stakeholders” (Garriga and Melé, 2004, p. 62). It is even argued that the first responsibility of the company is with its employees (Ostos and Hamann, 2020), and when properly applied it increases its identification, sense of belonging and commitment to the company (Contreras-Pacheco *et al.*, 2022). Under this approach, it is proposed that the CV is a tool to meet simultaneously the needs of the community and also the employees (Zappalá and McLaren, 2004, Jones, 2010, Cook and Geldenhuys, 2018; Gatignon-Turnau and Mignonac, 2015). In other words, the CV becomes a CSR activity aimed also at employees (and not only at the community), generating multiple benefits related to the man-

agement of human resources, since CSR allows building reciprocal behaviors between the company and its employees (Licandro *et al.*, 2021).

Regarding the definition of CV, under this approach of CSR: 1) the initiative and choice of causes and institutions are shared by the company and volunteers, but management is still predominantly in the hands of the company, 2) the choice of formats is no longer exclusively determined based on the type of intervention or service that the company intends to provide to the community, since the motivations and interests of volunteers are taken into account; and 3) the CV is used with the dual purpose of providing support to the social actions of the company and meet the motivations and interests of volunteers.

The third approach to CSR has antecedents before 2000 (Fitch, 1976; Reder, 1994), but its finished formulation occurred only in the first decade of this century. The ISO 26000 Guide, published in 2010, is perhaps the greatest conceptual development of this approach. CSR is defined in this document as the “responsibility of an organization for the impacts of its decisions and activities (products, services and processes) on society and the environment” (ISO, 2011, p.106). It includes both unwanted negative impacts as well as positive ones that the company can intentionally generate (Carroll, 2015). In other words, acting with CSR implies considering the externalities that the company’s operation can generate on stakeholders, society, and the environment. This approach includes the two previous ones, as contributions to society (first approach) can be conceptualized as positive externalities on it, whereas the attention to stakeholders’ interests and needs (second approach) requires the voluntary and responsible management of possible negative externalities on them (eg: avoiding discrimination within the company) and generating positive impacts (eg: promoting personal and professional development of employees).

Under this CSR approach, the definition of CV implies that: 1) initiative, choice of causes and institutions and management of CV is shared by the company and volunteers (stakeholder dialog is a necessary condition of CSR in the ISO 26000 Guide); 2) choice of formats is determined taking

into account the type of intervention, needs or motivations of volunteers and company objectives; 3) CV is applied with multiple objectives, which can include 1) supporting the company's social actions, 2) generating positive impacts on employees (development of skills, satisfaction of

needs, integration, etc.) and 3) strengthening the bond of employees with the company, as well as improving their performance. Table 3 summarizes the values assumed by the components of the definition of CSR, as applied to each of the three ways of interpreting CSR.

Table 3

Values assumed by the components of the CV definition in each CSR approach

How to interpret CSR as:			
Definition Component	Engagement with the community	Incorporation of Stakeholders' Needs.	Responsible impact management.
Initiative/ proposal	The company	La empresa, a veces los empleados	La empresa y los empleados.
Decision	The company	The company, sometimes the employees.	The company and the employees.
Management	The company	The company, sometimes the employees.	The company and the employees.
Activities	Formatos funcionales al tipo de intervención	It combines functional formats to the type of intervention and formats consistent with the needs (motivations) of volunteers.	It combines formats: functional to the type of intervention; consistent with the needs (motivations) of volunteers and the objectives in terms of developing skills and strengthening the bond of employees with the company.
Objectives of corporate volunteering	Supporting social actions	Supporting social actions. Meet employee needs.	Supporting social actions. Generate positive impacts on employees (skills development, needs satisfaction, etc.). Strengthen the bond of employees with the company and increase their performance. Facilitate the incorporation of CSR.

Discussion and conclusions

This paper aims to fill a gap in the conceptual development of CV, derived from the scarce theoretical reflection on this topic. The literature allowed observing that the authors in general do deepen on formulating a definition of the CV. Many do not even propose a definition but they simply mention general characteristics of the CV or refer only to the definitions of other authors without specifying their own definition of the concept. Only a minority of authors propose a definition, but they often do not include all of the elements, as can be seen in the definitions included in Table 1. There is a lack of theoretical effort in the literature to construct a definition that encompasses the different elements of this concept. The definition of CV proposed in

this paper is an attempt to cover this diversity, in order to contribute to research on CV and its practical application.

The construction process of this definition allowed mapping the values (alternatives) of these elements in the different ways of interpreting volunteering: individual or group, outside or within working hours, managed by the company or by volunteers, it includes only employees or other audiences, it will generate value for the community or also for employees, etc. In this sense, this definition establishes the variables (elements) that the concept should include but leaves open that these variables adopt different values (alternatives) in each situation. Each of these possible CV configurations is covered by it.

By filling this conceptual gap, the definition helps to improve the quality of empirical research.

Since the CV is like a big tent under which different shows are performed (Allen *et al.*, 2011), this definition is useful to specify and classify that diversity, i.e., to build typologies determined by the combination of different forms of leadership (initiative, decision making and management), formats and other variable elements. These typologies will be useful in refining research on the most studied topics in this field.

One topic is the identification and weighting of the motivations of employees to participate in the CV. In general, the analysis of answers to questions about motivations (using both quantitative and qualitative techniques) does not control the type of CV applied in the companies of the volunteers studied. It is worth asking if the same results will be obtained in companies where volunteers participate in decisions compared to companies where they do not, since it has been found that the structure of motivations is different in intra-organizational and inter-organizational volunteering (Licandro *et al.*, 2022). Is this structure similar when volunteering is a group structure than when it is an individual one? Another issue is the satisfaction of volunteers. Can satisfaction be measured with the same indicators when the volunteer designs and carries out a voluntary action, as when he/she does not? Equally important is to study the benefits obtained by companies. Are all types of CVs used to generate the same benefit type? Does any type of volunteering serve to develop teamwork skills, improve identification with the company or increase commitment?

The latter suggests the practical value of the definition proposed here. If a company identifies that egocentric motivations predominate among its volunteers related to the satisfaction of socialization needs, surely the activities must have a strong group component (example: *outdoor* solidarity). But if the predominant motivations are self-esteem, the activities should have a component that facilitates personal initiative (example: *matching* individual). In the case of satisfaction, if the company identifies a certain degree of dissatisfaction because volunteers do not feel like protagonists, perhaps it should reconsider the way in which activities are defined and managed, giving them greater participation.

In relation to the intended benefits, if the objective is to enhance the technical skills required in the production processes, it is probably best to engage pro-bono services, virtual micro-volunteering or managerial volunteering in CV activities where volunteers use those skills.

Finally, it is important to highlight the contribution of this definition to the application of CV in the framework of CSR. As illustrated in Table 3, the definition helps with decision-making. If the focus of the company is CSR towards the community, there will be monopoly of the initiative and the choice of the social organization where the CV will be applied. If the focus is CSR for employees, it may be best for volunteers to decide the cause and organization. But if CVs are applied as a combination of CSR to the community and employees, it will probably be interesting for them to share the initiative and decision.

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Capital Asset Pricing Model (CAPM) applied to the corporate sector of Ecuador

Modelo de Valoración de Activos Financieros (CAPM) aplicado al sector empresarial de Ecuador

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Abstract: the methodologies for calculating market risk have been mainly applied to economies in developed countries. In this research work, it is proposed to use the CAPM to determine the market risk and minimum expected return of companies in the corporate sector of Ecuador in the period 2009-2019. An average of 48,667 companies were analyzed, based on information obtained from the Superintendence of Companies, Securities and Insurance (SCSI). The sectors were analyzed according to the International Standard Industrial Classification (ISIC). An accounting Beta was used in the calculations considering the incipient development of the country's stock market; an estimation was made through ordinary least squares and an adjusted ROE was proposed. In addition, the minimum expected return of the sector was calculated through the CAPM. Among the main findings of this work, it is highlighted that sectors B, C, G, H, J, M and N had a Beta greater than 1, i.e., these sectors are more sensitive to a change in the market. It is also important to mention that sectors P, G, C, E, J and Q perform better than expected. The information provided constitutes a support for organizations or other interest groups, considering the high level of uncertainty existing in the market.

Keywords: CAPM, Beta, performance, uncertainty, return, market risk, corporate sector, ROE.

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Resumen: Las metodologías para el cálculo del riesgo de mercado han sido aplicadas principalmente a economías de países desarrollados. En este trabajo de investigación se propone utilizar el CAPM para determinar el riesgo de mercado y rendimiento mínimo esperado de las empresas del sector corporativo de Ecuador para el periodo 2009-2019. En promedio se analizaron 48 667 empresas, con base en la información obtenida de la Superintendencia de Compañías, Valores y Seguros (SCVS). Los sectores que fueron analizados de acuerdo con la Clasificación Industrial Internacional Uniforme (CIIU). En los cálculos se utilizó un Beta contable, considerando el incipiente desarrollo de la bolsa de valores del país; se realizó una estimación por mínimos cuadrados ordinarios y se propuso un ROE ajustado. Además, se calculó el rendimiento mínimo esperado del sector por medio del CAPM. Entre los principales hallazgos se destaca que los sectores B, C, G, H, J, M, y N tienen un Beta mayor a 1, es decir, estos sectores son más sensibles ante una variación en el mercado. También es importante mencionar que los sectores P, G, C, E, J y Q tienen un desempeño mejor al esperado. La información proporcionada sirve como apoyo para las organizaciones u otros grupos de interés, considerando el alto nivel de incertidumbre en el mercado.

Palabras clave: CAPM, Beta, desempeño, incertidumbre, rendimiento, riesgo de mercado, sector empresarial, ROE.

Introduction

If it is considered that an organization will be exposed to risk due to uncertainty in the market (Rutkowska and Markowski, 2022), a well-diversified portfolio allows for more investment opportunities and better returns. An optimal portfolio is achieved by combining properly diversified shares that maximize expected return and reduce risk. According to Markowitz's theory of diversification (1952), the diversifiable should decrease in relevance. Thus, the Capital Asset Pricing Model (CAPM) would imply that the important component is the non-diversifiable risk (Leyva, 2014). In this model, the expected investment returns on an investment are a function of market returns, the risk-free rate, and a Beta factor or coefficient, measuring the rate of change of the asset's historical returns versus historical returns of the market as a whole (Adekunle *et al.*, 2020; Elsas *et al.*, 2003; St.-Pierre and Bahri, 2006). Historically, the CAPM has been the methodology commonly used among financial institutions and intermediaries to measure the market risk of portfolios made up of shares (Trejo and Gallegos, 2021).

The CAPM was developed based on returns obtained in stock market transactions in countries with developed capital markets. Ruíz *et al.* (2021) stated that the valuation models used can be adapted for developed economies or emerging markets; however, they do not reflect an optimal mechanism for project valuation in countries where there are deficient stock markets. In the Ecuadorian context, as there is no developed stock market, the CAPM can derive from the ac-

counting data of non-listed companies. Thus, the accounting Beta is another way to determine the risk of a closed capital company against its environment. St.-Pierre and Bahri (2006) discussed the feasibility of using accounting in this context to measure intrinsic risk factors. Similarly, Tamara *et al.* (2017) asserts the utility of accounting Betas with referring to companies not having historical data on their share price or else having too much noise. In this context, the accounting measure of total and systematic risk has a significant impact on measures of market risk for companies, and the accounting Beta model presents itself as a powerful alternative to the CAPM (Rutkowska and Markowski, 2022; Faiteh and Aasri, 2022).

Risk indicators are important decision-making tools for various interest groups. Risk management is important for business for the search of competitiveness and sustainability. This situation must be complemented with public policies that guarantee stability and continuity in the long term (Pérez Pravia and Vega de la Cruz, 2021; Urdaneta *et al.*, 2021). The aim of this research is to calculate the market risk and the minimum expected return of the different sectors that make up the economy of Ecuador through the Capital Asset Pricing Model (CAPM) proposed by Sharpe (1964), Lintner (1965) and Mossin (1966). Due to the limited development of the Ecuadorian stock market, the calculation of an accounting Beta is proposed. This research empathizes that CAPM can be adjusted to the Ecuadorian business scenario by means of an adjusted ROE.

Literature review

Diversification is the best way to reduce investment risk. In lay terms, this means “not putting all your eggs in one basket”. Markowitz (1952) pioneered a portfolio selection model based on diversification, incorporating mean variance as an essential criterion for the optimal selection of assets. Astaiza (2012) states that the essence of the Markowitz model lies in the rule:

$$E-V \text{ (Expected return-Variance) } \quad (1)$$

According to this rule, when the risk involved in two portfolios are the same, the investor should prefer the one with the highest expected return. In market risk analysis, there is diversifiable (non-systematic) risk and non-diversifiable (systematic) risk, which are part of the total risk of an asset (Franchischetti *et al.*, 2014). While the former can be avoided through such strategies as hedging and portfolio diversification, the latter is unavoidable. Systematic risk can be diversified through investments in other assets whose correlation is less than 0 (Gallego and Marhuenda, 1997; Adekunle *et al.*, 2020).

Capital Asset Pricing Model (CAPM)

Markowitz (1952), Sharpe (1964), Lintner (1965) and Mossin (1966) independently developed the Capital Asset Pricing Model, by which one may estimate the profitability of financial assets or portfolios based on their risk, and find an indicator that represents the risk of such asset or portfolio with respect to the market, which is the coefficient β .

Several studies have been proposed to evaluate the effect of the level of systematic risk in companies through the CAPM (Binz, 2020). In the CAPM, there is an assumption that investors select a portfolio of assets that maximize expected returns and minimize associated risks. The relationship between return and risk is deduced to be linear and positive. Accordingly, the systematic risk becomes the only significant variable in the behavior of an asset's return (Galego and Marhuenda, 1997; Bautista, 2013; Adekunle

et al., 2020). The higher the Beta coefficient, the higher the required return. Thus, the correction for systematic risk that companies must include in their expected return is fully evaluated by a single parameter: β .

The Beta coefficient does not measure the total risk, but only the aggregate risk of a diversified portfolio; this characteristic, according to Támara *et al.* (2017), is deduced by calculating the Beta coefficient of an asset through a linear regression between the returns of the asset against the returns of the market during a reasonable period. In the same context, Sharpe's theory (1964) relates the profitability of an asset (explained variable), with the profitability of the stock market (explanatory variable), according to the following function:

$$R_t = \alpha + \beta^* R_m + \epsilon \quad (2)$$

Where:

- R_m = Return of the market index
- ϵ = Error term or random disturbance
- α = Intercept
- β = Slope of the line

Several authors have developed risk measurement models based on the classic CAPM, among which the following stand out: Zero Beta CAPM (Black, 1972), Intertemporal CAPM (Merton, 1973), APT model (Arbitrage Theory) (Ross, 1976), the Consumption CAPM (Rubinstein, 1976), the Three Factors model (Fama and French, 1992, 1993, 1996) and the D CAPM (Estrada, 2002).

Thus far, the CAPM has been applied primarily in the context of developed countries. Chang and Galindo (2018) asserted that all these models have been evaluated with data from developed economies, such as the United States, leaving open the question of whether such models also overcome the difficulties of the CAPM in emerging economies. Estrada (2002) analyzed market risk in emerging markets, indicating how to estimate the downside Beta, a risk measure proposed in his article, and showing how to integrate it into an alternative price model, the D-CAPM or

Downside CAPM. Other notable applications of the CAPM in emerging markets are Basu and Chawla (2010), who tested the validity of the CAPM for the Indian Stock Market. Martinez *et al.* (2014) calculated the Beta coefficient of a sample of 11 companies listed on the Argentinian Stock Exchange. Santana (2015) calculated the Beta coefficient in the Colombian real estate sector, and planned to explore a dynamic of changing Betas related to cycle theory. Flores *et al.* (2019) supported the importance of the CAMP to determine the financial risk in a company or asset in a manufacturing micro-enterprises in Mexico. Santos *et al.* (2019) applied the CAPM to analyze Brazilian investment funds, compared to alternative models such as the unconditional CAPM and the four-factor model.

In Ecuador, the CAPM has been applied to companies listed on the Guayaquil and Quito Stock Exchange, despite the limited development of this capital exchange. This is observed in Valverde and Caicedo (2019), who mention

the limited development of the Ecuadorian Stock Market. Orellana *et al.* (2020) calculate the accounting Beta coefficient and minimum expected return in the manufacturing sector of Ecuador in the period 2009-2018; the authors propose an adjusted ROE (operating profit without taxes / initial equity) in their methodology.

Materials and methods

Data

The total number of companies used in the investigation is presented in Table 1. On average, 48,667 companies were analyzed in the 2009-2019 period. This information was obtained from the Superintendency of Companies, Securities and Insurance (2020). (The description of the economic activities is set out in Annex 1)

Table 1
International Standard Industrial Classification (ISIC)

CIU												Average
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
A	2644	2810	3109	3269	3428	3394	3542	3559	3276	3164	3421	3238
B.	416	441	465	517	539	538	552	547	532	542	556	513
C	3639	3855	4008	4119	4269	4251	4487	4489	4141	3965	4148	4125
D	135	134	153	188	238	230	247	249	202	211	237	202
E	127	145	173	194	208	222	221	236	223	222	270	204
F	2610	3002	3485	3899	4300	4184	4270	4181	3822	3223	3730	3701
G	10707	11369	12098	12554	13188	13043	13140	12877	11943	11584	12610	12283
H	3308	3585	3991	4539	5414	5958	6527	6987	7260	7301	7696	5688
I	883	951	960	1000	1028	1059	1147	1165	1098	1094	1134	1047
J	1254	1382	1452	1529	1661	1785	2056	2230	2148	2145	2419	1824
K	572	627	678	552	571	629	1139	1195	1150	1158	1344	874
L	4215	4256	4588	4895	4959	4771	4675	4436	3924	3427	3447	4327
M	3692	4069	4569	4992	5471	5749	6136	6332	6024	5949	6578	5415
N	2781	2879	3005	3110	3304	3338	3495	3553	3414	3446	3824	3286
O	2	3	3	3	5	10	14	12	12	8	6	7
P	451	491	538	552	586	598	627	687	667	709	821	612
Q	457	523	590	792	857	909	984	1004	957	956	1115	831

CIU	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
R	189	196	177	169	179	175	200	223	228	231	259	202
S	251	268	271	284	291	277	304	312	284	295	302	285
T	2	2	2	2	3	4	4	3	2	3	3	3
U	1	1	1		1		1	1	1	1	1	1
Total	38336	40989	44316	47159	50500	51124	53768	54278	51308	49634	53921	48667

Note. Sectors O, T and U are not considered in the analysis due to their low representativeness. SCSI (2020).

Methodology for calculating market risk and minimum expected return

The CAPM used in this research is formulated as follows:

$$E(R_i) = R_f + \beta_i * (E(R_m) - R_f) \quad (3)$$

Where:

$E(R_i)$ = Minimum expected return on security i.

R_f = Profitability of the risk-free security.

$E(R_m)$ = Expected return on the market portfolio.

$E(R_m) - R_f$ = Expected return premium over the risk-free rate.

β_i = Measure of systematic risk.

The Beta coefficient is estimate using ordinary least squares. The dependent variable is the profitability of the specific asset over time (in this case each of the sectors analyzed), the independent variable is the market profitability (), the Beta of the CAPM is the coefficient associated with the variable . Covariance and correlation are involved in the above. In addition, it must be considered that a stock having high covariance in relation to other stocks must have a high Beta coefficient to those stocks and vice versa.

The Beta coefficient measures the degree of sensitivity of a stock in the market and is represented by the slope of the characteristic line. Kayo *et al.* (2020) and Grant *et al.* (2021) estimate the Beta coefficient based on historical returns.

In their study, company's cost of capital depends only on its systematic or non-diversifiable risk, captured by its Beta. For Montenegro *et al.* (2014), evaluating the results of Beta is based on the following assumptions:

- Negative Beta (less than 0): indicates an inverse relationship to the market.
- Beta equal to zero: the asset has no risk.
- Beta between 0 and 1: has a lower volatility than the market.
- Beta equal to 1: reflects the volatility of a representative market index.
- Beta greater than 1: represents higher volatility than the market.

Note that in this research in the calculation of the Beta coefficient an adjusted ROE is used to interpret accounting information:

$$ROE_{Adjusted} = \frac{\text{Operating profit without taxes } t}{\text{Equity } t-1} \quad (4)$$

In the case of market return, businessman must buy and sell through expert market proxies, since the real market portfolio must include all individual investments and is not observable (Kayo *et al.*, 2020) as well as fair tariffs for consumers, we test different options to find the set of parameters that provides the most stable beta for the transmission sector. This paper is prescriptive in nature and attempts to offer alternative options for the cost of equity estimation, without changing the theoretical framework (i.e., CAPM. In this study,

the total number of companies in the corporate sector of Ecuador is considered as a “market”. Thus, the Beta coefficient initially obtained will be unlevered since interest and taxes will not be considered in calculating the return. In addition, Feria criterion (2004) will be used applying the variance to equation 5, in order to differentiate between market (systematic) risk and specific (diversifiable) risk.

$$\sigma_t^2 = \beta^2 * \sigma_m^2 + \sigma_\epsilon^2 \quad (5)$$

Where:

σ_t^2 = Total security risk t

$\beta^2 * \sigma_m^2$ = Market risk

σ_ϵ^2 = Specific risk

As a risk-free rate for the model, 5.044 %, the average passive reference rate (2009-2019) of the Central Bank of Ecuador (2019) was used.

Results

Table 2 shows the adjusted ROE of the analyzed sectors. The market return is 9.19 %; the sectors of Manufacturing industries (C), Distribution of water sewerage-waste management and sanitation activities (E), Wholesale and Retail; repair of motor vehicles and motorcycles (G) and Information and communication (J) have a higher yield than the market. On the other hand, sectors Supply of electricity, Gas, Steam and Air Conditioning (D), Transport and storage (H) and Arts, entertainment and recreation (R) have a negative return.

Table 2
Market performance and by economic activity

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Market	8.00 %	18.69 %	18.93 %	15.94 %	14.08 %	9.30 %	6.12 %	2.93 %	6.59 %	6.68 %	6.46 %	9.19 %
A	1.01 %	10.27 %	9.67 %	6.58 %	6.71 %	3.67 %	-0.92 %	1.78 %	5.17 %	2.10 %	3.86 %	3.89 %
B	-3.66 %	16.05 %	16.49 %	23.84 %	22.33 %	10.04 %	-0.58 %	-5.95 %	5.75 %	10.56 %	9.09 %	8.21 %
C	21.41 %	30.83 %	23.37 %	19.58 %	18.43 %	14.83 %	12.84 %	8.35 %	11.63 %	11.29 %	9.96 %	14.99 %
D	-12.41 %	-12.16 %	-2.42 %	0.32 %	-3.39 %	-3.09 %	1.08 %	0.28 %	0.58 %	9.70 %	37.28 %	-2.72 %
E	7.43 %	21.68 %	37.71 %	19.58 %	13.28 %	18.24 %	14.48 %	14.42 %	15.63 %	15.73 %	14.26 %	16.64 %
F	0.59 %		9.00 %	5.20 %	13.36 %	1.80 %	1.54 %	1.59 %	3.80 %	5.34 %	0.38 %	3.79 %
G	15.92 %	27.68 %	25.44 %	20.87 %	19.49 %	13.73 %	10.99 %	5.74 %	10.25 %	9.86 %	9.06 %	13.56 %
H	-10.13 %	1.34 %	29.47 %	8.90 %		-9.48 %	-2.46 %	-5.82 %	-0.27 %	-8.93 %	0.78 %	-0.47 %
I	1.45 %	7.54 %	11.19 %	9.83 %	10.21 %	6.77 %	10.30 %	-1.07 %	3.29 %	5.45 %	8.32 %	6.46 %
J	18.20 %	42.74 %	33.57 %	37.20 %	27.88 %	27.04 %	12.55 %	18.11 %	8.99 %	7.50 %	10.41 %	21.86 %
K	1.24 %	6.43 %	9.77 %	1.85 %	8.09 %	-1.63 %	-2.34 %	-1.17 %	-0.27 %	-3.07 %	-2.01 %	0.30 %
L	-3.28 %	1.10 %	9.37 %	6.79 %	5.07 %	2.40 %	2.39 %	2.39 %	2.52 %	2.69 %	3.59 %	3.18 %
M	0.07 %	24.39 %	24.70 %	11.92 %	25.46 %	2.49 %	2.53 %	-7.15 %	-1.64 %	0.23 %	-0.06 %	4.35 %
N	7.56 %	21.46 %	23.80 %	19.65 %	15.24 %	6.31 %	2.60 %	-4.19 %	-3.04 %	0.88 %	-4.30 %	5.01 %
P	15.74 %	14.40 %	15.28 %	14.93 %	7.42 %	6.41 %	10.69 %	6.71 %	7.86 %	4.50 %	10.21 %	8.90 %
Q	-0.32 %	13.26 %	19.26 %	17.30 %	13.45 %	12.23 %	6.93 %	2.78 %	4.76 %	7.59 %	8.10 %	8.85 %
R			-57.91 %	-8.55 %	-5.30 %	-29.27 %	-5.40 %	-9.48 %	6.32 %	4.43 %	8.57 %	-11.19 %
S	21.39 %	30.28 %	14.08 %	10.95 %	9.28 %	8.76 %	8.79 %	2.66 %	5.36 %	2.57 %	4.82 %	8.53 %

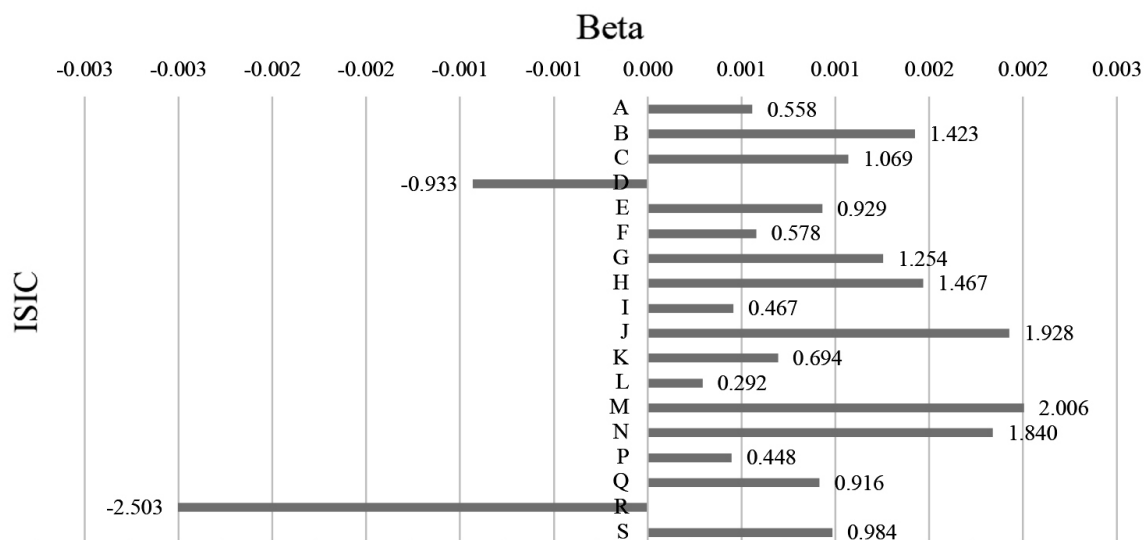
Note. SCSi (2020).

The Beta obtained for the different economic activities is summarized in Figure 1. The sectors of Exploitation of mines and quarries (B), Manufacturing industries (C), Wholesale and Retail; Repair of motor vehicles and motorcycles

(G), Transport and storage (H), Information and communication (J), Professional, scientific and technical activities (M) and Administrative and support services activities (N), which have a Beta greater than 1, are considered risky.

Figure 1

Beta coefficient by economic activity



Note. SCS (2020).

It is important to note that not all calculated Betas are statistically significant using a 5 % level of significance. In all cases, we reject the hypoth-

eses of heteroscedasticity and autocorrelation. (Table 3).

Table 3

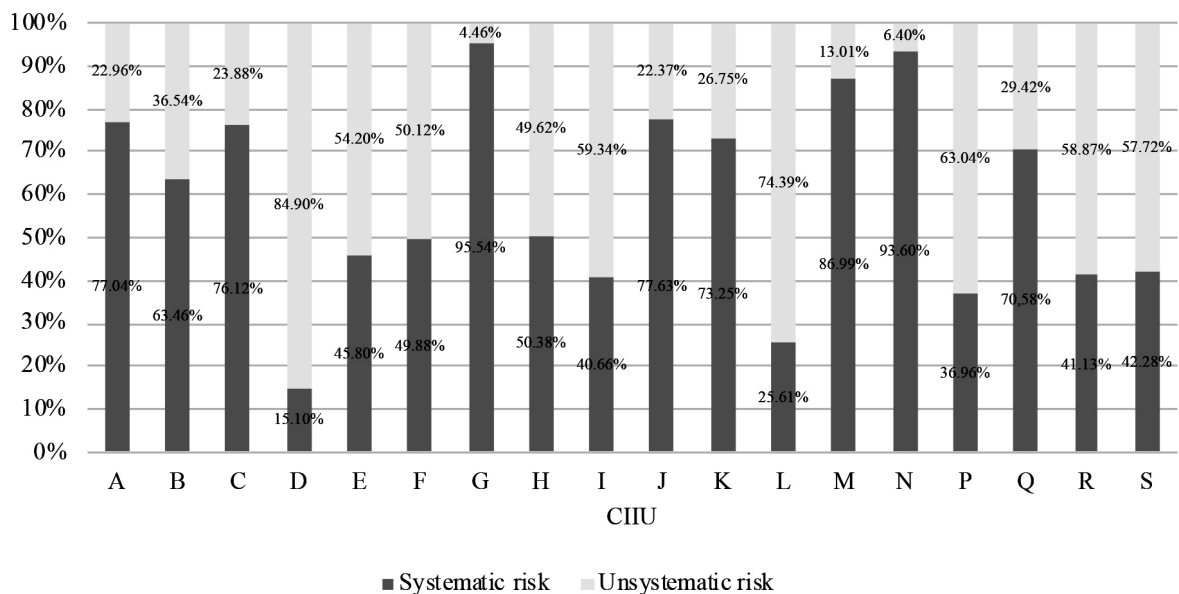
Summary of statistical significance

Sector	Individual significance at 5 %	Heteroscedasticity	Autocorrelation
A	Yes	No	No
B.	Yes	No	No
C	Yes	No	No
D	No	No	No
E	Yes	No	No
F	Yes	No	No
G	Yes	No	No
H	Yes	Yes	No
I	Yes	No	No

Sector	Individual significance at 5 %	Heteroscedasticity	Autocorrelation
J	Yes	No	No
K	Yes	No	No
L	No	No	No
M	Yes	No	No
N	Yes	No	No
O	No	No	No
P	Yes	No	No
Q	Yes	No	No
R	No	No	No
S	Yes	No	No
T	No	No	No

The specific risk is obtained by substituting the values of equation 5; the total risk of each of the activities analyzed is presented in Figure 2.

Figure 2
Systematic and non-systematic risk by economic activity

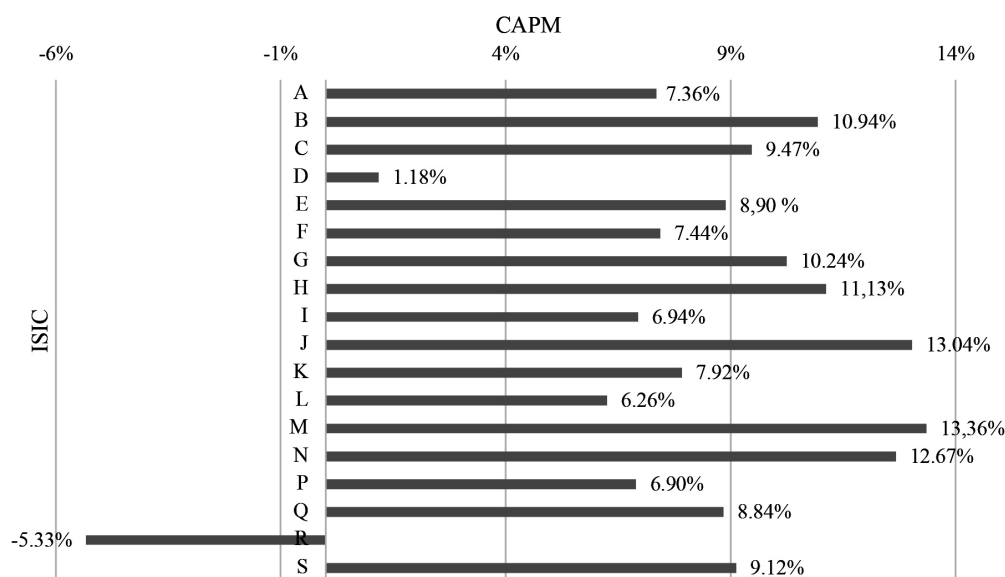


Note. SCSi (2020).

Figure 3 shows the expected minimum return calculated by means of the CAPM. The sectors of Professional, scientific and technical activities (M), Information and communication (J) and Administrative and support services activities (N)

have the highest performance with percentages of 13.36 %, 13.04 % and 12.67 % respectively. On the other hand, the sector of Arts, Entertainment and Recreation (R) has a negative minimum expected return (-5.33 %).

Figure 3
Minimum expected return by economic activity



Note. SCSI (2020).

Table 4 shows the yield of the analyzed sectors, compared with the minimum expected return of the CAPM. When the performance obtained from the CAPM is lower, the sector has a better performance since it has given a higher yield than required, i.e., value created. In this context, the sectors that create value are Infor-

mation and communication (J), Distribution of water sewerage-waste management and sanitation activities (E), Manufacturing industries (C), Wholesale and Retail; repair of motor vehicles and motorcycles (G), Teaching (P) and Human health care and social assistance activities (Q).

Table 4
Minimum expected return vs average return of the sectors

ISIC	Average performance	Minimum expected return	Value creation	Value destruction
J	21.86 %	13.04 %	8.83 %	
E	16.64 %	8.90 %	7.75 %	
C	14.99 %	9.47 %	5.52 %	
G	13.56 %	10.24 %	3.32 %	
P	8.90 %	6.90 %	2.00 %	
Q	8.85 %	8.84 %	0.01 %	
S	8.53 %	9.12 %		-0.59 %
B	8.21 %	10.94 %		-2.73 %
I	6.46 %	6.94 %		-0.48 %
N	5.01 %	12.67 %		-7.66 %
M	4.35 %	13.36 %		-9.01 %
A	3.89 %	7.36 %		-3.47 %

ISIC	Average performance	Minimum expected return	Value creation	Value destruction
F	3.79 %	7.44 %		-3.65 %
L	3.18 %	6.26 %		-3.08 %
K	0.30 %	7.92 %		-7.62 %
H	-0.47 %	11.13 %		-11.60 %
D	-2.72 %	1.18 %		-3.89 %
R	-11.19 %	-5.33 %		-5.85 %

Note. SCSI (2020).

Conclusions y discusion

Discussion

Two questions are pivoted to the discussion of the validity of analysis based on the capital asset pricing model. 1) Does the expected return increase as the risk increases? 2) Is the relationship between risk and return linear?

Clearly, the expected return does increase as the risk increases (Banerjee *et al.*, 2007; Breeden *et al.*, 1989). On the other hand, in a study conducted by Breeden *et al.* (1989), the linear relationship between risk and return implicit in the CCAPM (Consumption CAPM) is rejected with a significance level of 0.05. In the same scenario, Fama and French (1992) disagreed about the assumption of the positive relationship between average returns indicated by the CAPM.

There are various comments and criticisms about the CAMP, mainly about the feasibility of using the Beta coefficient as an adequate measure of risk. The CAPM assumes that the Beta coefficient is static and that the returns of the weighted portfolio (stock value) are an indicator of the return of aggregate wealth; its static specification is limited by its failure to consider the effects of time-varying investment opportunities in calculating an asset's risk (Jagannathan and Wang, 1996; Lettau and Ludvigson, 2001; Estrada, 2002; Miralles *et al.*, 2009).

The use of accounting information for calculating the Beta coefficient is justified by underdeveloped stock market in Ecuador. According to Valverde and Caicedo (2019), the limited development of that stock market makes its operational

functions inefficient. Moreover, the individual interests of the Stock Exchanges of Guayaquil and Quito, each with its own self-regulations, prices and commissions, makes statistical analysis difficult. Likewise, Riofrío (2019), asserts that:

The Ecuadorian stock market in recent years has not had a development in relation to countries such as Colombia and Peru since the market capitalization vs GDP is lower than in said countries in the period of analysis 2016-2018. (p.3)

To the inherent analytical difficulties of the incipient Ecuadorian securities market, it must be added the poor availability and quality of information. Pereiro (2010) refers to such statistical barriers in CAPM logic regarding investment assets in emerging markets, in that relevant local data may be nonexistent, unreliable or atypical. According to Poquechoque (2020), accounting Betas are generally used in emerging countries, where there are such limitations as: "few transactions in the stock market, changes in the composition of stock indices, absence of data statistics, high volatility, high informality and absence of historical data" (p.66).

It must be also considered the difficulties that may arise when applying accounting information for calculating the Beta coefficient. Tamara *et al.* (2017) indicates that there are three problems in the accounting Beta approach: profits in companies tend to be smoothed with respect to the underlying value of the company (Beta biased downwards for risky and upwards for less risky companies). Also, the majority of companies have non-operational factors that influence profits from an accounting view or results in changes in depreciation methods among others. Furthermore, quarterly or annual

consolidation periods for accounting imply regressions with few observations.

As indicated by Orellana *et al.* (2020), the CAPM is notable for its simplicity and the hypotheses implicit in it. These characteristics, however, have given rise to a series of criticisms from researchers. Among these were: Fama and French (1992), who refers to contradictions in the model, and one of the main ones is related to the size effect proposed by Banz (1981), who concludes that “in the period 1936-1975, the common shares of small companies had, on average, higher risk-adjusted returns than the common shares of large companies” (pp.3-4). He also asserts a strong negative relationship between average performance and firm size. In the same context. St.-Pierre and Bahri (2006) indicated that the accounting Beta is not a sufficient measure to determine the risk in SMEs and also suggested the development of a new model that links more risk components. Fama and French (1992) criticize the weakness of the Beta coefficient as an explanatory variable of the variations in returns, and affirm the existence of other variables that influence variation. They further asserted that a multifactorial model should be worked on, where there is a conditional relationship with a positive slope between the average return and Beta.

Despite such criticisms of the classic CAPM, and especially of the Beta coefficient as a factor to assess systemic risk, various authors have highlighted its importance and usefulness: The CAPM is a benchmark for calculating the cost of capital, and it is under this model that Beta is useful as a parameter to estimate risk (Támara *et al.*, 2017). Pereiro (2010) affirmed that the cost of capital of a company can be determined through the CAPM, and that it is a tool to determine the risk in companies that list on the Stock Market. Breeden *et al.* (1989) examined the performance of the consumption-oriented Capital Asset Pricing Model (Consumption CAPM or CCAPM) with a market portfolio-based model. The authors conclude that the performance of the traditional CAPM and the CCAPM are approximately the same. On the other hand, Ruiz *et al.* (2021) analyzed the feasibility of using the CAPM in emerging markets, concluding that there are several formulas with

different proposed variables, however, there is no universal formula.

Conclusions

Determining the level of risk is a fundamental aspect of decision making. In the field of investment, an investment portfolio with poorly or negatively correlated assets will be less volatile than one with positively correlated assets, since when one portion falls the other portion rises or at least maintains its value. Therefore, diversification is the best way to reduce investment risk. Since unsystematic risk can be minimized with diversification, it becomes irrelevant in market risk analysis. This is one of the implications of the CAPM: the only important component the non-diversifiable risk.

In this research, the objective is met by determining the market risk and the minimum expected return of 18 sectors of Ecuador's economy through the Capital Assets Price Model proposed by Sharpe (1964), this time using accounting information. The analysis involved all of the different economic activities of the Ecuadorian market, classified according to the International Standard Industrial Classification (ISIC), i.e., 48,667 companies on average per year and a total of 535,333 observations in the period 2009-2019. It should be noted that the financial information has an annual periodicity, which is a limitation of the research since the classic methodology looks at daily returns.

The applied methodology offers a return-risk ratio, which was a central inspiration in the introduction of the CAPM. The Beta coefficient was obtained from accounting information for reasons explained above. There were highlighted sectors of Exploitation of mines and quarries (B), Manufacturing industries (C), Wholesale and Retail; Repair of motor vehicles and motorcycles (G), Transport and storage (H), Information and communication (J), Professional, scientific and technical activities (M), and Administrative and support services activities (N) as having a Beta greater than 1. Thus, they are considered risky in that a variation in the market causes a greater variation in each of these sectors. On the other

hand, sectors as Supply electricity, gas, steam and air conditioning (D) and Arts, entertainment and recreation (R) have a negative Beta coefficient, therefore, an inverse relationship to the market (the sector appreciates when the market as a whole falls). Finally, the sectors of Manufacturing industries (C), Distribution of water sewerage, waste management and sanitation activities (E), Wholesale and Retail; repair of motor vehicles and motorcycles (G), Information and communication (J), Teaching (P) and Human health care and assistance activities(Q) add value, since they have a higher performance than expected.

It should be noted that these results reflect the Beta coefficient in the 2009-2019 period, and must be updated as more recent financial information becomes available. The results obtained will serve as a reference and support for business decision-making and indicator of the demand level of projects in the analyzed sectors.

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Annexes

Annex 1

Information on economic activities

ISIC	Description
A	Agriculture, forestry and fishing.
B	Exploitation of mines and quarries.
C	Manufacturing industries
D	Supply of electricity, gas, steam and air conditioning.
E	Distribution of water sewerage, waste management and sanitation activities.
F	Building
G	Wholesale and Retail; repair of motor vehicles and motorcycles.
H	Transport and storage
I	Accommodation and meal service activities.
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities.
N	Administrative and support services activities.
O	Public administration and defense; compulsory social security plans.
P	Teaching
Q	Human health care and social assistance activities.
R	Arts, entertainment and recreation.
S	Other service activities
T	Activities of households as employers; Undifferentiated activities of households as producers of goods and services for their own use.

Note. SCSI (2020).

Relationship between the Altman Z-Score model and the Z-Score financial indicators

Relación entre los indicadores financieros del modelo Altman Z y el puntaje Z

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Abstract: From a theoretical point of view, there is no general consensus on the identification of the financial difficulties of a company. The Altman Z-Score model is recognized in the literature as an indicator for measuring the probability of financial insolvency. While this model is widely used as a metric for predicting financial distress, there is no agreement on the factors that determine the behavior or outcome of the Z-Score. In this sense, the purpose of this study is to analyze the factors that determine the behavior of the Z-Score in Colombian companies. The research is developed under a quantitative methodological approach, with a correlational design. This research scope seeks to measure the association between the Altman Z-Score and the financial indicators that determine its outcome; for this purpose, it is analyzed a total of 2,684 companies of the Colombian commercial sector that reported financial information on a systematic basis during the period 2016-2020. The results of the statistical tests carried out reveal that there is a direct relationship between the indicator that measures the financial structure (equity/liabilities) and the Altman Z-Score. This leads to the conclusion that, from the point of view of Altman's model, a company that seeks to capitalize profits and keep debt levels under control will be a company with financial stability and a low probability of financial insolvency.

Keywords: liquidity, leverage, performance, financial structure, correlation, financial insolvency.

Resumen: desde un punto de vista teórico, no existe un consenso general sobre la identificación de las dificultades financieras de una empresa. El modelo Altman Z-Score es reconocido en la literatura como un indicador para medir la probabilidad de insolvencia financiera. Aunque este modelo es muy difundido y utilizado como métrica para predecir las dificultades financieras, no existe acuerdo sobre los factores que determinan el comportamiento o resultado del puntaje Z. En este sentido, el propósito de este estudio es analizar los factores que determinan el comportamiento del puntaje Z-Score en las empresas colombianas. Esta investigación se desarrolla bajo un enfoque metodológico cuantitativo, con un diseño de tipo correlacional. Este alcance de investigación busca medir la asociación entre el puntaje Z de Altman y los indicadores financieros que determinan su resultado; para tal fin se analizan un total de 2684 empresas del sector comercial colombiano que reportaron información financiera de forma sistemática durante el periodo 2016-2020. Los resultados de las pruebas estadísticas efectuadas revelan que existe relación directa entre el indicador que mide la estructura financiera (patrimonio/pasivo) y el puntaje Z de Altman. Adicionalmente, permiten concluir que, desde el punto de vista del modelo de Altman, las empresas que capitalizan sus beneficios y mantienen bajo control su nivel de endeudamiento son empresas financieramente estables y con baja probabilidad de insolvencia

Palabras clave: Liquidez, apalancamiento, rendimiento, estructura financiera, correlación, insolvencia financiera.

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Introduction

It is fundamental that the management of the organization monitors the financial health and the level of risk of the company considering the high degree of uncertainty and competitiveness at the global scale. The financial solidity of a company is determined by its capability to make timely payments, adequately finance its operation and face contingencies (Swalih *et al.*, 2021). Regardless of their size and economic activity, companies should overcome various challenges when pursuing their corporate purpose to guarantee their permanence in the market (Buele *et al.*, 2021). Some of these challenges include the deceleration of economic activity, which may lead to a decrease in sales and, thus, to loss of liquidity and also to an increase of the risk of financial difficulties. One of the options for monitoring the situation previously described, is to analyze the probabilities of financial bankruptcy in the short and medium term (Vavrek *et al.*, 2021).

Corporate bankruptcy is a sensitive issue in the financial world (Tung and Phung, 2019), since it refers to the financial health and stability of the organizations. The capability for predicting financial insolvency of a company is fundamental for its development and sustainability. However, the inability to precisely predict the risk of bankruptcy may produce devastating socioeconomical effects (Antunes *et al.*, 2017). At present, the literature identifies various traditional models of bankruptcy that are focused on the prediction of the financial difficulties of an organization; some of these models include Altman (1968, 1983, 1995), Beerman (1976, 1980), Taffler (1982), Zmijewski (1984), Almamy *et al.* (2016), among others. The aforementioned models are used to predict the bankruptcy probability of an organization in the years following the measurement; thus, they constitute an important financial tool for the finance managers to evaluate the financial health of the company (Sharma and Bodla, 2022).

Among the aforementioned models, the Altman Z-Score model stands out as a financial tool that has consolidated itself as a precise predictor of financial difficulties (Altman, 2018). This model incorporates the main dimensions of the financial

health of an organization, and for this reason it is not only a model to predict financial insolvency, but it has also become the prototype for many models of credit risk and default (Kacer *et al.*, 2019). Although this model has been widely applied in different economic sectors to predict the probability of company bankruptcy (Nafisa *et al.*, 2022) due to its level of reliability (between 75 % and 90 %) Ko *et al.* (2017), the following question arises: Which factors determine the behavior or outcome of the Z-score? To answer this question, the following research objective is posed: analyze the factors that determine the behavior of the Z-score in companies of the commercial sector in Colombia.

This document is structured in four sections. The first section presents a literature review about the Altman Z-Score model and the financial indicators that constitute it. The second section presents the applied research methodology, the data and the sample of financial information used in the research exercise, as well as the statistical tests carried out. The third section presents the results, making emphasis on the findings derived from the correlation tests applied. The fourth section describes the final considerations of the research, including its limitations and the future lines of analysis about the topic subject to study.

Literature review

The financial distress is defined by Hofer (1980) as a condition in which the company had net negative results along various consecutive years. Meanwhile, Hopwood *et al.* (1994) state that the financial difficulties occur when the working capital, the operating losses and the retained earnings are negative (an apocalyptic scenario according to these authors). From their point of view, Yuliastary and Wirakusuma (2014) identify the financial difficulties as the inability of the organization to fulfill its existing obligations such as taxes, accounts payable and short-term bank loans, among others. Bođa and Úradníček (2016) state that financial difficulties are represented by the combination of a low profitability indicator, a net negative result and a liquidity below one.

In summary, it could be stated that financial

difficulties are represented by the deterioration of the company liquidity, a gradual reduction of the operational income, earnings before interests and taxes and the profitability; these behaviors cause that the organization may fail to meet its obligations due to its inappropriate financial structure. The aforementioned situation generates concerns in the company actors (internal and external) Roque and Caicedo (2021). On one hand, there are the internal actors, which include shareholders, investors, managers and employees; on the other hand, the external actors are represented by clients, providers, financial institutions and the society in general Yuliastary and Wirakusuma (2014) and Muñoz *et al.* (2019).

Although a company may experience signals of financial difficulties, this process is not declared immediately. The bankruptcy process may vary considerably, with respect to its duration (Lukason and Hoffman, 2014). Hernández-Tinoco and Wilson (2013) state that there are various stages through a company may pass before it is defined as dead: financial difficulties, financial insolvency, bankruptcy declaration, economic failure, corporate failure, technical insolvency, etc. For Sormunen and Laitinen (2012), the process of financial distress consists of the following stages: a) initial stage, in which a reduction in the profitability of the company is experienced; b) late stage: the profitability drop is accompanied by a leverage increase in the financial statements; c) final stage: the profitability drop is accompanied by a leverage increase and a liquidity decrease.

The analysis of financial reports, through the financial reasons that may be obtained from them, is a way to determine the condition (successful or failed) of a company at a particular moment Bağcı (2015) and Vavrek *et al.* (2021). In this sense, organizations may supervise their financial condition from the same information they generate (Roque and Caicedo, 2022). For this purpose, variables that come from the accounting process may be used to detect corporate bankruptcy Sun *et al.* (2014) and Rahayu *et al.* (2016). There are various ways to measure the financial health of organizations Muñoz *et al.* (2019). From the perspective of Kristanti (2019), the prediction of financial difficulties may be measured from the application

of two types of models: alternative and classical.

Alternative models are represented by non-parametric techniques that are applied to study corporate failure. Lestari *et al.* (2021) acknowledge as alternative models those based on: conditional probability Ohlson (1980) and Mora (1994); application of decision trees techniques Altman (1993), Frydman *et al.* (1985) and Bonsón *et al.* (1997); artificial neural networks Odom and Sharda (1990), Nasir *et al.* (2000), Boyacioglu *et al.* (2009), Tseng and Hu (2010) and Khediri *et al.* (2015). Another group of alternative models focus their prediction analyses of financial insolvency on the theory of real options and incidental prices (Delapedra-Silva, 2021). The proposals made by Black and Scholes (1973) and Merton (1974) give birth to a group of real options models used for predicting financial failures (Milanesi, 2019). From the original proposal of Merton, Bharath and Shumway (2008), they developed the naive model to measure insolvency probability or financial failure Schmidt and Milanesi (2019), which was modified by Milanesi (2016), who propose a version of the naive barrier option model for predicting financial failure.

Some strengths of alternative models include: a) they consider a wide range of analysis factors, both internal and external, that enable handling complex corporate and economic situations, b) in some cases they integrate uncertainty and future trends in financial predictions, b) they use artificial intelligence and machine learning techniques. Although alternative models enable a deeper exploration and explanation of financial information, these nonparametric techniques require precise data for their application. Likewise, the application of alternative models is complex and they require a large amount of data to be used effectively. Therefore, these techniques are not understood as a substitute instrument, but they are complementary of other classical methods for predicting financial insolvency (Romero, 2013).

Classical models to measure insolvency probability are represented by univariate and multivariate analyses Pérez *et al.* (2013). Scherger *et al.* (2018) and Shi and Li (2019) acknowledge the classical models proposed by Beaver (1966, 1968), Altman (1968, 1983, 1995), Deakin (1972),

Blum (1974), among others. Some strengths of these models for predicting financial insolvency include: a) simplicity and reliability, b) low application cost and accessibility to primary information. Although one of the strengths of prediction models is that it starts from financial statements; although contradictory, this could also be a limitation in their application, considering that financial information may be modifiable according to the convenience of the company in terms of corporate strategy (Grisales and Trujillo, 2016; Vega *et al.*, 2021; and Roque *et al.*, 2022).

Based on the above, from the statistical point of view, the models of discriminant analysis have the following limitations: a) they assume that variables are normally distributed, b) they set equal the variance and covariance matrices and c) they do not assign probabilities of occurrence to type I and type II errors for the cut-off point (Romero, 2013). Therefore, more than an exclusive tool for prediction, the models based on the discriminant approach that have been proposed for predicting corporate bankruptcy should be considered as an indicator that facilitates corporate diagnosis (Vera, 2017). Despite the limitations of classical models, they have had a high empirical development and are found in a large number of works (Romero, 2013). Authors such as Karas and Režnáková (2012) and Alaka *et al.* (2018) argue that the methods of multiple discriminant analysis are the techniques mostly used worldwide to predict the financial health of companies.

Altman (1968) is the founder and pioneer of the use of multiple discriminant analysis. The Z-score model proposed by this author is currently the best known and most widely used prediction model (Gavúrová *et al.*, 2017). The Altman Z-score model is applied worldwide as the main tool to analyze bankruptcies, both in research works and in practice (Altman *et al.*, 2017). The model is commonly accepted to anticipate financial failures and bankruptcy risks in various sectors (Alcalde *et al.*, 2022), which indicates its acceptability as a simple, reasonable and easy to implement measure (Apan *et al.*, 2018). The Z-score model is one of the best models to evaluate the financial solidity of any company, and it is accepted worldwide in the area of corporate

management (Divekar and Sukhari, 2021).

The first Altman Z-score model was formulated for organizations that were listed in the stock market and that belonged to the industrial sector. The author structures the first version of the model based on the following categories: liquidity, leverage, return, financial structure and activity (Hosaka, 2019). The first version of the model was structured as follows:

$$Z = 1.2*(X_1) + 1.4*(X_2) + 3.3*(X_3) + 0.6*(X_4) + 0.999*(X_5)$$

The financial indicators of the Z-score model are now presented (Altman *et al.*, 2017).

$$X_1 = \frac{(\text{urrent Assets} - \text{Current Liabilities})}{\text{Total Asset}}$$

The X_1 indicator enables to measure liquid assets with respect to the size of the company (Sareen and Sharma, 2022). The relationship between the working capital and the total assets of the company is related to the capacity of the organization to fulfill its short-term financial obligations Alcalde *et al.* (2022). A higher X_1 implies that the liquidity position is favorable (Divekar and Sukhari, 2021), since organizations with financial adversities experience operating losses; this may imply a reduction of the current assets with respect to the total assets (Laurens and Mulyani, 2022).

$$X_2 = \frac{(\text{Retained Earnings})}{\text{Total Assets}}$$

The X_2 indicator refers to the retained earnings with respect to the total assets. This indicator represents the seniority and the purchasing power of the company (Sareen and Sharma, 2022). When a company accumulates continuous losses, the reserves may become negative. Nevertheless, when it accumulates earnings, the reserves will be positive, which evidences the organic growth capability through the reinvestment to self-finance its projects (Alcalde *et al.*, 2022). This scenario is positive, because the company has not required to increase its level of indebtedness (Hernández, 2014).

$$X_3 = \frac{(\text{Earnings before interests and taxes})}{\text{Total Assets}}$$

The X_3 indicator represents the efficiency with which the management leads the company to maximize the profits generated by its main activity (Divekar and Sukhari, 2021). The companies should be able to consolidate their operations, to generate the amount of resources necessary to guarantee their sustainability in the long term (Sareen and Sharma, 2022). Companies in financial difficulties will exhibit continuous operating losses (Laurens and Mulyani, 2022). A higher value of this variable implies a lower bankruptcy probability (Alcalde *et al.*, 2022).

$$X_4 = \frac{\text{Market value of the wealth}}{\text{Total Liabilities}}$$

The X_4 indicator shows the weight of the value of the wealth with respect to the liabilities (Hernández, 2014). This indicator enables to establish the amount of value created for the company shareholders through market capitalization, and the total amount contributed by people external to the business (Divekar and Sukhari (2021). The index will show the sufficiency of the company wealth to face ordinary liabilities—short and long term— (Laurens and Mulyani, 2022). Authors such as Alcalde *et al.* (2022) state that a higher value of this financial indicator will imply a lower bankruptcy probability.

$$X_5 = \frac{\text{Sales}}{\text{Total Assets}}$$

The X_5 indicator represents a standard measure for asset turnover (Sareen and Sharma, 2022), showing the administrative and commercial capacity of the company to face the competitiveness of other companies of the same sector in which it operates (Alcalde *et al.*, 2022). This indicator focuses on the use of the total assets (current and noncurrent) to generate maximum sales (Divekar and Sukhari, 2021).

The Z-score model proposed by Altman was initially used as a tool for predicting financial insolvency, obtaining positive reactions and some criticism (Altman, 1970). Among the latter there is the theoretical limitation that it can be only applied to open capital companies that belong to the industrial sector. With the purpose of increasing

the group of companies to which the insolvency test may be applied, Altman (1983) proposed a new version of the model. The second version of the model has the following structure:

$$Z' = 0.717*(X_1) + 0.847*(X_2) + 3.107*(X_3) + 0.420*(X_4) + 0.998*(X_5)$$

The new version of Altman Z-score model was proposed for close capital companies that belong to the manufacturing sector. In this proposal, Altman (1983) adjusts the X_4 financial indicator, replacing the market value of the wealth by its book value. Nevertheless, the new version of the Z-score model inherited the limitation of the first proposal, since both models could only be used for companies of the manufacturing sector. In this sense, parameters and coefficients were adapted for different situations, which resulted in the third version of the model for nonmanufacturing companies that operate in emerging markets (Altman *et al.*, 1995; Altman and Hotchkiss, 2006). The proposal of the is presented below.

$$Z'' = 3.25 + 6.56*(X_1) + 3.26*(X_2) + 6.72*(X_3) + 1.05*(X_4)$$

In the third version of the model, the indicator of financial activity is eliminated and the constant 3.25. is added. The field of application is extended in this version. Its functionality and wide field of application have converted the Z-score Altman model in an effective tool for the analysis, foresight and prediction of the probability of corporate bankruptcy in different economies and with different aims (Roque and Caicedo, 2022).

The Z-score model has been the subject of a wide range of studies, through which different implementations and adaptations have been proposed in different sectors (Roque and Caicedo, 2022). This has given rise to a large number of applications and modifications of the Z-score Altman model, either for specific countries, private companies and emerging markets (Kapounek *et al.*, 2022). Research works have been recently published about the adaptation of Altman Z-score model in specific sectors of different economies, such as: European private companies (Kapounek

et al., 2022), companies in the areas of tourism, hotels and restaurants (Goh *et al.*, 2022; Lestari *et al.*, 2021), aviation companies (Divekar and Sukhari, 2021), wholesale and retail commercial companies (Buele *et al.*, 2021), automotive industries (Swalih *et al.*, 2021), Indian real estate companies (Sidhu and Katoch, 2019), Indian micro, small and medium companies (Prakash and Verma, 2019), Vietnamese multidisciplinary companies (Tung and Phung, 2019) and manufacturing companies (Siwi *et al.*, 2018), among others.

Similarly, the Z-score model has been considered a technique to associate the bankruptcy probability with other internal processes of the companies. Among the aspects analyzed, there is the relationship between the creation of added economic value and the probability of financial insolvency (Roque and Caicedo, 2021). Moreover, the analysis of financial difficulties and their relationship with aspects such as sustainable development (Pizzi *et al.*, 2022), corporate social responsibility (Bhuvanekumar *et al.*, 2022; Farooq and Noor, 2021) and integration of environmental, social and corporate governance factors (Brogi *et al.*, 2022). Similarly, the Z-score model has been also considered in studies focused on the association existing between the probability of financial insolvency and the impact of profitability and productivity (Milić *et al.*, 2022), sensitivity of cash flows (Gupta and Mahakud, 2022), and the prediction of the behavior of shares price (Sareen and Sharma, 2022). Other studies associate the insolvency probability with fraud in financial statements (Aviantara, 2021) and (Saleh *et al.*, 2021) or with issues such as the potential contribution of intellectual capital (IC) to financial stability (Festa *et al.*, 2020) and quality management practices (Kriemadis *et al.*, 2022). Based on the above, it is demonstrated that the Z-score model has not only exhibited longevity as a precise predictor of corporate problems, but it has also demonstrated that it can be successfully modified for a series of applications beyond its original approach (Altman, 2018, p. 34).

Although most of the studies focus on the applications of the Z-score model and the differ-

ent derivations and/or modifications that may arise from its application, other group of studies are focused on the determinants of bankruptcy probability (Habib *et al.*, 2018). With respect to such determinants, authors such as Kapounek *et al.* (2022) acknowledge that financial insolvency is influenced not only by the specific features of the company, but also by the macroeconomic development of the company. Authors such as Inekwe and Valenzuela (2019) and Tinoco *et al.* (2018) state that the inclusion of macroeconomic variables in the calculation of the Z-score enables more precise estimations of the financial insolvency of the companies. Meanwhile, authors such as Alfaro *et al.* (2019) state that the effect of the indebtedness of a company and its size may also have influence on the bankruptcy probability.

Materials and methods

The research was conducted under a quantitative approach that enables to identify the relationship between the Z-score and the financial variables that constitute the Z-score model. The study is established under a correlational research design, since the purpose of this research model is to show or examine the relationship between variables or results of variables (Salkind, 1998). The proposed methodology examines associations, but not causal relationships, where a change in the factor directly influences in the change of another (Bernal, 2016).

In order to identify the companies subject of study, it is considered as selection criterion the organizations that systematically report their financial statements in the Integrated System of Corporate Information (SIIS, Sistema Integrado de Información Societaria¹), of the Superintendency of Companies of Colombia, during the period 2016-2020. The companies are organized according to the International Standard Industrial Classification (ISIC), identifying the number of business units in every economic sector in Colombia.

1 <https://siis.ia.supersociedades.gov.co/#/massivereports>

Table 1
Companies by sector that systematically report in the SIIS (period 2016-2020)

Sector	Number of companies	Relative weight
Agricultural	578	6.40 %
Commercial	2684	29.70 %
Communications	157	1.74 %
Construction	794	8.79 %
Financial	325	3.60 %
Industrial	1763	19.51 %
Mining-Energy	174	1.93 %
Services	2427	26.86 %
Transportation	135	1.49 %
Total	9037	100 %

Based on the information obtained from the Integrated System of Corporate Information (SIIS), the companies that continuously reported financial information are identified during the observation window subject of study. The Colombian commercial economic sector is proposed for conducting the study, since the economic activity of the commercial and technology sectors are the main forces that drive the global economic transformation. According to the report jointly published by the World Bank and the World Trade Organization (2021), the trade and value chains have demonstrated to be robust and to be able to boost the recovery from COVID-19.

The Colombian wholesale and retail commercial sectors are characterized by exhibiting a large potential to generate jobs, increase earnings and, hence, contribute to the growth of the Colombian economy. During the health crisis caused by COVID-19, the commercial sector experienced a decrease of 6.6 % in its growth rate with respect to 2019; this situation arose due to the restrictions implemented by the National Government during 2020 with the purpose of limiting the propagation of the COVID-19 virus. During 2021, the Colombian commercial sector experienced a recovery in its contribution to the Gross Domestic Product, becoming the economic activity that mostly contributed to the added value dynamics of the Colombian economy. The scenario described above was repeated in 2022, where the commercial sector continued contributing significantly

to the GDP and to economic recovery.

Although the Colombian commercial sector only experienced a significant contraction during 2020, it is important to point out that the health crisis caused by COVID-19 had a negative impact on the performance of the business fabric, causing commercial losses, reduction of the employment rate and exports, and decrease in the internal and external demand; these consequences lead to a larger exposure of Colombian companies to the risk of financial insolvency (Ibáñez, 2022). The aforementioned bankruptcy risk materialized during 2021, where a total of 855 requests for financial insolvency were filed, and it became the second sector of the Colombian economy with a greater number of processes to adhere to the 2006 Law 1116 (Morales, 2021). Considering the importance of the commercial sector in Colombian economy and the scenario lived during the health crisis, it was established that the sample subject to study was constituted by 2684 companies of the commercial sector that systematically reported financial statements in the SIIS, of the Superintendency of Companies of Colombia, during the period 2016-2020.

After the companies subject to analysis were defined, the Z-score model was applied with the purpose of identifying those companies that, according to their financial information, show signs of financial insolvency. The cut-off points defined by Altman Z-score model were used to analyze the Z-score results (Anjum, 2012).

- If the Z-score < 1.10, the company is in a state of difficulty (it is in the bankruptcy region).
- If $1.10 < \text{Z-score} < 2.60$ Z-Score, the company is in the ignorance region.
- If the Z-score > 2.60, the company is in the safe region.

Once the results of the Altman Z-score model (Z'') have been identified, correlations tests are carried out as a natural measure of the relationship between two random variables (Wooldridge, 2009). This enables to conclude which financial indicators have greater incidence on determining the Z-score. The correlation matrix and the variables subject to investigation are now presented.

Illustration 1

Correlation matrix

$$M_a = \begin{pmatrix} 1 & m_{12}(x_1, x_2) & m_{13}(x_1, x_3) & m_{14}(x_1, x_4) & m_{15}(x_1, x_5) \\ m_{21}(x_2, x_1) & 1 & m_{23}(x_2, x_3) & m_{24}(x_2, x_4) & m_{25}(x_2, x_5) \\ m_{31}(x_3, x_1) & m_{32}(x_3, x_2) & 1 & m_{34}(x_3, x_4) & m_{35}(x_3, x_5) \\ m_{41}(x_4, x_1) & m_{42}(x_4, x_2) & m_{43}(x_4, x_3) & 1 & m_{45}(x_4, x_5) \\ m_{51}(x_5, x_1) & m_{52}(x_5, x_2) & m_{53}(x_5, x_3) & m_{54}(x_5, x_4) & 1 \end{pmatrix}$$

where the correlation matrix is structured using the following study variables:

$$\text{Liquidity: } x_1 = \frac{(AC_{ca} - PC_{ca})}{AT_{ca}}$$

$$\text{Leverage: } x_2 = \frac{GA_{ca}}{AT_{ca}}$$

$$\text{Return: } x_3 = \frac{UAI_{ca}}{AT_{ca}}$$

$$\text{Financial structure: } \frac{Pat.T_{ca}}{PT_{ca}}$$

Altman Z-score model: Z''

The relationship Z'' between the score and the financial indicators of Altman model are analyzed using the scale of the relationship between variables defined by Martínez *et al.* (2009).

- If the range is between 0 and 0.25, the relationship is Poor.
- If the range is between 0.26 and 0.50 the relationship is Weak.
- If the range is between 0.51 and 0.75 the relationship is Moderate.
- If the range is between 0.76 and 1 the relationship is Strong.

Results

The Altman Z-score model is applied to the selected sample of 2684 companies of the Colombian commercial sector, during the period (2016-2020). The statistical test is focused on calculating the correlation between the explicative variables of the Z-score model, through the analysis of the panel data using the STATA 16 tool. The results of the descriptive statistics of the model are presented in table 2.

Table 2
Descriptive statistics of the variables of the Altman Z-score model

Variable		Mean	Std. Dev.	Min	Max	Observations		
Z	overall	7,83261	7,90095	-333,17190	439,92800	N	=	13.420
	between		5,55491	-59,77126	142,41020	n	=	2.684
	within		5,61935	-265,56800	350,45240	T	=	5
X1	overall	0,2728136	0,30993	-10,22944	9,68488	N	=	13.420
	between		0,26326	-5,13253	2,03198	n	=	2.684
	within		0,16361	-4,82410	7,92571	T	=	5
X2	overall	0,1859217	0,45556	-11,98908	15,25838	N	=	13.420
	between		0,39804	-6,61115	3,10893	n	=	2.684
	within		0,22169	-6,74004	12,33537	T	=	5
X3	overall	0,0805305	0,45177	-50,28133	2,66921	N	=	13.420
	between		0,21666	-10,05431	0,59836	n	=	2.684
	within		0,39644	-40,14649	10,18058	T	=	5
X4	overall	1,5673210	5,77438	-1,01424	412,99040	N	=	13.420
	between		3,83164	-0,81097	126,72560	n	=	2.684
	within		4,32046	-102,22090	328,26970	T	=	5

The average of the Altman Z-score model results obtained in this research work is greater than the theoretical limit (2.60). This result indicates that, in average, the companies of the sector have low probabilities of facing a financial insolvency process, with a low data dispersion because the standard deviation is close to the average.

Regarding the results of the financial indicators integrated in the Z-score model, their behavior is now described. Variable X1, which measures the relationship between working capital and assets, is low (0.25); this indicates that, in average within the group of companies analyzed, for every Colombian peso in assets the working capital is 0.25 Colombian pesos. A considerable dispersion occurs in this variable, since the standard deviation is slightly higher than the mean (0.30). Variable X2, which measures accumulated earnings with respect to assets, evidences that, in average, the companies have 0.18 Colombian

pesos of accumulated earnings for every Colombian peso in assets, with a high data dispersion because the standard deviation is more than twice the value of the mean (0.45). Variable X3 shows that, for every Colombian peso in assets, the companies obtained 0.08 Colombian pesos in earnings before interest and taxes, also with a high data dispersion. At last, variable X4, which measures the relationship between wealth and liability, is greater than 1 with a high dispersion, which indicates that, in average, the companies of the sector have a robust asset structure, but with a high variability between companies and through time.

After the descriptive statistics of the variables subject to study have been calculated, the measurements and behavior of the Z-score for the business units analyzed are presented. The results of the Z' Altman model are shown in table 3.

Table 3*Results of the application of Altman Z-score model in companies of the Colombian commercial sector*

Region	2016		2017		2018		2019		2020	
	Number	Relative weight	Number	Relative weight	Number	Relative weight	Number	Relative weight	Number	Relative weight
Bankruptcy	62	2.3 %	64	2.4 %	64	2.4 %	70	2.6 %	84	3.1 %
Ignorance	48	1.8 %	54	2.0 %	62	2.3 %	68	2.5 %	56	2.1 %
Safe	2574	95.9 %	2566	95.6 %	2558	95.3 %	2546	94.9 %	2544	94.8 %

Table 3 evidences in a sustained manner, that more than 90 % of the companies in the commercial sector are in the safe region. This behavior enables to conclude that this economic sector has shown particular stability for this period of time. Nevertheless, it should be remarked that companies in the bankruptcy and ignorance regions have marginally increased their participation.

With the objective of identifying the behavior of the Liquidity, Leverage, Return and Financial Structure indicators for the 2684 companies of the Colombian commercial sector during the (2016-

2020) period, an individual analysis of the ratios previously described is carried out. Considering the atypical (extreme) observations obtained in the results of the variables (and in order to mitigate the possible distortion in the average, the deciles are used as a statistical measure to analyze the results. The decile analysis of the Liquidity, Leverage, Return and Financial Structure indicators enables to establish the range of the Pareto of the observations. In this sense, table 4 shows the decile distribution of the Liquidity (X1) variable of the Altman Z-score model.

Table 4*Decile distribution of variable X1 of Altman Z-score model*

Decile	2016	2017	2018	2019	2020
1	-0.02	-0.02	-0.01	-0.02	-0.01
2	0.06	0.06	0.07	0.06	0.09
3	0.13	0.13	0.13	0.13	0.16
4	0.19	0.20	0.19	0.20	0.24
5	0.25	0.25	0.25	0.26	0.30
6	0.31	0.31	0.32	0.33	0.37
7	0.38	0.39	0.39	0.41	0.44
8	0.48	0.48	0.48	0.50	0.54
9	0.60	0.61	0.60	0.62	0.65

The liquidity indicator is negative (although decreasing) for 10 % of the companies analyzed, which indicates that companies that are within this decile experienced a negative working capital. Nevertheless, for 70 % of the companies

subject to study it is evidenced that the ratio measured by variable X1 is positive, but smaller than 0.5. This means that the working capital is under 50 % of the total asset for most of the companies in the sample.

Table 5
Decile distribution of variable X2 of Altman Z-score model

Decile	2016	2017	2018	2019	2020
1	-0.04	-0.04	-0.05	-0.07	-0.08
2	0.03	0.03	0.03	0.04	0.04
3	0.08	0.08	0.08	0.09	0.10
4	0.12	0.13	0.13	0.14	0.16
5	0.18	0.18	0.18	0.20	0.22
6	0.24	0.25	0.25	0.26	0.29
7	0.31	0.32	0.32	0.34	0.36
8	0.41	0.41	0.41	0.43	0.46
9	0.52	0.56	0.55	0.56	0.60

The analysis of the accumulated earnings indicator shows that 10 % of the companies in the sample obtained negative accumulated results in every year. This indicates that for all companies in this decile, the losses are higher than the earn-

ings. For 70 % of the companies this indicator is positive, although lower than 0.5. In other words, for most of the companies, less than 50 % of the asset is represented by the results of previous exercises.

Table 6
Decile distribution of variable X3 of Altman Z-score model

Decile	2016	2017	2018	2019	2020
1	0.01	0.00	-0.01	0.00	-0.02
2	0.03	0.03	0.02	0.02	0.01
3	0.05	0.04	0.04	0.04	0.03
4	0.07	0.06	0.06	0.06	0.05
5	0.09	0.08	0.07	0.07	0.07
6	0.11	0.10	0.09	0.09	0.09
7	0.13	0.12	0.11	0.11	0.12
8	0.17	0.15	0.14	0.14	0.15
9	0.23	0.20	0.19	0.19	0.20

The analysis of the Return (X3) financial indicator shows that this ratio is close to 0 for the companies in the commercial economic sector that are in decile 10. This result implies that during the study period, a small percentage of the companies had operating losses. For 70 % of the companies,

this indicator was between 0.14 and 0.17. This enables to conclude that the operational earnings of a large percentage of the companies of the commercial sector may represent up to 17 % of the value of its assets, and in few cases, it is greater than 19 % (decile 9).

Table 7
Decile distribution of variable X4 of Altman Z-score model

Decile	2016	2017	2018	2019	2020
1	0.16	0.16	0.16	0.16	0.19
2	0.28	0.30	0.30	0.32	0.36
3	0.40	0.43	0.43	0.45	0.50
4	0.53	0.56	0.55	0.59	0.67
5	0.68	0.73	0.71	0.76	0.85
6	0.91	0.92	0.95	0.98	1.13
7	1.19	1.26	1.27	1.33	1.52
8	1.67	1.86	1.82	1.95	2.24
9	2.67	2.90	2.99	3.32	3.97

Taking into account that variable X4 measures the ratio between wealth and liabilities, it is evidenced that almost 60 % of the companies have a ratio similar or lower between liabilities and wealth (with the exception of 2020, in which it exceeds 1). From decile 7 and for every year this indicator is higher than 1, which implies a greater participation of the wealth with respect to the liabilities within the financial structure. It is also evident an increasing trend in the ratios. This en-

ables to conclude that there has been an increase of the wealth with respect to the liabilities for the group of companies subject to study.

Once the independent results of the financial variables that integrate the Altman Z-score (Z'') have been identified, the results of the correlation tests to identify the financial indicator that has greater incidence on a higher Z-score are presented. Table 8 shows the results.

Table 8
Correlation between the financial variables of Altman Z-score model and the Z-score. Safe region

	Z	X1	X2	X3	X4
Z	1.00				
X1	0.48	1.00			
	0.00				
X2	0.43	0.44	1.00		
	0.00	0.00			
X3	0.43	0.08	0.12	1.00	
	0.00	0.00	0.00		
X4	0.82	0.14	0.10	0.00	1.00
	0.00	0.00	0.00	0.66	

The results that measure the relationship between the explicative variables of the Altman Z-score model and the Z-score, show a weak relationship of the liquidity, leverage and return variables. For the case of the financial structure

variable (X4), there is a greater association (strong positive relationship) with the score of the model. This result enables to conclude that one of the characteristics of the companies that show a low bankruptcy probability is their financial solidity.

Table 9
Correlation between the financial variables of Altman Z-score model and the Z-score

Variable	2016		2017		2018		2019		2020	
	r ²	Relationship	r	Relationship	r	Relationship	r	Relationship	r	Relationship
X ₁	0.30	Weak	0.44	Weak	0.66	Moderate	0.70	Moderate	0.51	Moderate
X ₂	0.23	Poor	0.39	Weak	0.53	Moderate	0.69	Moderate	0.46	Weak
X ₃	0.18	Poor	0.76	Strong	0.41	Weak	0.43	Weak	0.22	Poor
X ₄	0.96	Strong	0.56	Moderate	0.81	Strong	0.77	Strong	0.90	Strong

From the results obtained, it is seen that X₄ (Wealth/Liabilities) is the financial variable that may generate a larger impact on the result of Altman Z-score model. These results enable to conclude that the companies that maintain a sufficiently high proportion of wealth with respect to liabilities will obtain a good result in the evaluation of insolvency, which will indicate the financial solidity of the company or its capacity to face economic crises. Nevertheless, for the last three years (2018-2020) the ratio of the working

capital with respect to assets (X₁) had a positive moderate impact on Altman Z-score. Therefore, it may be concluded that, in addition to financial solidity, having a robust working capital also benefits companies in this economic sector.

After carrying out the correlation analysis for all companies in the sample, the process is repeated for organizations that are within the three regions identified by the model, namely, Bankruptcy, Ignorance and Safe regions.

Table 10
Correlation between the financial variables of Altman Z-score model and the Z-score. Bankruptcy region

Variable	2016		2017		2018		2019		2020	
	r	Relationship	r	Relationship	r	Relationship	r	Relationship	R	Relationship
X ₁	0.19	Poor	0.03	Poor	0.68	Moderate	0.78	Strong	0.89	Strong
X ₂	0.59	Moderate	-0.09	Poor	0.72	Moderate	0.86	Strong	0.81	Strong
X ₃	0.59	Moderate	0.99	Strong	0.51	Moderate	0.44	Weak	0.30	Weak
X ₄	0.31	Weak	-0.13	Poor	0.26	Weak	0.31	Weak	0.35	Weak

For the companies that are in the bankruptcy region, according to the result of Altman Z-score model, there is a diversity of results, as opposed to what is shown by the correlation of the total sample. Between 2016 and 2018, the correlations of the financial variables with the results of the model (Z-score) show poor and weak relation-

ships. In 2019 and 2020 is it observed a strong relationship between variables X₁ and X₂ and the result of the model. Therefore, it may be concluded that high working capital and high retained earnings with respect to total assets considerably affect the insolvency probability, at least for the last two years of the study.

Table 11

Correlation between the financial variables of Altman Z-score model and the Z-score. Ignorance region

Variable	2016		2017		2018		2019		2020	
	r	Relationship	r	Relationship	r	Relationship	r	Relationship	r	Relationship
X ₁	0.14	Poor	0.16	Poor	0.24	Poor	0.09	Poor	-0.09	Poor
X ₂	0.12	Poor	0.13	Poor	0.16	Poor	0.15	Poor	0.23	Poor
X ₃	-0.01	Poor	0.01	Poor	0.05	Poor	0.27	Weak	0.33	Weak
X ₄	0.22	Poor	0.03	Poor	-0.10	Poor	-0.05	Poor	0.07	Poor

For the companies of the commercial economic sector that are in the gray or ignorance region, according to the results of Altman Z-score model, it is evident that in most of the years, with the exception of 2019 and 2020 (in variable X₃), all

relationships are poor. This implies that for the companies that are in such region, there is no trend about the particular impact of some of the financial variables on the result of the model.

Table 12

Correlation between the financial variables of Altman Z-score model and the Z-score. Safe region

Variable	2016		2017		2018		2019		2020	
	r	Relationship	r	Relationship	r	Relationship	r	Relationship	r	Relationship
X ₁	0.26	Weak	0.60	Moderate	0.59	Moderate	0.62	Moderate	0.39	Weak
X ₂	0.17	Poor	0.52	Moderate	0.37	Weak	0.57	Moderate	0.33	Weak
X ₃	0.13	Poor	0.35	Weak	0.28	Weak	0.25	Poor	0.10	Poor
X ₄	0.97	Strong	0.84	Strong	0.88	Strong	0.89	Strong	0.97	Strong

There is clear trend for the companies of the commercial economic sector that are in the safe region; specifically, the X₄ financial indicator shows a strong correlation with the results of the model in every year. This result enables to infer that for a company to have a low insolvency probability, the ratio of the wealth to the liabilities should be watched, seeking that the former is higher than the latter. With respect to the rest of financial variables under study, the magnitude of the relationship changes every year.

Conclusions and discussion

The financial solidity of a company is a concern that involves both internal and external parts, since the interconnection generated by the companies affects the entire corporate system. Altman Z-score model is considered a reliable tool to predict a potential corporate insolvency. From the

theoretical point of view, there is no consensus about which financial variable has the higher impact on the financial difficulties of a company. Therefore, the research study conducted enables to determine which variable affects considerably the behavior of the Z-score and its meaning with respect to financial insolvency.

The Z-score model is a simple linear model that does not take into account the complexity and the interaction of financial factors such as the management, the corporate strategy and the general economic conditions that may have influence on the bankruptcy probability of a company. Despite these limitations, it is a model easy to understand and easy to apply, which makes it accessible for a wide range of users. Similarly, Altman Z-score model has demonstrated to be a reliable and effective tool that may be applied to a wide variety of industries and companies to predict their bankruptcy probability; thus, such model has become a valuable tool for corporate

decision making.

Taking into account the results of Altman Z-score model, it is observed that during the 2016-2020 period there are signs of stability in the companies of the commercial sector. Due to the temporary situation that occurred in 2020, it may be stated that the companies of this sector adequately got around the pandemics. Only 10 % of the companies of the commercial sector exhibit liquidity problems, since they had an indicator below 1. This confirms the financial solidity of the companies of this sector. The accumulated earnings were positive for 90 % of the companies, and this indicator is greater than 50 % for those companies that are in decile 9. Therefore, it may be stated that one of the main features of the companies that are in this decile is the capitalization of earnings. For 30 % of the companies the wealth/liabilities ratio is greater than 1, with an increasing trend, which indicates for these companies it is important to increase the wealth with respect to the liabilities to increase their financial solidity.

With respect to the companies that are in the bankruptcy region, it can not be stated that there is a variable that is determinant when evaluating the insolvency probability. Nevertheless, the results obtained in the correlations of variables X1 and X2 for 2019 and 2020, might give an indication about what can negatively affect a company with a high insolvency probability. For the companies that are in the ignorance region, there is no evident trend of any particular variable that may explain the insolvency probability. For the companies that have low insolvency probability, a high wealth/liabilities ratio may explain the solidity. In this sense, a company that seeks to capitalize earnings and maintain a controlled level of indebtedness from the point of view of Altman model, will be a stable company.

In general terms, the correlation indicators show that there is a direct relationship between the wealth/liabilities ratio and the Altman Z-score, which enables to conclude that this variable considerably affects the score that a company may obtain regarding its insolvency. The companies that rely more heavily on their own capital tend to be more attractive, because their level of insolvency risk may be lower. If a com-

pany is able to strengthen its own resources and reduce its obligations through financial planning, the shareholders and/or investors will have less concerns when financial crises arise.

The results of this research work have academic and practical implications. With respect to the academic implications, the study is focused on determining the relationship between the Z-score and the financial variables that constitute Altman Z-score model in a particular scenario. The results obtained in this research process may motivate future research works where it is determined the relationship described previously, but in other sectors of the Colombian economy. Regarding the practical implications, the research represents a contribution to the literature, showing new evidence about the relationship between the Z-score and the financial variables that constitute Altman Z-score model.

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Gender diversity and financial performance in Mexican stock companies

Diversidad de género y desempeño financiero en empresas bursátiles mexicanas

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Abstract: since profit maximization is the main objective of private companies, it is important to know how the behavior of decision-making agents can influence the performance of the company. The objective of this document is to estimate if gender diversity on the board of directors has any effect on the financial performance of Mexican stock companies. We use a sample of Mexican non-financial companies listed in the Mexican Stock Exchange and that are part of the IPC Index, during the 2011-2021 period. Four regression models were used: panel data regression, OLS2S regression, GMM system, and DiD. Results show that the presence of only one woman on the board of directors had a negative effect on the ROA of companies and that the recommendation for female inclusion on boards had an effect on the presence of women on the boards of directors. These results support the Critical Mass Theory that in biased groups women are symbolic, and their presence has negative or no effect. In order to have an effect, the number of women on the board of directors must increase

Keywords: corporate finance, governance, behavioral finance, financial performance, gender diversity, women on boards, corporate decision making, critical mass theory.

Resumen: debido a que la maximización de utilidades es el principal objetivo de las empresas privadas, es importante conocer cómo puede afectar el comportamiento de los agentes que toman las decisiones. El objetivo del artículo es estimar el efecto que la diversidad de género en la junta directiva tiene en el desempeño financiero de las empresas y evaluar si la sugerencia de la Bolsa Mexicana de Valores de incorporar a mujeres en los consejos de administración tuvo un efecto en la diversidad de la junta directiva. Para ello, se utilizó una muestra de las empresas bursátiles no financieras del Índice IPC de la BMV en el periodo 2011-2021. Se aplicaron cuatro modelos de regresión: de datos panel, MC2E-VI, sistema GMM y DiD. Los resultados muestran que la presencia de solo una mujer en el consejo de administración tuvo un efecto negativo sobre el ROA de las empresas y que la sugerencia de inclusión femenina en los consejos tuvo un efecto sobre la presencia de mujeres en las juntas directivas. Esto respalda la teoría de la masa crítica de que en grupos sesgados las mujeres son símbolos y su presencia no tiene efecto o tiene efectos negativos. Para que haya un efecto debe incrementar el número de mujeres en el consejo de administración.

Palabras clave: finanzas corporativas, gobernanza, finanzas conductuales, desempeño financiero, diversidad de género, mujeres en los consejos, toma de decisiones corporativas, teoría de la masa crítica.

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Introduction

At present, studies about gender diversity have generated interest, perhaps because diversity enables that members of a group identify themselves within it, since this broadens the group overview by including different points of view. In addition, gender diversity enables to reduce the working gaps that affect the women insertion possibilities in the job market (Iranzo and Richter, 2002), which increase as they move up in the corporate hierarchy. According to the OECD (2022), in both developed and developing countries, between 52 % and 60 % of the women are employed in badly remunerated job sectors.

As it is known, the main objective of companies is to maximize the profits of shareholders; therefore, it is important to study how the behavior of decision makers may affect the company results. In the corporate scope, it has been studied gender differences among decision makers, such as general manager, owner and members of the board of directors. One way to investigate diversity is the behavioral finances approach, which studies how cognitive biases of individuals influence decision making (Hirshleifer, 2015). Such biases include overconfidence, mainly attributed to men, and risk aversion, attributed to women; it is known that there may be differences in the financial performance of companies due to these biases.

The objective of this research is to estimate the effect that the gender diversity in the board of directors had on the financial performance of Mexican stock companies that are part of the Prices and Quotes Index (IPC, Índice de Precios y Cotizaciones) during the 2011-2021 period, controlling the endogeneity under different approaches. In addition, it is evaluated if the recommendation of the Mexican Stock Exchange (BMV, Bolsa Mexicana de Valores) in 2018 to incorporate women in the steering committee had an effect in the diversity of the board of directors.

This document provides an important contribution to the literature, since by this time there are few studies about the role of the gender of decision makers on corporate performances, and it is different from existing studies about Mexico because various approaches are applied with

the purpose of controlling the inverse causality and the endogeneity. Therefore, it represents a novelty for the Mexican market; it helps to mitigate the existing knowledge gap about gender diversity in the boards of directors, and has a social contribution since it helps to reduce the social stigmas that limit the access of women to managerial positions.

Relationship between gender diversity and the performance of companies

In empirical investigations about gender diversity and its impact on corporate decision making, behavioral biases have been found that are attributed to men and women that may influence on the financial performances of a company; hence, it is important to investigate them. On one hand, women are more cautious and conservative than men in information handling (Adhikari, 2013) and, on the other hand, men are prone to have too much confidence when making decisions (Barber and Odean, 2001). For example, García Solarte *et al.* (2018) demonstrated that the gender influences the behavior promoted by directors; while the companies led by women promote aspects such as participation, sense of belonging and teamwork, those led by men stimulate competitiveness and productivity.

Those who make the main decisions in companies are often the owners, the members of the board of directors or the members of the senior management team, such as the general manager. Chirwa (2008) and Robb and Watson (2012) found that when women are the owners and decision makers, there are no differences on the profit margins of the companies.

Jeong and Harrison (2017), as well as Martín-Ugedo *et al.* (2018) found that having a female director increases the performance, mainly in the long term. Similarly, Naseem *et al.* (2019) also found a positive effect in the existence of female directors, although smaller than in companies with male directors. In contrast, Lam *et al.* (2013) and Adhikari (2013) verified an inverse effect between the existence of female directors and the performance of companies. Specifically, for Thai manufacturing companies, having a female

director has a negative effect both in the short and long terms, although such effect is reduced as the educational level and experience increase (Singhathep and Pholphirul, 2015). Finally, Kaur and Singh (2018) and Baloyi and Ngwakwe (2017) did not find evidence that the existence of a female director affects the performance of companies.

Regarding the diversity of women in the boards of directors, the findings are diverse. On one hand, for the Spaniard market, Campbell and Minguez-Vera (2008) as well as Valls Martínez and Cruz Rambaud (2019); for India, Srivastava, *et al.* (2017), and in the STOXX600 European stock index the research work by Nuber and Velte (2020), all them found that as the number of women in the committees increase, a better financial performance is obtained. Controlling endogeneity and inverse causality, Chatterjee and Nag (2022) conclude that there are large and positive impacts of gender diversity on the performance of the company and on the creation of value. On the other hand, Yang *et al.* (2019) found a negative effect of gender diversity on performance, while Unite *et al.* (2019) and Dang *et al.* (2021) agreed that there is no significant effect of the gender diversity on the board of directors on the performance.

Critical mass theory

The critical mass social theory is an analogy of a known theory in nuclear physics, which suggests that it is required a critical mass of material to cause a nuclear fission. The critical mass social theory of Kanter (1977) is based on the idea that an appropriate percentage of socially and culturally different people is key to form the interaction dynamics in a group of people. Therefore, this theory explains the need of a minimum percentage of people so that their interaction within a group causes a significant reaction.

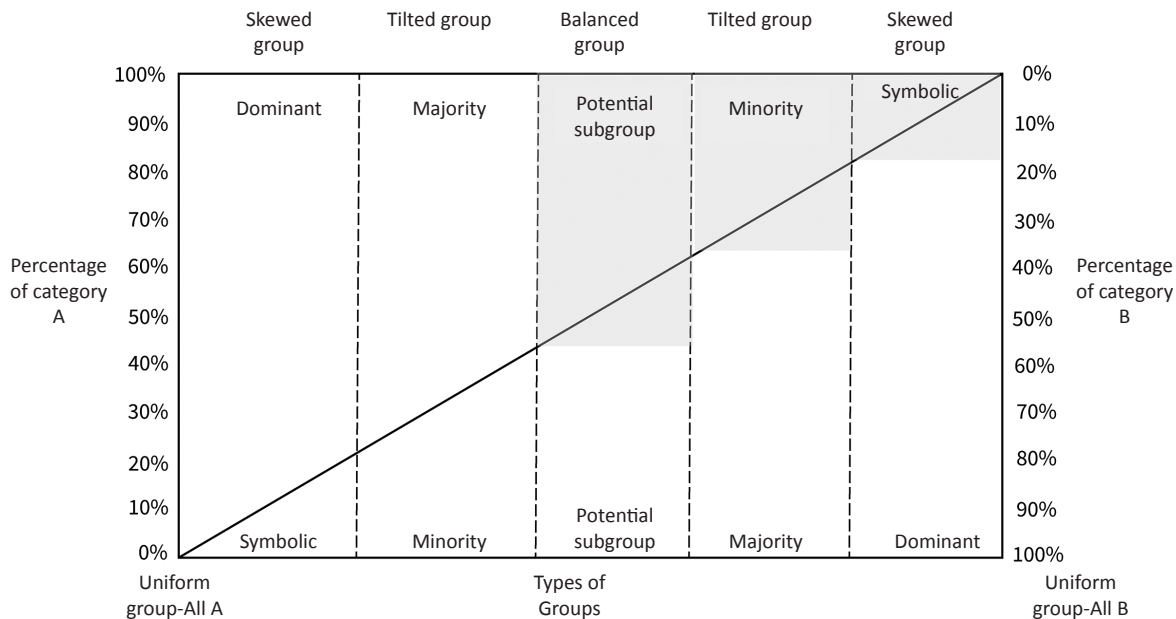
According to Kanter (1977), there may be three types of groups depending on the percentage composition of each category. Figure 1 presents its graphical representation. The first type are uniform groups, with a 100 % to 0 % ratio, where there are people of only one category. The second type, the skewed groups, occur when few people of one category are added to the group, causing that their presence is only symbolic. In skewed groups there is a group that is dominant on another symbolic group in an approximate ratio of 85 % to 15 %; the latter may consist of one or two people, a very small number to have an impact on for an alliance to be formed between both symbolic members. The third type, the tilted groups, with a 65 % to 35 % ratio. In this distribution, the dominant become majorities and the symbolic become minorities, but there may be alliances between the members of minorities that have effects on the total group. The fourth type is a balanced group, which occurs when a 60 % to 40 % or a 50 % to 50 % ratio is reached.

Aiming the critical mass social theory to the context of inclusion of women as members of the board of directors in companies, adding a few women to an organization might provide them a sole symbolic status, and although it might be expected that due to the presence of a few women it would become easier and faster to incorporate even more women, their symbolic status perpetuates their limited presence. Therefore, the number of members should be enough to counteract the effects of symbolism.

According to Kanter (1977), to improve the steering committees there should a critical mass of female directors of approximately 35 %, i.e., the one existing in tilted groups, so that female directors not anymore represent the “women’s perspective”, and the other directors become aware of the opinion of female directors rather than of their gender.

Figure 1

Types of groups defined by the proportional representation of two social categories



Note. Adapted from Kanter (1977, p. 209).

Nevertheless, according to Levrau (2017), the majority of gender studies examine boards of directors that have, in average, less than 10 % of female directors, because this is the most common composition of boards of directors, and consequently, there is still a consensus that a critical mass of three women is necessary for an impact to exist. Kanter (1977) states that, once the minimum threshold of gender balance is passed, the presence of women will improve the performance of the board of directors.

Gender diversity in Mexico

According to the OECD (2022), from 2016 the percentage of women in the boards of directors of public companies listed in the USA and Canada exceeds 20 %. For 2014, in Latin America there were 9.5 % of women in steering committees, while in Mexico it was only 6 % (CEPAL, 2015). As it is shown in figure 2, in Brazil and Chile there is a greater presence of women in the boards of directors of the companies listed, with 16.9 % and 15.2 %, respectively; these numbers are almost

triple for Brazil and double for Chile compared to 2015, when they were 5.8 % and 7.7 %, respectively. Meanwhile, Mexico is below Brazil, Chile and Colombia, and between 2016 and 2021 the percentage went from 7.2 % to 10.6 %.

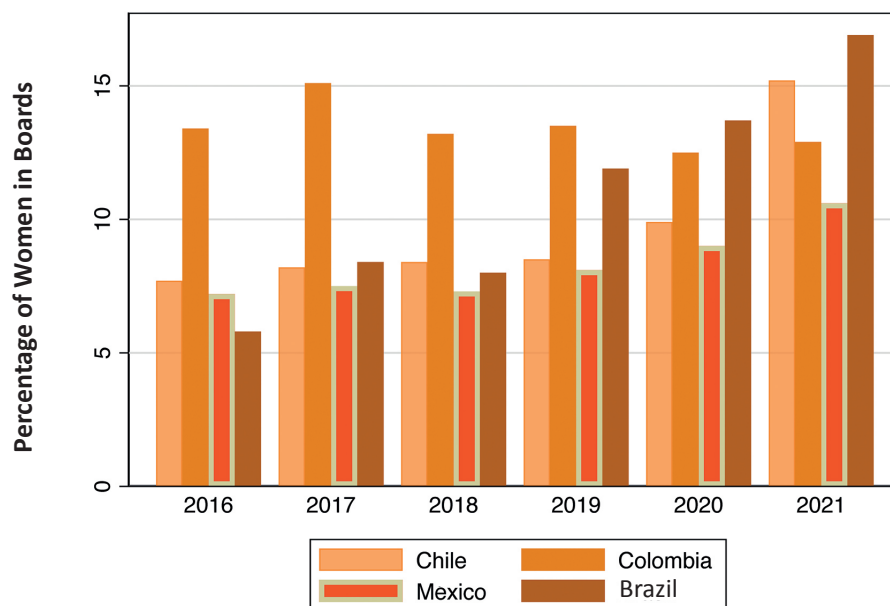
The Mexican Institute for Competitiveness (IMCO, Instituto Mexicano para la Competitividad) pointed out that the percentage of employment of women in the companies listed in the BMV is 36 %, but it decreases as the hierarchical level of the position increases, to 10 % for the financial manager and 4 % for the general manager. In addition, about 32 of the total number of companies listed in the BMV had never had a female director, and the average participation of women in the boards of directors is 11.5 %, of which 8.5 % correspond to non-independent advisors; this might suggest that their participation involve a relationship with the team or with the shareholders (IMCO, 2022). The following hypothesis was formulated considering the context and the literature reviewed:

Hypothesis 1: due to the scarce presence of women in the boards of directors, their participation as advisors is at a symbolic level. Therefore, there may be

negative, negligible or null effects on the financial performance of the company.

Figure 2

Percentage of women in steering committees of public companies in Latin American countries



Note. Made with data from OCDE (2022).

For the Mexican context, it is difficult to find data about female directors of companies over time due to the lack of information. Apparently, women face obstacles when trying to move up in the corporate hierarchy; a report by OCDE (2018) remarks that, although women have a good participation in high level positions in the public sector, it is necessary to increase their participation in the private sector. This limits the investigation about women in managing positions in the private sector. Mendoza-Quintero *et al.* (2018) investigated the impact of gender diversity in the boards of directors and in the management teams regarding performance and the level of debt of the companies listed in the BMV up to 2016, and they only found effect on the level of debt.

In Mexico, the BMV suggests the use of practices and principles about corporate governance stated by the Corporate Coordinator Board (CCE, Consejo Coordinador Empresarial). From 2018,

the CCE added practices to diversify and enrich the knowledge and points of view in the boards; one of these practices recommend the incorporation of women in the boards of directors (CCE, 2018), and such suggestion was promoted by the BMV. The following hypothesis was formulated based on the previous literature:

Hypothesis 2: The inclusiveness suggestions of the BMV in 2018 help to increase the participation of women in the boards of directors.

Materials and methods

A challenge faced by studies about gender and its effect on decision making is the limited information (Adams, 2016); consequently, the research problem stated is analyzed using the IPC stock index of the BMV. With 141 companies current-

ly listed, the BMV is the second biggest stock exchange in Latin America, after the Sao Paulo Stock Exchange in Brazil (Bolsa Mexicana de Valores [BMV], 2022a). The IPC is the most important stock index of the BMV, since it contains the most important 36 companies listed in the domestic market, and represents a balanced, weighted and representative sample of the BMV and of the Mexican economy (BMV, 2022b). Therefore, studying the phenomenon under investigation using the companies of the IPC provides an adequate approximation for the Mexican economy in general.

The study population are the 36 companies that take part of the IPC index of the BMV. Nevertheless, since the companies that provide financial services were excluded—because they are treated differently due to the general provisions that are applicable—the final sample consisted of 30 companies of the IPC. The distribution by sector of the companies in the sample is as follows: 26 % of the companies are in the industry sector, 26 % in the sector of frequently consumed materials, 16.2 % in the sector of materials, 9.9 % in telecommunication services, 9.9 % in basic consumption services and 3.3 % in each of the energy, health and information technologies sectors.

The information about the companies was obtained through an analysis of the content of the reports that such companies submit annually to the BMV, through the Stock Information Transfer System (STIV-2, Sistema de Transferencia de Información sobre Valores) (Comisión Nacional Bancaria y de Valores [CNBV], 2022). The models used to fulfill the research objective are presented below.

Model specification

Equation 1 describes the model used to evaluate the impact of the presence of women in the boards of directors on the performance of the company, in order to test the first hypothesis.

$$PF_{it} = \alpha_{it} + PF_{it-1} \gamma + Diver_{it} \delta + x_{it} \beta + \varepsilon_{it} \quad (1)$$

where $t=2011-2021$, PF_{it} represents the per-

formance, measured as the value of the return on assets at the operational level, of the total of companies, for years t ; $Diver_{it}$ δ is the variable of interest, the diversity in the board of directors, given as the percentage of women in the boards of directors of the total of companies, for years t ; PF_{it-1} is the lagged value of the performance in previous years of the total i of companies, for years t ; x_{it} β represents the set of control variables which are shown in table 1.

There may be a problem of endogeneity in the model stated due to (i) the non-randomness and the non-observable effects due to which companies include women in the board of directors, (ii) the heterogeneity between the information collected from the companies, and (iii) the relationship between the variables through time, due to which the independent variables may be correlated to the error term. In addition, there may be a problem of inverse causality because, as well as the performance affects diversity, the incorporation of women in the boards may be an effect of the individual features of the companies. An important reason to address both problems is that not attempting to identify the causal effects, indirectly contributes to perpetuate more stereotypes about women, erroneously overestimating the positive and negative effects that the female presence has on the performance of the companies (Adams, 2016).

A first solution is the panel data model with fixed effects estimator, but this might provide a biased estimator due to the correlation of the independent variables with the error term. Another alternative is the least squares model on the first difference of Equation 1; however, this might result in a biased estimator due to the correlation between the dependent lagged variable ΔPF_{it-1} and the error term $\Delta \varepsilon_{it}$. A least squares model with instrumental variable (MC2E-VI) where the instrumental variables are correlated with the independent variable of interest, but not with the dependent variable, may control the endogeneity but not the inverse causality. Another solution is the use of differences in differences (DiD) to find the effect, for instance, of gender in places that apply policies of gender diversity and in those that do not (Valls Martínez and Cruz Rambaud,

2019; Yang *et al.*, 2018). At last, a solution for the endogeneity and inverse causality is the Generalized Methods of Moments (GMM) of Arellano and Bond (1991), in which a lag of the response variable is added to the model as independent variable (Arora, 2023; Chatterjee y Nag, 2022; Dang *et al.*, 2021).

According to the GMM in which, besides including the variable of interest, $Diver_{it}$ δ , and other independent control variables, x_{it} β , it is carried out a transformation of the first difference, including lags of the dependent variable as instrumental variable of the percentage of women in the board of directors. This model assumes sequential exogeneity, because adding sufficient lags eliminates the correlation of the independent variables and the error as well as the individual effects of each company; this is shown in Equation 2:

$$\Delta PF_{it} = \Delta PF_{it-1} + \Delta Diver_{it} \delta + \Delta x_{it} \beta + \Delta \varepsilon_{it} \quad (2)$$

In order to test the second hypothesis, a model was built to know the effect of the change in the code of better corporate practices about diversity in the board of directors. The second model is explained as follows:

$$PDivCA_{it} = \alpha_{it} + \beta PDivE + \delta T2018_{it} + \delta T2018_{it} \times \beta PDivE + x_{it} \beta + \varepsilon_{it} \quad (3)$$

where $PDivCA_{it}$ represents the diversity in the board of directors; $PDivCA_{it}$ is a fictitious variable of the treatment group, i.e., those companies that have more than 30 % of female employees in a first version of the model, and more than 40 %

of female employees in a second version of the model. $\delta T2018_{it}$ is a fictitious variable that takes a value of 1 in the period after 2018, year in which it is recommended to incorporate women in the boards on the companies listed in the BMV. Finally, x_{it} β is a set of control variables that have influence on the diversity in the board of directors.

Description of the variables

Table 1 presents the indicators of the dependent variable, the explanatory variables of interest and the explanatory control variables. The dependent variable was the financial performance and the indicators used to measure it were: ROA, operating ROA and ROE. The variable of interest, gender diversity, is measured using three indicators based on the ones used by Adams and Ferreira (2009), Arora (2022), Chatterjee and Nag (2022), Dang *et al.* (2021), Unite *et al.* (2019) and Valls Martínez and Cruz Rambaud (2019): the percentage of female directors, a fictitious variable when there is one female director, and a fictitious variable when there are three female directors. According to the critical mass social theory, the fictitious variable one woman in the board represents a board with symbolic presence, while the fictitious variable presence of three women corresponds to a board in which women are a minority.

At last, the control variables presented in table 1 were also used by Adams and Ferreira (2009), Arora (2022), Campbell and Minguez-Vera (2008), Chatterjee and Nag (2022), Dang *et al.* (2021), Nuber and Velte (2021), Unite *et al.* (2019) and Valls Martínez and Cruz Rambaud (2019).

Table 1
Operationalization of the variables

Identifier	Definition
Indicators of the dependent variable	
ROA	Net profit with respect to total assets.
ROAop	Operating profit with respect to total assets.
ROE	Net profit with respect to capital.
Independent variables of interest	
Div3Adm	Fictitious variable. 1, when there are 3 female directors; 0, otherwise.
Div1Adm	Variable Fictitious variable. 1, when there is 1 female director; 0, otherwise.
PDivAdm	Percentage of female directors in the board of directors with respect to the total number of members.
Independent control variables	
TAdm	Number of members of the board of directors.
TDirec	Number of members of the board of directors.
PCAIInd	Independent directors with respect to the total.
CEOdual	Fictitious variable. 1 when the CEO is also president of the board of directors.
CEOCA	Fictitious variable. 1 when the CEO is also member of the board of directors.
PDirCA	Percentage of executives that are not members of the board of directors with respect to the total.
InVentas	Value of annual sales.
InActivos	Value of annual assets.
Sec	Fictitious variable of each industry.
Edad	Age of the company.

Note. The information was obtained from the annual reports of each company through the STIV-2 (CNBV, 2022).

Results

Table 2 shows the main features of the variables used. Three different regression approaches were implemented to test the first hypothesis: regression of panel data with fixed effects estimator and regression with instrumental variable to control

the endogeneity, both based on Equation 1, and the dynamic model to control the endogeneity and inverse causality, based on Equation 2. In addition, a DiD model based on Equation 3 was applied to test the second hypothesis, to evaluate if there was a change in the diversity of boards after the recommendation of the BMV in 2018.

Table 2
Descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Dependent variables					
ROA	296	9.37	6.48	-9.10	40.20
ROAop	325	10.05	5.95	-10.61	38.01
ROE	307	21.20	23.71	-122.70	160.00
Independent variables					
DivAdm3	321	0.20	0.40	0	1
DivAdm1	321	0.65	0.47	0	1
TAdm	328	17.60	9.65	0.00	43.00
PDivAdm	321	7.53	6.85	0.00	36.36
PCAIInd	307	41.14	16.42	0.00	83.33
TDirec	312	8.91	4.32	0.00	23.00
PDirCA	321	7.16	9.56	0.00	50.00
CEOdual	318	0.32	0.46	0	1
CEOCA	318	0.40	0.49	0	1
InVentas	325	9.97	2.09	4.18	13.89
InActivos	325	10.62	1.76	6.17	14.33
Edad	330	33.85	23.98	-4	96

Note. Prepared by the authors based on the data of the STIV-2 (CNBV, 2022).

The approach of panel data with fixed effects is presented in table 3. For the models with the panel data approach, it was carried out the Hausman test (unreported) of fixed effects with respect to random effects, and it was found that it is better to use the fixed effects estimator. Although the

effect is positive for the presence of three women and negative for the presence of one woman, the fixed effects estimator was only significant when there is a female director and has negative effects on the ROA.

Table 3
Model of fixed effects with panel data

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Div3	-0.008 (1.118)			0.149 (1.001)			2.555 (2.289)		
Div1		-2.312** (0.999)			-1.145 (1.068)			0.981 (3.701)	
PDiv			-0.100 (0.062)			-0.041 (0.055)			0.188 (0.153)
Cons	-77.428 (426.141)	-260.000 (471.307)	-210.000 (464.527)	24.687 (343.863)	-63.994 (354.396)	-46.291 (367.538)	-1500 (1100)	-1500 (1100)	-1300 (1200)
TAdm	-0.091	-0.034	-0.076	-0.086	-0.055	-0.077	-0.427	-0.436	-0.443

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.101)	(0.104)	(0.100)	(0.080)	(0.086)	(0.079)	(0.256)	(0.296)	(0.265)
PCAIInd	-0.030	-0.020	-0.032	-0.007	-0.003	-0.007	0.010	-0.001	0.006
	(0.044)	(0.044)	(0.043)	(0.038)	(0.037)	(0.038)	(0.111)	(0.108)	(0.109)
PDirCA	-0.082*	-0.119**	-0.103*	-0.113***	-0.131***	-0.121***	-0.120	-0.101	-0.078
	(0.048)	(0.053)	(0.051)	(0.025)	(0.034)	(0.030)	(0.119)	(0.156)	(0.145)
TDirec	0.311*	0.299	0.292	0.232	0.221	0.225	0.734	0.696	0.725
	(0.181)	(0.187)	(0.183)	(0.148)	(0.150)	(0.149)	(0.434)	(0.446)	(0.443)
CEOdual	4.113	4.393	4.328	2.928	3.054	3.022	1.914	2.127	1.857
	(3.053)	(3.061)	(2.991)	(2.383)	(2.394)	(2.349)	(7.283)	(7.267)	(7.298)
CEOCA	1.393	1.365	1.528	1.256	1.261	1.317	5.256	5.364	5.092
	(1.437)	(1.444)	(1.461)	(0.914)	(0.932)	(0.927)	(3.112)	(3.077)	(3.133)
InActivos	-14.888***	-14.857***	-14.993***	-12.536***	-12.422***	-12.550***	-38.012***	-38.409***	-38.411***
	(2.944)	(2.936)	(2.874)	(2.706)	(2.710)	(2.706)	(5.214)	(5.501)	(5.370)
InVentas	17.717***	17.758***	17.882***	14.942***	14.856***	15.003***	54.293***	54.303***	54.181***
	(4.051)	(4.049)	(4.082)	(3.260)	(3.285)	(3.281)	(12.465)	(12.641)	(12.541)
Edad	-0.121	-0.130	-0.133	(-0.022)	-0.025	-0.030	-0.716	-0.686	-0.661
	(0.129)	(0.147)	(0.137)	0.117	(0.122)	(0.120)	(0.425)	(0.412)	(0.418)
Año	0.035	0.123	0.102	(-0.015)	0.029	0.020	0.711	0.707	0.613
	(0.217)	(0.238)	(0.235)	(0.1749)	(0.179)	(0.185)	(0.558)	(0.562)	(0.583)
R2	.3657	.3769	.3725	.3651	.36833	.366	.2491	.2483	.2500

Note. * $p < .1$; ** $p < .05$; *** $p < .01$. Robust standard errors in parenthesis.

Although the panel data approach handles endogeneity to some extent, it exhibits biases. Consequently, models were estimated using the MC2E-VI approach. The size of the board of directors was used as instrument, following Campbell and Minguez-Vera (2008) and Nuber and Velte (2021), who consider it as a corporate governance variable which is expected to have a significant positive relationship with the appointment of female directors (Campbell and Minguez-Vera, 2008), and although it is not completely exogenous, it is relatively stable along time and may be much less affected by the performance of the company than other variables of corporate governance (Nuber and Velte, 2021).

The Durbin-Wu-Hausman (DWH) endogeneity test and the test for weak instruments were applied to the models of table 4; the results are

also presented in such table. It was found that the indicators of the variable of interest are indeed endogenous. For the second test, results show that when the percentage of female directors in the board with the respect to the total number of members is used as dependent variable, the instrument is weak for the three performance indicators (ROA, ROE and operating ROA). On the other hand, when the fictitious variables about the presence of one or three female directors are used, the test show that the instrument is not weak. The models evidence that the existence of one or three female directors negatively and significantly affects the financial performance: when ROA is used as indicator of financial performance (models 1 and 2), when operating ROA is used (models 4 and 5) and when ROE is used (models 7 and 8).

Table 4
MC2E-VI model

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Div3	-3.883**			-3.501**			-17.434***		
	(1.882)			1.469			6.369		
Div1		-5.237**			-4.700**			-21.852**	
		(2.436)			(1.986)			(8.484)	
PDiv			-2.265			-0.961			-6.715
			(2.554)			(0.603)			(5.281)
Cons	19.108***	23.793***	47.402	14.439***	18.113***	20.184***	18.076	30.825***	64.819
	(3.318)	(4.569)	(35.246)	(2.724)	(3.361)	(5.782)	(11.302)	(13.709)	(47.241)
PCAInd	0.034	0.073**	0.014	0.043**	0.073***	0.110**	0.263**	0.465***	0.402*
	(0.038)	(0.033)	(0.089)	(0.023)	(0.027)	(0.049)	(0.108)	(0.114)	(0.219)
PDirCA	0.029	-0.020	-0.183	0.024	-0.010	-0.112	0.049	-0.152	-0.528
	(0.035)	(0.050)	(0.270)	(0.036)	(0.045)	(0.111)	(0.155)	(0.187)	(0.582)
TDirec	-0.132	-0.040	0.162	-0.049	0.024	0.180	0.554	0.964**	1.529
	(0.100)	(0.117)	(0.423)	(0.088)	(0.106)	(0.211)	(0.373)	(0.433)	(1.133)
CEOdual	-0.951	-1.343	-2.925	-0.385	-0.445	-0.327	0.192	-1.596	-6.290
	(0.885)	(0.935)	(3.377)	(0.849)	(0.925)	(1.273)	(3.709)	(4.017)	(9.569)
CEOCA	-0.419	-1.755	-10.776	-0.110	-1.276	-2.640	6.321*	1.182	-22.057
	(0.926)	(1.322)	(12.379)	(0.768)	(0.944)	(1.931)	(3.542)	(4.553)	(24.791)
InActivos	-3.298***	-3.825***	-11.047***	-3.034***	-3.303***	-4.461***	-11.642***	-12.525***	-27.551***
	(0.830)	(0.945)	(9.714)	(0.609)	(0.688)	(1.393)	(2.775)	(3.075)	(15.486)
InVentas	3.079***	3.237***	11.094***	3.067***	3.060***	4.544***	11.606***	11.172***	29.682***
	(0.839)	(0.835)	(10.125)	(0.554)	(0.599)	(1.407)	(2.747)	(2.851)	(17.580)
Edad	-0.011	0.001	0.005	0.004	0.017	0.021	0.164**	0.234***	0.317
	(0.025)	(0.024)	(0.054)	(0.019)	(0.021)	(0.029)	(0.077)	(0.084)	(0.196)
Fictitious years	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fictitious sector	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	.1381	.0638	.	.1320	.0305	.	.1122	.0025	.
N	302	302	302	302	302	302	302	302	302
Test DWH	.347	.053	.031	.136	.007	.018	.069	.005	.005
Test Instrum.	115.161	46.705	0.833	128.539	59.528	4.242	121.153	53.580	1.950

Note. * $p < .1$; ** $p < .05$; *** $p < .01$. Robust standard errors in parenthesis.

Continuing the analysis, to examine the relationship between gender diversity and the financial performance of the company, controlling

inverse causality and endogeneity, the GMM is considered more effective. The GMM addresses the problem of endogeneity using instruments

of lagged dependent variable and endogenous variables with appropriate lags (Chatterjee and Nag, 2022).

The Sargan test and the Hausman test regarding the overidentification of the model, and the Arellano-Bond autocorrelation test on the first AR(1) and the second lag AR(2), are applied to all models of table 5. It is observed that in the second lag there is no correlation between the

errors. The results are only significant for model 9, which shows that the percentage of female directors in the boards has a negative effect on the financial performance measured through the ROE. In addition, the impact of the percentage of female directors in the boards is negative, but much less than the one shown by the MC2E-VI model (model 9 of table 4).

Table 5
Dynamic GMM system model

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep	0.389***	0.376***	0.378***	0.336***	0.336***	0.334***	-0.299	-0.281	-0.284
t-1	(0.076)	(0.080)	(0.070)	(0.079)	(0.079)	(0.075)	(0.255)	(0.252)	(0.241)
Div3	-0.640			0.404			7.738		
	(2.130)			(1.912)			(11.417)		
Div1		-2.137			-0.884			-7.145	
		(1.459)			(1.428)			(4.232)	
PDiv			-0.183			-0.111			-0.769*
			(0.118)			(0.128)			0.379
TAdm	-0.121	-0.069	-0.104	-0.124	-0.103	-0.111	-0.415	-0.238	-0.333
	(0.099)	(0.112)	(0.089)	(0.082)	(0.089)	(0.077)	(0.322)	(0.341)	(0.363)
PCAInd	-0.025	-0.015	-0.030	-0.004	0.000	-0.004	-0.129	-0.109	-0.163
	(0.043)	(0.043)	(0.042)	(0.033)	(0.034)	(0.033)	(0.129)	(0.134)	(0.153)
PDirCA	-0.070	-0.110*	-0.109*	-0.059	-0.072	-0.078	-0.119	-0.224	-0.250
	(0.046)	(0.062)	(0.059)	(0.037)	(0.051)	(0.047)	(0.217)	(0.237)	(0.216)
TDirec	0.164	0.184	0.149	0.122	0.117	0.109	1.091**	0.973*	0.843
	(0.161)	(0.152)	(0.145)	(0.120)	(0.118)	(0.117)	(0.532)	0.512	0.553
CEOdual	2.887	3.125	3.196	2.015	2.091	2.142	8.547	10.047	10.591
	(2.148)	(2.159)	(2.194)	(1.410)	(1.478)	(1.503)	(9.089)	9.144	9.090
CEOCA	-0.159	-0.219	0.098	0.458	0.487	0.675	1.775	2.113	3.443
	1.090	1.110	1.233	0.750	0.788	0.894	4.284	4.306	4.804
InAssets	-10.304***	-10.354***	-10.362***	-8.686***	-8.615***	-8.644***	-43.749***	-43.092***	-42.851***
	(2.219)	(2.217)	(2.229)	(2.018)	(2.166)	(2.213)	(7.978)	(8.136)	(7.826)
InSales	9.413***	9.660***	9.758***	8.962***	8.947***	9.171***	56.298***	55.545***	55.803***
	2.624	2.606	(2.589)	(1.711)	(1.783)	(1.790)	(15.513)	(15.255)	(15.001)
Age	0.604	0.567	0.589	0.322	0.319	0.294	-1.873	-1.702	-1.633
	0.431	0.416	(0.415)	(0.442)	(0.455)	(0.451)	(2.113)	(2.113)	(2.234)
Fictitious years	SI	SI	SI	SI	SI	SI	SI	SI	SI

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	.007	.006	.006	.007	.007	.006	.007	.011	.015
AR(2)	.472	.424	.503	.238	.245	.268	.510	.816	.952
Sargan Test	.516	.265	.075	.182	.057	.009	.000	.000	.000
Hansen Test	.948	.988	.974	.959	.984	.769	.805	.989	.997

Note. * $p < .1$; ** $p < .05$; *** $p < .01$. Robust standard errors in parenthesis.

Finally, to test the second hypothesis and know if the recommendations made by the BMV had an effect on gender diversity in the boards of directors after 2018, table 6 presents the results on the DiD model of Equation 3; the model without controls—models 1 and 3—and with controls—models 2 and 4—under two treatment groups: those companies that have more than 30 % of female employees and those companies with more than 40 %.

It is observed that both the companies with

more than 30 % of female employees and those with more than 40 % of female employees have a positive effect on the diversity in the board of directors of the company, but the effect is greater on the companies with more than 40 % of female employees. Similarly, although there was a change in the diversity of the companies after 2018, it did not take place in companies that have more gender diversity in their employees.

Table 6
DiD model

V. Explic.	PDivAdm			
	(1)	(2)	(3)	(4)
30PDivE	2.1369**	2.9214***		
	(1.0098)	(1.009)		
40PDivE			2.872**	4.9502***
			(1.2617)	(1.2788)
T2018	3.6437***	3.8978***	4.0275***	4.2396***
	(1.0614)	(0.9649)	(0.9712)	(0.8873)
T2018x30PDivE	1.8937	1.1060		
	(1.8373)	(1.6699)		
T2018x40PDivE			0.9842	-0.7047
			(2.1788)	(1.9627)
Cons	5.6319***	-3.8462	5.8118***	-6.7988**
	(0.5543)	(3.4073)	(0.5072)	(3.4175)
TAdm		0.1317**		0.1244***
		(0.044)		(0.0432)
PCAInd		0.0457*		0.0314
		(0.0261)		(0.0265)

V. Explic.	PDivAdm			
	(1)	(2)	(3)	(4)
PDirCA		-0.0732*		-0.0909**
		(0.0427)		(0.0421)
TDirec		0.3013***		0.2638**
		(0.1024)		(0.1025)
CEOdual		-0.9295		-0.4484
		(1.0069)		(1.0084)
CEOCoad		-3.1043***		-2.7392***
		(0.8972)		(0.8967)
InAssets		-1.5023***		-0.7314
		(0.6984)		(0.7139)
InSales		2.1774***		1.8265***
		(0.6409)		(0.6401)
Sec		-1.072***		-1.2064***
		(0.2695)		(0.2743)
Age		0.0007		0.0011
		(0.0219)		(0.0218)
Company		0.1684***		0.1514***
		(0.0448)		(0.0449)
R2	.0967	.2954	.0926	.3039
N	321	302	321	302
F	12.41	10.02	11.88	10.39

Note. * p<.1; ** p<.05; *** p<.01. Robust standard errors in parenthesis.

Conclusions and discussion

Gender diversity may guarantee the presence of members from different categories within a group, as well as equal conditions for the appointment of some of these members. In this study, it was tested the hypothesis that the presence of women in the boards of directors in Mexico is limited, resulting in a symbolic state with negative or slightly significant effects on the performance of the company. For this purpose, three regression approaches were applied: panel data with fixed effects, MC2E-VI and GMM. Similarly, it was evaluated the effect of the recommendation of incorporating more women in the advices about diversity of the boards of directors.

For the models of fixed effects regression,

results suggest that the presence of one female director has significant and negative effects only on the ROA variable. When the endogeneity is controlled with the MC2E-VI regressions, it was found that both the participation of one woman or three women in the board of directors has significant and negative effects on the three performance indicators. Recalling that Adams and Ferreira (2009) and Adams (2016) remark that, to avoid effects that are erroneous and greater than the real ones, it should be addressed the endogeneity and inverse causality in the performance regressions; with the GMM model, results show that only the effects of the percentage of female directors on the ROA are significant.

If only the results of the MC2E-VI approach are considered, it would be concluded that there is a negative effect of the presence of female directors

on financial performance. Nevertheless, with the additional contribution of the GMM approach, the results of regression models should be interpreted with caution to avoid contributing with stereotypes by erroneously overestimating the effects (Adams, 2016). Now, observing the GMM model approach, the percentage of women in the boards may have negative effects on the performance of the company. These results are similar to Unite *et al.* (2019) and Kumar *et al.* (2020), who find a negative or, in some cases, not significant effect of the diversity of the board on the performance of the company. Regarding this, and aligned with Kumar *et al.* (2020), it is considered in this document that the little impact is due to the limited presence of female directors.

In addition, the decrease of the negative effect when going from one model to another (table 4 to table 5), might suggest that in Mexico the women in the boards of directors only have a symbolic effect, aligned with Kanter (1977), and under such symbolism, there may be negative or null effects. According to the critical mass social theory, when the number of female directors increase to the level of minority, the effects might be positive. The above supports the first hypothesis presented since, due to the little presence of women in these positions, although the effect is negative under the MCO with instrumental variable approach, it is not when using the GMM approach.

A second hypothesis was that the recommendations of 2018 for female inclusion in the boards of directors increased the presence of women in the boards. Using the DiD method, it was tested that in Mexico there has been an increase in the number of female directors after the recommendations of the BMV in 2018. This is aligned with the results of Yang *et al.* (2019), who tested that mandatory female representation increases the presence of women in the boards of directors. However, it is important to point out that in Mexico this is still a recommendation. This implies that the recommendation of the BMV had impact after 2018, but not in the companies with greater gender diversity among its employees. A reason for this may have been that after the recommendation, the companies without high percentages of diversity considered to include women in their boards of directors.

The results of both hypotheses confirm that, although an increment has occurred in the number of female directors in the boards of directors after 2018, the number is still small for it to have an effect more than symbolic. In various countries, a common response to guarantee the existence of gender diversity has been the laws with gender quotas. As part of the learning process to such adoption, many advantages and disadvantages of setting a minimum and mandatory percentage of women in the boards of directors have arisen—which are out of the scope of this paper—. Nevertheless, according to Adams (2016) it should be acknowledged that it is not possible to study gender diversity if such diversity does not exist. Therefore, to analyze the impact of diversity in the boards it is necessary that there is a diversity great enough to produce effects.

As a consequence of the shortage of women in the boards, Mexico is in a situation in which their participation is still symbolic and, if it remains as such, there may be no increase in the presence of women and such symbolic situation may perpetuate. In addition, following the IMCO report (2022), the shortage of independent female directors represents an opportunity for the inclusion of female directors that are not related to the shareholders of the company.

Limitations of the study include, on one hand, the lack of information about the companies and, on the other hand, the lack of women in the boards of directors. It is important to acknowledge that, despite using companies of the IPC—known to be a representative sample of the BMV and of the Mexican economy (BMV, 2022b)—, the results may not be generalizable due to the size of the sample; in addition, due to the number of companies analyzed, this research differs from other more extensive studies conducted in countries where there is more information.

Future research works might compare various indices representative of Latin American companies, or either compare those countries that have mandatory gender quotas with those countries where it is only a recommendation. This research contributes to the literature about diversity in the private sector of Mexico. Similarly, it opens the debate about the need for methods that guarantee

diversity, such as mandatory gender quotas, which also help to reduce the gender gap and guarantee more inclusive companies.

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Non-rational herd behavior in reward-based crowdfunding: a field experiment

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Introduction

The aim of the paper is to know if the gregarious behavior occurs in reward crowdfunding even without the rational factor as a simple imitation of a previous behavior, independently of the rational motivation of the success of the project.



Result or Conclusion 3

The results of this field experiment highlight the importance of designing campaign rewards in terms of qualitative characteristics as well as creating gregarious behavior in customers/sponsors in that qualitative direction. Thus, it is important to consider both the rational and the non-rational components of herd behavior.



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Behavior chosen or forced to choose: norms and values assumed by executives

Authors:

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Introduction

This research is important because it describes the norms and values expressed in the negative or positive behaviors of executives as part of their social group. In addition, the research presents a methodological advance for studying these components from its dissemination system.



Objective

The study focuses on the empirical exploration of the norms and values expressed by executives in their speeches or in their actions in the contexts of work, family and social groups. There are differences in the effects of these rules and values in the conditioning effect they have on group membership.

Methodology

The research follows a qualitative methodology for describing standards and values common to a group of executives. The stories of their social behaviors were analyzed using a technique typical of the method. The analysis allows to describe some common standards and values among executives.

Result or Conclusion 1

Some of the standards and values indicate that executives seek to demonstrate efficiency, lead groups, and achieve social status positions. On the other hand, they pursue short-term goals, are willing to make personal sacrifices or demand them from other members as a condition of acceptance.

Result or Conclusion 2

The norms and values (NV) of the executives guide them to look for achievements that improve their social image in the group. NV encourage them not to involve with people they work with, keeping this aspect of their relationship in working terms.

Result or Conclusion 3

Executives may perceive certain behaviors as inappropriate or different from their personal values, but they will follow them because they are part of the guidelines of group identity, reason for which their NV differ from other groups or from society at large.



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The relationship between the psychological distress derived from COVID-19 and the loss aversion modulated by the alexithymia trait

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Introduction

Stress affects our decision making, but this relationship is always approached by means of acute and artificial stressors in a laboratory setting. The COVID-19 pandemic, however, is an opportunity to study the effects of a persistent, natural stressor.



Objective

To study the relationship between the psychological distress derived from the pandemic context and changes in risk decision-making, considering alexithymia as a potential moderating factor

Methodology

The alexithymia level of participants was evaluated, as well as their psychological distress levels and their risk decision making pre- and during-confinement. Subsequently, the change of these decisions was addressed according to the alexithymia trait through moderation analysis for repeated measures.

Result or Conclusion 1

A month after confinement, participants showed increased psychological distress and greater aversion to losses during decision-making.

Result or Conclusion 2

Greater aversion to losses was significantly related to increased psychological distress, but only in those participants with low alexithymia levels.

Result or Conclusion 3

This increase seems to be moderated by alexithymia trait, which might be dampening the effects of stress as people with high alexithymia would have more difficulty knowing their emotions, even the negative ones that result from stress.



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Risk aversion when making economic decisions, certainty effect and probabilities estimation

Author:

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Introduction

It is important that citizens, who may already be affected by various biases, make their economic decisions by weighing the probabilities of different events appropriately, as this will affect the possible outcomes they may obtain.



Result or Conclusion 3

There is a positive relationship between those who better understand the probabilities and the fact of showing a greater risk aversion. Conversely, the lower the understanding of probabilities, the more likely it is to make risky decisions that can result in significant losses



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Fighting Gender Violence with Behavioral Public Policy: Scope and Limitations

Author:
Alejandro Hortal

Introduction

Behavioral economy-based interventions have been applied in a variety of public policy and administrative areas, but their use on gender-based violence issues has been largely ignored. Therefore, it is important to explore the application of these tools in gender violence.



Objective

To analyze the state of the art and the possible use of behavioral economics tools in public policies related to gender violence, such as nudges, boosts or sludge auditing.

Methodology

An exploratory review of the topic is carried out, providing possible ways for using behavioral public policies on issues related to gender violence.

Result or Conclusion 1

The article reveals the lack of research that attempts to use advances in behavioral public policies regarding gender violence

Result or Conclusion 2

Most research is focused on interventions that do not consider individual behavioral aspects or rational boundaries.

Result or Conclusion 3

Behavioral research on public policies related to gender violence should be increased, such as nudges, boosts or sludge audits.



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Why visiting Lifestyle Centers?: Alternative variables of attraction through structural equation model

Introduction

Due to the limited number of studies available in Latin America regarding the attractiveness of lifestyle centers or mega malls and their evolution and progressive increase, it is required to analyze their acceptance degree in emerging countries

Authors:

Alejandro Forero-Bautista
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Objective

To study the attraction variables of the current Lifestyle Centers to understand those aspects that are more valuable to the current consumer, through the analysis of their effects on visitor intention.

Methodology

An explanatory non-experimental quantitative research was developed using a survey applied to 398 visitors to Lifestyle Centers.

Result or Conclusion 1

The results reveal nine attraction factors of lifestyle centers, namely the variety of the offer, the physical environment, convenience and location, entertainment, perception of luxury, the presence of eco-natural environments, the inclusion of resources and uses of technology, the use of special events and quality of service, achieving to extend the available literature on shopping malls

Result or Conclusion 2

The results of the structural equation model revealed that six of the proposed attraction variables show positive and significant effects on visit intention. Particularly the physical environment, entertainment, special events and quality of service positively influence the possibility of preferring to visit and recommend a lifestyle center.

Result or Conclusion 3

The findings suggest managers of the shopping mall industry the possibility of increasing the visit, loyalty and recommendation of customers through the management and arrangement of spaces with "surprising" commercial exhibits, combining interactive physical atmospheres, entertaining and eco-natural, supported by the offer of special events by using technology and permanent superior quality service



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Corporate Volunteering: Definition and Relationship with Corporate Social Responsibility

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Introduction

There is no universally accepted definition of Corporate Volunteering in the literature. This situation limits theoretical development and empirical research in this field of research, hindering the articulation between this concept and the concept of Corporate Social Responsibility (CSR).

Objective

Since there are different ways of interpreting and applying CSR, a good definition of CSR must be based on concepts (variables) capable of showing itself differently depending on the conceptual framework of CSR under which it is applied. The main objective of this work is to propose a definition of CV that meets this theoretical and practical need.

Methodology

Articles that propose definitions of CV were searched through a literature review in different catalogs (Ebsco, JStor, SAGE, Science Direct, Springer and Redalyc). 18 definitions were selected and analyzed in order to identify and systematize the concepts (variables) used by each author to define the CV.

Result or Conclusion 1

A definition of CV was constructed, which includes a statement on each of the identified concepts, among which stand out the type of contribution of the volunteers, the purpose of the CV, the variety of formats, the role of the company, and other variables assumed by different individual or group values, within or outside work hours, participation of other actors, etc.

Result or Conclusion 2

This definition is useful for studying and managing CSR under the main CSR approaches, as a synonym for corporate citizenship, as equivalent to meeting the needs/demands of stakeholders and as responsible management of externalities. The variables used in the definition can assume appropriate values for each of these approaches.

Result or Conclusion 3

The definition proposed here is a contribution to the theoretical development and research in the field CV, since so far there is no definition that covers the wide variety of aspects that involve it.



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Capital Asset pricing model (CAPM) applied to the corporate sector of Ecuador

Introduction

The CAPM was developed based on returns obtained in stock market transactions in countries with developed capital markets. In the Ecuadorian context, as there is no developed stock market, the CAPM can derive from the accounting data of non-listed companies

Authors:

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Luis Gabriel Pinos-Luzuriaga
Iván Felipe Orellana-Osorio
Luis Bernardo Tonon-Ordóñez



Objective

The purpose of this research is to calculate the market risk and the minimum expected return of the different sectors that make up the economy of Ecuador through the Capital Asset Pricing Model.

Methodology

The CAPM was used to calculate the market risk and minimum expected return of companies in the corporate sector of Ecuador. The Beta coefficient was obtained from accounting information. On average, 48667 companies were analyzed in the 2009-2019 period.

Result or Conclusion 1

The market return is 9.19%
The sector of manufacturing industries (C), distribution of water sewerage-waste management and sanitation activities (E), wholesale and retail; repair of motor vehicles and motorcycles (G) and Information and communication (J) have a higher yield than the market.

Result or Conclusion 2

The sectors of Exploitation of mines and quarries (B), manufacturing industries (C), wholesale and retail, repair of motor vehicles and motorcycles (G), transport and storage (H), information and communication (J), professional, scientific and technological activities (M) and administrative and support services activities (N) which have a Beta greater than 1 are considered risky.

Result or Conclusion 3

The sectors of Information and communication (J), distribution of water sewerage-waste management and sanitation activities (E), manufacturing industries (C), wholesale and retail, repair of motor vehicles and motorcycles (G), teaching (P) and human health care and social assistance activities (Q) create value since they have a higher profitability than required.



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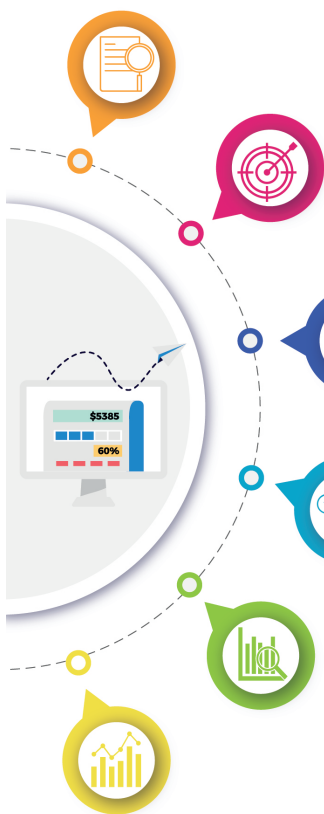
Relationship between the Altman Z-score model and the Z-Score financial indicators

Authors:

Daniel Isaac-Roque
Andrés Caicedo-Carrero

Introduction

Financial insolvency refers to the inability of a company to meet its debts; therefore, its constant monitoring ensures early identification of financial problems.



Objective

To analyze the factors that affect the insolvency of companies in the commerce sector in Colombia.

Methodology

The research was conducted using a quantitative approach of correlational type, in which trading companies in Colombia were analyzed during the period 2016 - 2020.

Result or Conclusion 1

The relationship between the explanatory variables of the model (Altman Z score) and its score shows that liquidity, leverage and profitability have a weak relationship. In other words, these variables do not affect a company's financial insolvency to any significant extent

Result or Conclusion 2

The financial structure shows that the higher the ratio (equity/liability) the lower the probability of insolvency. One of the characteristics of companies with a low likelihood of bankruptcy is the financial strength.

Result or Conclusion 3

The Correlation Indicators show that there is a direct relationship between the equity/liability ratio and the low probability of bankruptcy. Therefore, this variable has a significant impact on the solvency of a business.



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Gender diversity and financial performance in Mexican stock companies

Introduction

The effect of gender diversity on boards, controlling its bias, helps to reduce gender stereotypes that overestimate the impact of the presence of women on boards

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Michael Demmler
Lizeth A. Razo-Zamora



Objective

To estimate the effect of gender diversity on the board of directors on the financial performance of Mexican stock companies that are part of the price and stock price index (IPI). To evaluate whether the suggestion of the incorporation of women in the boards of directors had an effect on the composition of the board.

Methodology

Data regression models were applied on the Least Squares Panel with instrumental variable (MC2E-VI), the Generalized Method of Moments (GMM) and Differences in Differences (DD) using the companies from the IPC Mexican Stock Exchange in the period 2011-2021.

Result or Conclusion 1

It was found that the intervention of one woman on the board of directors and three women has significant and negative effects on the company's performance. But, the negative impact is reduced by controlling the bias of reverse causality and endogeneity.

Result or Conclusion 2

The Mexican stock exchange's suggestion of women's inclusion in the boards in 2018 had an effect on the presence of women on boards of directors. Companies with less gender diversity might consider including women on their boards.

Result or Conclusion 3

Women on boards of directors have minimal or symbolic representation that can cause negative or insignificant effects on performance. The minimal presence of female board, contrary to promoting the incorporation of more women, may perpetuate the symbolism.



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Basic writing rules

Universidad Politécnica Salesiana del Ecuador

General information

“Retos” is a bilingual scientific publication by the Universidad Politécnica Salesiana de Ecuador, which has been edited on a bi-annual basis since January 2011. The journal focuses on Development and transdisciplinary issues including Public Administration, Social Economics, Marketing, Tourism, Entrepreneurship, Management, Administrative and Economic Science, etc.

It is an arbitrated Scientific Journal that uses an external evaluation system known as *peer-review*, employing *double-blind review*, in accordance with the American Psychological Association (APA) style rules. By using this system, the authors have access to an objective, impartial and transparent review process, which facilitates their publication being included in databases, repositories, and international indexed references.

“Retos” is indexed in the selective directory and catalog of the Online Regional Information System for Scientific Journals in Latin America, the Caribbean, Spain, and Portugal (Latindex), in the REDALYC Scientific Information System, the Directory of Open Access Journals in repositories, libraries, and specialized catalogs in Ibero-America.

The Journal is published with two different editions: printed (ISSN: 1390-62911) and electronic (e-ISSN: 1390-8618), in Spanish and English, and each article is identified with a DOI (Digital Object Identifier System).

Scope and policies

Themes

Original contributions in Development issues, as well as related fields: Public Administration, Social Economics, Marketing, Tourism, Entrepreneurship, Management...and all other disciplines related to the central thematic issue.

Contributions

“Retos” preferably publishes the results of empirical research about Development, written in Spanish and/or English, while reports, studies, and proposals are also accepted, as well as reviews of state-of-the-art literature.

All of the publications must be original, never have been published in any other journal, and not be undergoing any arbitration or publication processes. Contributions to the journal can include any of the following:

- **Research:** 5,000 to 6,500 words of text, including the title, abstracts, keywords, tables, and references.
- **Reports, Studies, and Proposals:** 5,000 to 6,500 words of text, including the title, abstracts, tables, and references.
- **Reviews:** 6,000 to 7,000 words of text, including tables and references. Justified, current, and selective references shall be evaluated, and should include around 70 publications.

“Retos” is published bi-annually (20 articles per year), in April and October, and each edition has two sections with five articles each, the first containing a **Monograph** theme edited by subject matter experts, and a second **Miscellaneous** section, made up of diverse contributions related to the publication’s theme.

Presentation, structure, and submission of manuscripts

Papers are to be presented with Arial 10 typeface, single line spacing, all justified, without indentation or blank spaces between paragraphs. A space is only to be included between the major sections (title, authors, abstracts, keywords, credits, and epigraphs). All margins on each page must be 2 cm.

The papers are to be presented in Microsoft Word format (.doc or .docx), and the file is to be anonymous in the File Properties such that the author(s) is(are) not identified.

Manuscripts are to be submitted only through the OJS (Open Journal System), in which all authors must first register. Original papers sent via email or another interface are not accepted.

Manuscript Structure

For papers that are empirical research, the manuscripts are to follow IMRDC structure, while Notes and Contributions epigraphs are optional. Papers that constitute reports, studies, proposals, and reviews are afforded greater flexibility in terms of epigraphs, especially in relation to Materials and Methods, Analysis and Results, and Discussion and Conclusions. All types of papers are required to include References.

1. **Title (Spanish) / Title (English):** Concise but informative, the first line in Spanish and the second, in English. Maximum 80 characters are accepted, including spaces. The Editorial Board is allowed to propose changes to the author’s title.
2. **First and last names:** of each of the authors, organized in order of priority. Maximum three authors are accepted per original paper, although justified exceptions may be allowed, based on the theme, complexity, and length. The names are to be followed by the professional category, workplace, each author’s email address and ORCID number. It is mandatory to include whether the author has a doctorate degree (Dr. before the name).
3. **Abstract (Resumen, Spanish) / Abstract (English):** This section can contain a maximum of 230 words, first in Spanish and then in English. The abstract shall concisely contain the following, and in this order: 1) Justification of the theme; 2) Objectives; 3) Methods and sample; 4) Main results; 5) Main conclusions. It should be written impersonally “This paper analyzes...” In the abstract, automatic translation is not accepted due to its poor quality.
4. **Keywords (descriptores, Spanish) / Keywords (English):** Six keywords are to be included for each language, and must be directly related to the paper’s theme. This requirement shall be scored based on whether the keywords can be found in the UNESCO Thesaurus.
5. **Introduction and State of the Question:** The section proposes the question, the context of the issue surrounding it, justification, basis, and proposal for the study, using bibliographic references, including the most important up-to-date literature on the theme, both nationally and internationally.
6. **Material and Methods:** This is to be composed in such a way that the reader can easily understand how the research was performed. As appropriate, describe the method, sample,

sampling, and refer to the type of statistical analysis used. If it is an original method, present the reasons for applying it, and describe any possible limitations.

7. **Analysis and Results:** This section should seek to highlight the most important observations, and without including any value judgments, describe the methods used. Throughout the text, essential tables and figures shall be included in a logical sequence, without repeating any data.
8. **Discussion and Conclusions:** This section summarizes the most important findings related to any observations from relevant studies, pointing out contributions and limitations, without repeating data from other sections. The discussion and conclusions paragraph is to include inferences and new lines of research for the future.
9. **Contributions and acknowledgment (optional):** The Science Editors Board recommends that the author(s) specify the financing source for their research. Priority shall be given to work endorsed by competitive national or international projects. Regardless, for the manuscript to be scientifically evaluated, it is to be anonymized with an XXXX only for the initial evaluation, in order to avoid identification of any of the authors or research teams, which are to be named in the Cover Letter and later, in the final manuscript.
10. **Notes** (optional) are included, only if necessary, at the end of the article (before the references). They are to be included manually, since the Word footnotes are not recognized by the layout systems. Note numbers are to be included using superscript, both in the text and in the final note. Notes including simple bibliographic references (without comments) are not allowed, since these are supposed to be included in the references.
11. **References:** Bibliographic references are to follow the text references. Under no circumstances should references be included that have not been cited in the text. There should be enough references in order to contextualize the theoretical framework, and be based on criteria of contemporary relevance and importance. They are presented alphabetically, according to the author's last name (if the last name has more than one word, based on the first word of the last name).

Rules for references

Periodical publications

Journal article (one author) Valdés-Pérez, D. (2016). Incidencia de las técnicas de gestión en la mejora de decisiones administrativas [Impact of Management Techniques on the Improvement of Administrative Decisions]. *Retos*, 12(6), 199-2013. <https://doi.org/10.17163/ret.n12.2016.05>

Journal article (up to six authors): Ospina, M.C., Alvarado, S.V., Fefferman, M., & Llanos, D. (2016). Introducción del dossier temático "Infancias y juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Conflicts, Memories and Peace Construction Processes"]. *Universitas*, 25(14), 91-95. <https://doi.org/10.17163/uni.n25.%25x>

Journal article (more than six authors): Smith, S.W., Smith, S.L. Pieper, K.M., Yoo, J.H., Ferrys, A.L., Downs, E.,... Bowden, B. (2006). Altruism on American Television: Examining the Amount of, and Context Surrounding. Acts of Helping and Sharing. *Journal of Communication*, 56(4), 707-727. <https://doi.org/10.1111/j.1460-2466.2006.00316.x>

Journal article (with no DOI). Rodríguez, A. (2007). Desde la promoción de salud mental hacia la promoción de salud: La concepción de lo comunitario en la implementación de proyectos sociales. *Alteridad*, 2(1), 28-40. (<https://goo.gl/zDb3Me>) (2017-01-29).

Books and chapters of books

Complete books: Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Quito: Abya-Yala.

Chapters of a book: Zambrano-Quiñones, D. (2015). *El ecoturismo comunitario en Manglaralto y Colonche*. En V.H. Torres (Ed.), *Alternativas de Vida: Trece experiencias de desarrollo endógeno en Ecuador* (pp. 175-198). Quito: Abya-Yala.

Electronic media

Pérez-Rodríguez, M.A., Ramírez, A., & García-Ruíz, R. (2015). La competencia mediática en educación infantil. Análisis del nivel de desarrollo en España. *Universitas Psychologica*, 14(2), 619-630. <https://doi.org/10.11144/Javeriana.upsy14-2.cmei>

All reference that have a DOI (Digital Object Identifier System) must be included in the References (which can be obtained at <http://goo.gl/gfruh1>). All of the journals and books that do not have a DOI are to appear with a link (to the online version, if available, shortened using Google Shortener: <http://goo.gl>) and the date of query in said format.

Journal articles are to be listed in English, except for those that are available in Spanish and English, in which case, both languages are to be included in brackets. All internet addresses presented are to be shortened in the manuscript, except for the DOI, which are to be included in the established format (<https://doi.org/XXX>).

Epigraphs, Tables, and Graphs

The epigraphs in the article's body are in Arabic numbers. These are to avoid all capital letters, underlining, or bold text. Numbering should use maximum three levels: 1. / 1.1. / 1.1.1. A carriage return is to be used at the end of each epigraph.

Tables are to be included in the text in Word format, according to their order of appearance, with Arabic numbering and captioned with a description of their content.

Graphics or figures should be kept to a minimum and incorporated into the text, in accordance with their order of appearance, with Arabic numbers and captions with a short description. Quality should be no less than 300 ppp, if necessary, using TIFF, PNG, or JPEG formats.

Submission process

The papers are to be submitted in two files through the journal's OJS system:

1. **Cover letter and title page**, which includes the title in Spanish and English, first and last names of the authors (standardized format) with ORCID number, abstract in Spanish and English, keywords in Spanish and English, and a declaration that the manuscript constitutes an original contribution that has not been sent for evaluation in another journal, confirmation of the authorship, acceptance (as the case may be) of formal changes to the manuscript according to the rules, and partial transfer of copyright to the publishing house (use the official format).
2. **Completely** anonymized manuscript in accordance with the preceding rules.

All authors are to register on the OJS platform, even if only one of them will be in charge of correspondence. No author can submit two manuscripts simultaneously, with a penalty of not being able to participate in four consecutive editions (2 years)..