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Opportunity entrepreneurship after 65: Relevant factors in OECD countries

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Abstract

This research aims to analyze individual and national level factors that influence opportunity-driven senior entrepreneurship (people older than 65 years) in a group of 12 OECD countries. At this age most people in developed economies could choose between retiring, continuing working, or starting a new venture. It is important to understand the motivations behind their decision. We use data from the Global Entrepreneurship Monitor (GEM), to identify the effect of attitudes, perceptions, and aspirations as well as their sociodemographic characteristics. The sample consists of 24,139 observations from individuals older than 65 years. Additionally, we used the Human Development Index (HDI) – from the United Nations database–, to measure the country's level of development. Because of the nested nature of the data, we estimate our models using a multilevel logistic regression. Our results show that income, education, and occupation, in conjunction with the level of human development of a country have a significant influence on the probability of entrepreneurship by opportunity for senior individuals (+65). This research has policy and practical implications related to the decision of senior people to explore the creation of a new venture instead of opting for other alternatives such as retiring.

Keywords Senior entrepreneurship · Retirement · Human Development Index · Economic development · OECD countries · Logit multilevel

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Introduction

The world's population is aging. This phenomenon is even more profound in the developed economies of Asia and Europe, where a significant percentage of the population is 65 years of age or older. At the top is Japan at 30%, followed by Italy at 24%. Other European countries like Finland, Portugal, and Greece round out at 23% (United Nations, 2022). Other regions like North America or inclusive developing economies, for example, in 2050 Latin America will have similar figures, and experiment with an accelerated aging process. The aging of the population is due to two phenomena that coexist simultaneously: the low birth rate, which does not allow for generational replacement rates and population bonuses, and secondly, the improvement in the health system, which increases the population's life expectancy. Life expectancy at birth is expected to increase from 72.6 to 77.1 years by 2050 worldwide, with this being more widespread in developed countries.

This phenomenon of rapid aging of the population, although it can be considered an important achievement from the point of view of advances in medicine that foresee the early death of many people, is also affecting embattled welfare systems (the public ones, lower funded and higher demanded), that include the health systems and pensions systems. With more people, more time, demanded better health and financial resources to maintain their (over) life, the situation could be complicated to many economies across the world. In this context emerges a question about how societies could maintain economic activity with this growing proportion of the older population. Especially if a percentage of this older population can be considered vulnerable (in terms of income and access to health services). Some mechanisms that could help, apart from the traditional mechanisms of social assistance and pensions, is that older adults remain employed for a longer period. That is, changing the retirement age, but this has been controversial. On the other hand, it encourages older adults to start a new business and become entrepreneurs capable not only of generating self-income but eventually generating dynamic and growing business models.

Precisely entrepreneurial activity is vital for the economic development of a country, generating employment and reducing unemployment (Maâlaoui & Razgalla, 2019) and economic growth (Amorós et al., 2013; Almodóvar-González et al., 2019; García Rodríguez et al., 2017). Amorós et al. (2021) consider that in countries -especially developing ones- high rates of entrepreneurial activity contribute to poverty reduction, even if it has high levels of necessity motivation. The fact that entrepreneurship decreases poverty reflects the idea that it generates growth and development through the introduction of innovations, the creation of new jobs, and boosting competition (Vivarelli, 2013). Researchers also agree in pointing out that the percentage of the "entrepreneurial population" in developing countries exceeds that existing in more advanced economies (Acs & Amorós, 2008; Bosma & Kelley, 2018) while observing that the characteristics of the entrepreneurship activity vary according to the country's level of development.

Within those antecedents, the figure of "*senior entrepreneurs*" could constitute a relevant segment, firstly in itself, because, as with all other segments, it

contributes to the creation of small and medium-sized enterprises, which generates an important part of GDP and employment, allowing job creation, income generation, innovation, and productivity, by modifying or adapting business models or processes (Saiz-Alvarez & Coduras-Martínez, 2020). Thus, the entrepreneurial activity of this group contributes to reducing the number of beneficiaries of social security payments. Even though the aging of the population is a cause for concern as far as it leads to a reduction in entrepreneurial activity, as a proportion of the total population (Cossette et al., 2010). According to the Global Entrepreneurship Monitor (GEM) project, the early-stage entrepreneurship activity, TEA (new ventures) by opportunity for people over 65 in the OECD countries analyzed in our research is 2.2%, a much lower percentage than the average of other ages. When people reach retirement age, around 65 years in all OECD countries – the entrepreneurial activity drops dramatically. Only between 1 and 2% of people of this age start a venture in these countries – Chile the exception with a TEA of 5.6% followed by the USA with 2.5%-. However, as we explain, people's physical and mental health and economic possibilities would allow many of them to continue in the labor market, either as entrepreneurs or working for other companies. The promotion of entrepreneurship in this group could contribute to solving some of the problems mentioned in the previous paragraphs.

However, the factors that influence the entrepreneurial activity of this group (+65) have not been sufficiently studied (Zhu et al., 2022). To this end, it is fundamental to identify the factors that drive senior individuals (+65) to become entrepreneurs based on their motivations, sociodemographic characteristics, attitudes, and perceptions, as well as the context and institutions of the countries in which they live. In addition, it should also be considered that there are major differences in entrepreneurial activity and in the factors that affect it in diverse cultures, countries, or territories because of economic, demographic, or institutional variables, that are specific to each area (Bosma & Schutjens, 2011; Coduras et al., 2018; Vodă et al., 2020). Moreover, opportunity-driven entrepreneurship (see next section) is of great interest since there is some evidence that countries with a higher opportunity-to-necessity ratio have higher rates of economic growth (Wong et al., 2005). For this reason, it is of great interest to understand the factors that determine senior entrepreneurship by opportunity when making economic policy decisions to promote it. In this context, promoting the entrepreneurial activity of this group could generate a high economic and social impact. It is therefore essential to have a better understanding of their nature and characterization to generate a legal framework and far-reaching public policies in the region.

Given the potential economic and social relevance of senior entrepreneurship, and the existing research gap (for people older than 65), the main objective of this paper is to identify the internal and external factors that influence senior entrepreneurship (+65) in a group of OECD countries (Australia, Canada, Chile, Estonia, France, Netherlands, Polonia, Slovenia, Sweden, Switzerland, United Kingdom, United States) and to quantify their incidence on the propensity to engage entrepreneurial activity. This research has considered senior entrepreneurship by opportunity, different individual sociodemographic variables, as well as attitudes and perceptions, and the level of development of each country -measured through the

Human Development Index. Even some evidence shows that the level of development of a country has an inverse relationship with its entrepreneurial activity rate (Amorós et al., 2021), this relationship is little studied, especially regarding the senior group, and requires further research (Saiz-Álvarez & Coduras-Martinez, 2020), which gives this study additional added value.

This article is structured as follows: "Literature review" section reviews the existing literature on senior entrepreneurship, motivations, and the internal and external factors that influence entrepreneurial activity. This section also establishes the research hypotheses. Next, it presents the methodology used, describing the sample and key variables, as well as the statistical model employed. Sect. "Results" presents the results of the research. The final sections are dedicated to the discussion and conclusions, as well as to the identification of limitations and implications.

Literature review

Senior entrepreneurship

There is no general definition of what senior people are defined as. In empirical analysis, most of the authors refer to chronological age. Different researchers consider that senior entrepreneurship starts at different ages (see Table 1). Other authors define seniors as those already retired from the labor force, which means that the transition from one life stage to the next, (i.e. retirement) has taken place (Fachinger, 2019). This does not always occur at the same age and differs between occupations and genders in most of the countries. Given the goal of our research, in what follows, seniors are defined as those people + 65 (who can be retired from the labor force in most of the countries). They may be retired or not. Appendix I shows the retirement age in the different countries studied.

Senior entrepreneurship generates several benefits such as unemployment reduction, or social development of a territory (Amorós et al., 2021). Zhu et al. (2022) state that seniors can create new businesses with economic value and job opportunities, as well as provide mentoring to younger generations passing them their professional experience. In general, entrepreneurs delay their age of retirement (Kautonen et al., 2017), which generates benefits for the social security system. Senior entrepreneurs use to proportion some advantages such as a more extended professional experience, contact network, and managerial skills, as

Table 1 Senior Entrepreneurs according to the literature

Age	Authors
45	Figueiredo and Paiva (2018)
50	Cerveny et al. (2016), Maritz and Eager (2017), Tervo (2014) Maâlaoui et al. (2012), and GEM
55	Rossi (2009)

Source: Saiz-Álvarez & Coduras-Martinez (2020)

well as more financial stability, which allows their business to survive for more years than those of younger individuals (Kahn, 2013). Several researchers have identified some potential benefits of late-stage career transition to entrepreneurship for seniors including high quality of life, high subjective life satisfaction, and health and longevity in life, compared to others who are retired or dedicated to other professional activities (Isele & Rogoff, 2014; Kautonen, et al., 2017).

The barriers faced by senior entrepreneurs could be considered insufficient human or social capital, discrimination for age reasons, bad health conditions, a larger opportunity cost (because of a reduced time to recover their investment), financial disincentives, lack of entrepreneurial education or training, and other elements associated to institutions or context (Oelckers, 2015). It is assumed that most seniors prefer to enjoy their time with friends and family better than engaging in stressful activities such as creating new ventures, and they prefer to dedicate themselves to activities with more immediate rewards. All these reasons reduce the probability of seniors engaging in entrepreneurial activities, with longer return time (Halabisky, 2012). Given all the previous benefits and barriers, Figueiredo and Paiva (2018) consider governments should promote entrepreneurial activity in this segment, with specific actions targeted to them, as they do for other sociodemographic groups.

Motivations to start a new business

Entrepreneurship literature developed different social, economic, or psychological approaches. Caines et al. (2019) consider that entrepreneurial activity is affected by the social context. From an economic approach, the focus moves to the relation between entrepreneurship and economic activity. Finally, the psychological approach differentiates between push and pull factors. The former, and the focus of this research, is associated with entrepreneurial opportunities perceived by individuals, and they relate to people's desire to increase their income, self-fulfillment, achieve their dreams, or get an adequate level of social activity (Weber & Schaper, 2004; Heimonen et al., 2012; Wainwright et al., 2015; Matos et al., 2018; Guerrero & Serey, 2019; Soto-Simeone & Kautonen, 2021). Perenyi et al. (2018) consider that senior entrepreneurs are more motivated by opportunity than by necessity. On the other hand, push factors are more associated with the need of people to earn a living, and with negative aspects of people's jobs, such as low job satisfaction (Harms et al., 2014), low salary level, or lack of job stability (Weller et al., 2018).

Several authors consider that the dichotomy between opportunity and necessity motivation is not always true and that both motivations may appear successively or simultaneously (Anderson et al., 2013; Jafari-Sadeghi, 2020). Sometimes other reasons completely different from necessity or opportunity may appear (Puente et al., 2019) such as altruism (Perenyi et al., 2018), previous work experiences (Tervo, 2014), income diversification (Caines et al., 2019; Weller et al., 2018), to continue active, or to work less hours (Fraser et al., 2009). While necessity-driven entrepreneurship predominates in low-income countries, entrepreneurship by opportunity is more common in high-income ones (Amorós et al., 2012; Minniti & Levesque,

2010). Other authors, such as Zhu et al. (2022) suggest that seniors consider pursuing entrepreneurial ventures as an *active aging* lifestyle to achieve *aging well.* Other authors consider that it is vital for the success of an entrepreneurial project to understand what influences entrepreneurs to take relevant actions, which depend on different factors including their personality traits. Amorós et al. (2021) consider that the motivation to start a new business explains the relationship between economic development and poverty under different circumstances. For Anokhin and Wincent (2012) the opportunities differ between developed and developing countries, and entrepreneurial initiatives have more quality in the former (Shane, 2009).

As we discussed, even though there is an increasing interest in understanding senior entrepreneurship, we believe that there is an existing gap in many countries for the specific sub-group of senior entrepreneurs older than 65. In the next subsections we will discuss the relevance of determining and quantifying the impact of some internal factors - sociodemographic, attitudes, perceptions, and previous experience - and external factors - focused on the level of development of the countries – on entrepreneurial activity - by opportunity - of senior individuals (over + 65). This highlights the necessity to understand better not only the personal characteristics of the senior entrepreneurs but also the contextual factors that are embedded (Farmaki et al., 2022). As a comparative analysis, Table 2 shows different quantitative research that focuses on the impact of internal and external factors on senior entrepreneurship activity. In the next section, we analyze some of these factors that help to sate out hypotheses.

Determinants of senior entrepreneurship

Individual factors

Some factors influencing entrepreneurship have a sociodemographic nature – gender, education, income, or occupation- meanwhile others are related to individuals' characteristics and behavior like attitudes, perceptions, and previous experiences (Cucculelli et al., 2023). Many seniors are economically motivated to continue active in economic activities (Block & Sandner, 2009). Some other authors consider that seniors may take more risk, as they have fewer financial obligations and more income (Kibler et al., 2011) and they accumulate more financial resources (Singh & De Noble, 2003). On some occasions, they are motivated by the need for additional revenue (Shane, 2009; Valdez & Richardson, 2013). Considering the above arguments, the following hypothesis is proposed:

H1: The probability of engaging in opportunity senior entrepreneurship increases if individuals have a source of income.

According to Block and Sandner (2009), opportunity entrepreneurs have a higher educational level, which helps them to identify opportunities (Sánchez, 2011). Torres-Marín et al. (2020) establish that formal education has a positive effect on the rate of senior entrepreneurial activity in Chile. Other authors, such as Pilkova et al.

Table 2 Examples of quantitative research analyzing the impact of internal and external factors on senior entrepreneurship

Authors	Seniors Age	Internal Factors Impacting Entrepreneurship Activity	Institutional/Contextual Factors Impacting Entrepreneurship Activity	Countries and data period	Comments
Cerveny et al. (2016)	50+	Age, gender, education, occupation, household income, business opportunities, skills, knowledge, and experience, fear of failure, and knowing entrepreneurs.	Adequate financial opportunities, enough government subsidies for new firms, government policy favors new firms, new firms get permits in one week, tax amount does not burden for new firms, gov. taxes/regulations predictable, adequate govt. Programs for new firms, new firms get good legal/acc. service, culture encourages self-reliance, IPR legislation comprehensive, IPR laws enforced, effective retirement age, corporate tax rate.	European Countries from GEM (Eastern and Western Europe (2001–2012)	There is no differentiation between TEA by opportunity and by necessity. Multilevel Logistic Regression Model
Holienka et al. (2016)	55–64	Alertness to opportunities, self-confidence, knowing an entrepreneur, fear of failure, gender, income.	Not include Institutional/contextual factors	Visegrad countries: Czech Republic, Hungary, Slovakia, and Poland (2011–2014)	Differentiates between TEA by opportunity and by necessity Generalized Linear Models (GLM) set on binomial family with logit transformation Controlled by country.
Rehak et al. (2017)	55–64	Knowing an entrepreneur, alertness to opportunity, self-confidence, fear of failure, gender, income	Not include Institutional/contextual factors	European countries in GEM (2010–2014)	Differentiates between A by Opportunity and by necessity Generalized Linear Models (GLM) set on binomial family with Logit Transformation

Table 2 (continued)

Authors	Seniors Age	Internal Factors Impacting Entrepreneurship Activity	Institutional/Contextual Factors Impacting Entrepreneurship Activity	Countries and data period	Comments
Martin and Omrani (2019)	55–64	Gender, age, occupation, income, education, status, skills, self-employed acquaintance, media, risk tolerance	55–64 employment rate, GDP growth rate, enterprise internet diffusion rate, contribution of ICT capital services to value, real fixed capital stock for computing equipment, real fixed capital stock for communication equipment	11 European Union Countries (2006–2013)	Non-differentiate between TEA by opportunity and by necessity Probit Model
Villegas-Mateos and Amorós (2020)	55–64	Experience, fear of failure, household income, education, graduate experience, gender, activity sector.	Social Security contribution as a percentage of GDP	31 OECD countries (2010–2016)	Differentiate between TEA by opportunity and by necessity Multilevel Logistic Regression Model
Torres-Marin et al. (2020)	55 +	Occupation, education, knows an entrepreneur, age, perceived skills,	Not include Institutional/contextual factors	Chile (2016)	Non-differences between TEA by opportunity and by necessity Logistic Regression Model
Leporati et al. (2021)	55 +	Occupation, education, income level, age, gender, know entrepreneur, perceived skills, perceived opportunities, fear of failure, intrapreneurship, business angel, good career choice, good status.	Not include Institutional/contextual factors	Chile (2012–2016)	Differentiate between TEA by necessity and by opportunity. Logistic Regression Model Control variables: different years

Table 2 (continued)

Authors	Seniors Age	Internal Factors Impacting Entrepreneurship Activity	Institutional/Contextual Factors Impacting Entrepreneurship Activity	Countries and data period	Comments
Amorós et al (2023)	50+	Income level, education level, experience, occupation	HDI, Country cultural support	Seven countries of Latin America (2013–2017): Brazil, Argentina, Chile, Peru, Colombia, Ecuador, Mexico	Differentiate TEA by opportunity and necessity Multilevel Logistic Regression
Saiz Alvarez and Coduras-Martinez (2020)	50+	Not include individual variables	Business discontinuation annual rate, total population average age, individual perception to entrepreneurship index, HDI	All Countries in GEM (2016)	Non-differentiate TEA by opportunity and necessity Multiple Linear Regression Model

Source: Own elaboration

(2014) consider that senior entrepreneurs rely more on previous professional experience than on knowledge and skills acquired through formal education. Based on the above arguments, the following hypothesis is proposed:

H2: The probability of engaging in opportunity senior entrepreneurship increases if individuals have higher degrees of formal education.

Many authors consider that *occupation* negatively influences the probability of starting a new business because it reduces the time available for entrepreneurship (Kautonen, 2012) and for observing new opportunities available (Halabisky, 2012). For Weber and Schaper (2004) low resource generation, or small job satisfaction, may drive entrepreneurial activity. Finally, some individuals create a venture to have more flexible timetables (Zissimopoulos & Karoly, 2007), or to work fewer hours (Fraser et al., 2009). Based on the above arguments, the following hypothesis is proposed for senior entrepreneurs:

H3: The probability of engaging in opportunity senior entrepreneurship decreases if individuals have other occupational choices.

Many authors suggest that gender is a variable that affects the probability of starting a new venture (Driga et al., 2009; Minniti et al., 2005; Weber & Schaper, 2004). Delmar and Holmquist (2004) consider that women have more difficulties accessing education, which, in combination with the male stereotype of entrepreneurs (Bruni et al., 2004) diminishes their possibilities to start a new venture. On the other hand, Leporati et al. (2021) point out that being a woman increases the probability of necessity entrepreneurship regardless of age in Chile. Based on the abundant existing literature on this topic we propose the following hypothesis:

H4: The probability of engaging in opportunity senior entrepreneurship decreases if individuals are women.

Several authors as Maâlaoui et al. (2023), Vodă et al. (2020), and Coduras et al., (2018), found a positive relationship between entrepreneurial activity and several *attitudes and perceptions* including the ability to identify opportunities, having attitudes and skills, previous experience, and knowledge of other entrepreneurs. Senior entrepreneurs have more experience and have created larger networks (Kibler et al., 2011). Rehák et al. (2017) establish, for various European countries, that senior entrepreneurs differentiate from younger ones in their perception of having adequate skills to start a business. Kibler et al. (2011) state that having previous experience increases the probability of developing the right skills and knowledge for entrepreneurship. Social capital is also fundamental for the development of senior entrepreneurship (Pilkova et al., 2014). Freire-Gibb and Gregson (2019) identify the crucial role of local networks to enable entrepreneurs to get access to resources that include knowledge, finance, and human capital and to connect them with advisors, investors, and workers. Based on the above arguments, we propose the following hypotheses:

H5a: The probability of engaging in opportunity senior entrepreneurship increases if individuals have better contact networks.
H5b: The probability of engaging in opportunity senior entrepreneurship increases if individuals perceive that they have entrepreneurial skills.
H5c: The probability of engaging in opportunity senior entrepreneurship increases if individuals have had previous entrepreneurial experiences.

Finally related to some individual factors some authors consider that *fear of failure* constitutes a barrier to entrepreneurship (Arenius & Minniti, 2005; Vodă et al., 2020; Coduras et al., 2018; Mancilla & Amorós, 2015; Bosma & Schutjents, 2011). On the other hand, Kibler et al. (2011) consider that seniors have a greater capacity to take risks. Based on the above arguments, we propose the following hypothesis:

H6: The probability of engaging in opportunity senior entrepreneurship decreases if individuals experiment with fear of failure.

Contextual factors

Contextual factors are truly relevant in the determination of entrepreneurial activity (Brannback & Carsrud, 2019; Fuentelsaz et al., 2015; González-Pernía et al., 2018; Welter, 2011), although many researchers have considered them as a moderating force more than the main cause (Davidsson et al., 2021). The Institutional Theory studies how institutions and the environment affect the decisions of individuals to start a new venture. There are many aspects to be considered: the moment of the economic cycle (Biehl et al., 2013), the existence of institutions that encourage entrepreneurial activity (Pilkova et al., 2014), the immediate social environment (Kautonen et al., 2011) or the entrepreneurial culture (Weber & Schapper, 2004; Kautonen et al., 2011). Brás (2020) found some positive influence of formal and informal institutions on entrepreneurial activity in Baltic countries. Similar conclusions were found by Audretsch et al. (2022), for a set of 52 countries between 2005–2015. Different research suggests that certain regulatory environments incentivize entrepreneurs more than others (Estrin & Mickiewicz, 2012; Stenholm et al., 2013; Ardagna & Lusardi, 2010; Acs et al., 2008; Klapper et al., 2006). Audretsch et al. (2019a) studied the impact of national regulation on entrepreneurship in 228 European cities between 2004 and 2009, concluding that regulations related to property registration and taxation have a greater impact on entrepreneurship than other types of regulation.

Other authors have shown that firm creation depends on various macroeconomic conditions as the growth of the economy, aggregate demand, unemployment level, per capita income, or interest rates (Congregado et al., 2012; Koellinger & Thurik, 2012; Fritsch et al., 2015). Scheu and Kuckertz (2023) consider, after a systematic review of the literature on international entrepreneurs from developed countries, that the context impacts how entrepreneurs discover new opportunities. Similarly, Vasilescu et al. (2023) identified that the country's level of development stimulated some entrepreneurship activities specifically in the context of 36 European countries. So, the extended evidence demonstrates that the combination of institutional

climate and policies may generate push and pull factors, that contribute to different types of entrepreneurship activities -opportunity and necessity- (Audretsch et al., 2019b; Block et al., 2015; Block & Sandner, 2009; Nikolaev et al., 2018; Stenholm et al., 2013; van der Zwan et al., 2016; Welter et al., 2019).

Based on the previous discussion, how the impact of the *level of development* of countries could determine senior opportunity entrepreneurial activity for people older than 65, is a relevant factor that has been little researched up to date. To operationalize it, some authors use the Human Development Index (Saiz-Alvarez & Coduras-Martinez, 2020). Empirical evidence showed an inverse relationship between the HDI and the TEA. Amorós et al. (2023) also conclude that there is a negative relationship between the HDI and the senior rate of entrepreneurial activity in seven Latin American countries surveyed between 2013 and 2017. Based on the arguments developed in the previous paragraphs, the following hypothesis is put forward:

H7: The probability of engaging in opportunity senior entrepreneurship decreases if individuals live in a country with high Human Development.

Methodology

Database

Our research uses data from the Global Entrepreneurship Monitor, GEM, and more specifically the Adult Population Survey (APS) from GEM. This survey is based on a standardized process to identify the main aspects of attitudes, perceptions, and aspirations of respondents using a conceptual framework that considers the entire venture life cycle (Bosma et al., 2021; Reynolds et al., 2005). The dataset used is based on the APS of respondents that were 65 years old or higher from twelve countries that belong to OECD (Australia, Canada, Chile, Estonia, France, Netherlands, Polonia, Slovenia, Sweden, Switzerland, United Kingdom, United States) with a total of 24,139 observations between years 2014 and 2018. The selection of these countries was done because they were the ones from the OECD that measure respondents of the selected age group in the APS. Moreover, the dataset includes the variable of the Human Development Index (HDI) for the countries and years included in our work to capture the external environment that influences senior entrepreneurship. HDI is a composition of other indexes that measure life expectancy, education level, and income level of each country.

Description of variables

The APS defines Total early-stage Entrepreneurial Activity (TEA), as our dependent variable. TEA variable is given the value of 1 when a person older than 65 is either actively involved in starting a new venture or owning and managing a new one for up to 42 months (Bosma et al., 2021). Table 3 shows the description of the variables we introduced in the model.

Table 3 Variables included in the model

Variable	Description	Type	Values
Income level	Individuals' household income level.	Category	Low, Medium, High
Education	Individuals' level of education.	Category	0-Non-primary/Primary level 1-Secondary level 2-Post-Secondary 3-Graduate
Occupation	Type of occupation of individuals.	Category	1- Retired 2- Other occupation
Gender	Gender of individuals.	Binary	Man = 0; Woman = 1
I know an entrepreneur	Knows someone personally who has started a venture in the last two years.	Binary	No = 0; Yes = 1
Perceives skills	Believes in having the knowledge, skills, and experience necessary to start a new venture.	Binary	No = 0; Yes = 1
Fear of failure	Fear of failure that will prevent a person from undertaking a venture.	Binary	No = 0; Yes = 1
Entrepreneurial experience	Respondent shut down the business in the last 12 months.	Binary	No = 0; Yes = 1
Year	Year of the observation	Categorical	2014 2015 2016 2017 2018

Table 3 (continued)

Variable	Description	Type	Values
Country	Country of observation	Categorical	AU-Australia CA-Canada CH- Switzerland CL-Chile EE-Estonia FR-France NL-Netherlands PL-Polonia SE-Sweden SI-Slovenia UK-United Kingdom US-United States
HDI	Human Development Index	Continuous	Between 0 and 1
TEA_OPP	Total early-stage entrepreneurial activity by opportunity	Binary	No = 0; Yes = 1

Source: Own elaboration

Empirical model

The model used in our research is a multi-level logistic regression model to determine how the probability of an event happening—the variable TEA by opportunity —is influenced by both the presence or absence of different factors and their estimation (fixed effects) and the variance of the Countries (random effect) (Shepherd, 2011). The model can be formulated as follows (Skrondal & Rabe-Hesketh, 2004):

$$y = X\beta + Zb + \varepsilon \tag{1}$$

Where y is a $N \times 1$ column vector, the dependent variable; X is a $N\ x\ p$ matrix of the p predictor variables; β is a $p \times 1$ column vector of the fixed-effects regression coefficients; Z is the $N\ x\ q$ design matrix for the q random effects; b is a q×1 vector of the random effects; and ε is a $N \times 1$ column vector of the residuals. In our research, Countries are going to be considered as a random effect of the vector b. The multilevel logistical model tested is the following:

$$\begin{aligned} TEA(OPP) = {} & \beta_0 + \beta_1 * Income\ level + \beta_2 * Education + \beta_3 * Occupation + \\ & \beta_4 * Gender + \beta_5 * Knows\ an\ entrepreneur + \beta_6 * Perceives\ skills + \beta_7 * Fear\ of\ failure + \\ & \beta_8 * Entrepreneurial\ experience + \beta_9 * Year + \beta_{10} * HDI + b * Country + \varepsilon \end{aligned} \tag{2}$$

The selection of parameters is done using the Wald z-statistics and applying Akaike´s information criterion to select the model and estimator. Marginal effects were calculated following the Ai and Norton (2003) method. The statistical power of the model is evaluated with the following goodness-of-fit methods: χ^2 calculation, log-likelihood, and pseudo-R2 (McFadden). The model helps to identify which internal and external factors have an impact on TEA seniors in the OECD countries selected. Other studies follow a similar methodology (Holienka et al., 2016; Leporati et al., 2021; Gonzalez-Pernía et al., 2018). Our research is different from previous works in the fact that we present HDI as a context variable that influences entrepreneurial activity for seniors older than 65 years old in OECD countries under opportunity.

Descriptive statistics

The descriptive statistics of the datasets used are included in Table 4 where the average and standard deviations of each variable are shown. Table 5 shows the TEA by opportunity by country.

Results

Table 6 shows the correlation matrix between variables and confirms there is not a multicollinearity problem. Table 7 shows the results obtained from the model, including the random effects and the fixed effects, which include the value of the

Table 4 Descriptive statistics

Variable	N	Frequency or Mean	Std. Dev.
Income level	24,139		
… Low	12,843	53.20%	
… Medium	6,894	28.60%	
… High	4,402	18.20%	
Education level	24,139		
… Non-primary/Primary	6,752	28%	
… Secondary	6,773	28.10%	
… Post-Secondary	8,607	35.70%	
… Graduate	2,007	8.30%	
Occupation	24,139		
… Retired	17,721	73.40%	
… Other occupation	6,418	26.60%	
Gender	24,139		
… Man	11,598	48%	
… Woman	12,541	52%	
Age	24,139	71.539	5.439
Entrepreneurial experience	24,139		
… No	23,608	97.80%	
… Yes	531	2.20%	
I know an entrepreneur	24,139		
… No	19,369	80.20%	
… Yes	4,770	19.80%	
Perceive Skills	24,139		
… No	14,618	60.60%	
… Yes	9,521	39.40%	
Fear of Failure	24,139		
… No	16,833	69.70%	
… Yes	7,306	30.30%	
TEA_OPP	24,139		
… No	23,605	97.80%	
… Yes	534	2.20%	
HDI	24,139	0.912	0.035
Year	24,139		
… 2014	3,551	14.70%	
… 2015	4,484	18.60%	
… 2016	6,291	26.10%	
… 2017	5,278	21.90%	
… 2018	4,535	18.80%	
Country	24,139		
… AU	1,032	4.30%	
… CA	1,600	6.60%	
… CH	2,420	10%	

Table 4 (continued)

Variable	N	Frequency or Mean	Std. Dev.
… CL	4,752	19.70%	
… EE	957	4%	
… FR	1,410	5.80%	
… NL	2,090	8.70%	
… PL	325	1.30%	
… SE	3,793	15.70%	
… SI	607	2.50%	
… UK	3,942	16.30%	
… US	1,211	5%	

Source: Own elaboration

estimators (Est), the standard deviation (SD), the value of the marginal effects (ME), and the significance of the parameter (Sig).

From Table 7, the statistical power tests defined in the methodology show the goodness-of-fit for opportunity (AIC = 3,685; Loglikelihood = -1,824; $\chi^2 = 16{,}485$; PseudoR2 [McFadden] = 0.49169584). The analysis of the normality of the residuals has been tested and does not present any problem. Under opportunity, higher income levels increase the probability of becoming an entrepreneur (High-income level: $\beta = 0.330$; ME = 0.0015). These findings confirm hypothesis 1, as higher income levels increase seniors' entrepreneurial activity for people older than 65 in OECD countries. Formal education levels are relevant factors for older entrepreneurs by opportunity. Higher levels of education increase the probability of becoming an entrepreneur (post-secondary: $\beta = 0.463$; ME = 0.0020/Graduate: $\beta = 0.490$; ME = 0.0028). This supports hypothesis 2 as education seems to be a key factor in discovering opportunities for seniors. Having an occupation different from being retired seems to be a driver for entrepreneurship by opportunity ($\beta = 2.238$;

Table 5 TEA opportunity by country

Country	TEA_OPP
AU	1.6%
CA	2.2%
CH	1.0%
CL	5.6%
EE	1.9%
FR	0.6%
NL	1.1%
PL	0.3%
SE	1.8%
SI	0.5%
UK	1.0%
US	2.5%

Source: Own elaboration

Table 6 Correlation matrix

Variable		1	2	3	4	5	6	7	8	9	10	11	12
1	Income	1.00											
2	Education	0.25	1.00										
3	Occupation	0.20	0.07	1.00									
4	Gender	0.21	0.11	0.08	1.00								
5	Knows an entrepreneur	0.13	0.10	0.15	0.05	1.00							
6	Perceive skills	0.21	0.16	0.25	0.20	0.19	1.00						
7	Fear failure	0.09	0.08	0.03	0.09	0.04	0.16	1.00					
8	Previous experience	0.03	0.01	0.07	0.04	0.06	0.12	0.01	1.00				
9	Year	0.06	0.04	0.04	0.02	0.03	0.01	0.03	0.03	1.00			
10	HDI	0.16	0.25	0.32	0.08	0.13	0.18	0.15	0.11	0.92	1.00		
11	Country	0.09	0.24	0.32	0.07	0.11	0.18	0.15	0.10	0.19	0.92	1.00	
12	TEA_OPP	0.10	0.06	0.21	0.05	0.14	0.15	0.04	0.03	0.06	0.14	0.12	1.00

Source: Own elaboration

Table 7 Logistic Multilevel Model Results for Opportunity-based senior entrepreneurs older than 65 years old

Variables	Est	M.E.	SD	Sig
Income level: Low	Ref.			
Income level: Medium	0.165	0.0007	0.126	
Income level: High	0.330	0.0015	0.128	**
Education: Non-primary/primary	Ref			
Education: Secondary	0.054	0.0002	0.157	
Education: Post-Secondary	0.463	0.0020	0.144	**
Education: Graduate	0.490	0.0028	0.191	**
Occupation (Not retired)	2.238	0.0185	0.138	***
Knows an entrepreneur (Yes)	0.951	0.0056	0.095	***
Perceive skills (Yes)	1.538	0.0084	0.142	***
Fear of failure (Yes)	-0.299	-0.0012	0.122	*
Previous experience (Yes)	-0.009	-0.0001	0.216	
Gender (Women)	-0.225	-0.0009	0.101	*
Year 2014	Ref			
2015	-1.610	-0.0046	0.211	***
2016	-0.334	-0.0009	0.142	*
2017	-0.245	-0.0006	0.139	
2018	-0.289	-0.0007	0.146	*
HDI	-5.901	-0.0593	2.961	*
Cons	-1.132		2.713	
Country				
Var (cons)	0.054		0.232	

Source: Own elaboration

Number of obs. = 24,139; Number of groups = 12; Wald $\chi^2 = 16{,}485$; Log Likelihood = -1,823; Prob > $\chi^2 = 0.000$; AIC = 3,683; BIC = 3,829; Adjusted R^2 (McFadden) = 0.49169584

Sig. *$p < .1$; **$p < .05$; ***$p < .01$

ME = 0.0185). These results reject hypothesis 3, as having an occupation increases the probability of becoming a senior entrepreneur. Being a woman affects senior entrepreneurs by opportunity negatively (β = -0.225; ME = 0.0009), supporting hypothesis 4. Knowing an entrepreneur affects senior entrepreneurs by opportunity (β = 0.951; ME = 0.0056). Perceiving having the appropriate skills and capabilities also increases the probability of becoming a senior entrepreneur by opportunity (β = 1.5 38; ME = 0.0084). These results support hypotheses 5a and 5b. Previous entrepreneurial experience is not relevant for seniors, thus rejecting hypothesis 5c. Fear of failure negatively impacts senior entrepreneurs by opportunity (β = -0.299; ME = -0.0012) supporting hypothesis 6.

Regarding the contextual factors, the HDI variable seems negatively representative of opportunity (β = -5.901; ME = -0.0593). These results support hypothesis 7, suggesting that the contextual dimensions that are included in the HDI variable (i.e., long, and healthy life, education, and a decent standard of living) are relevant for determining the probability of becoming a senior entrepreneur by opportunity.

Summarizing, income levels, education levels, and occupations affect positively senior entrepreneurs through opportunity. Attitudes and perceptions also positively affect this group, but fear of failure affects it negatively. Previous experience as an entrepreneur does not have any effect. Being a woman negatively affects entrepreneurial activity. Regarding the contextual factors, the dimensions included in the HDI seem negatively relevant to determining the senior entrepreneurial activity by opportunity in the countries analyzed.

Discussion

Entrepreneurial activity of people older than + 65 in OECD countries is affected by individual and external/contextual factors. Our results show that a higher level of income increases the probability of becoming an entrepreneur by opportunity, suggesting that this variable influences the access of seniors to new opportunities in the market (Singh & De Noble, 2003). Additionally, higher levels of formal education help entrepreneurs identify these opportunities (Block & Sandner, 2009; Coduras et al., 2018). However, other researchers suggest that formal education is not relevant (Weber & Schaper, 2004; Pilkova et al., 2014; Martin & Omraní, 2019) or only relevant for some countries (Torres-Marín et al., 2020). For people older than 65 living in OECD countries, having an occupation seems to be a driver to find new opportunities to create a venture. This can be explained considering that having an occupation helps to identify opportunities in the market that then can be materialized in a new venture. Another perspective related to occupation is that for the OECD countries analyzed, lower net replacement rates drive higher levels of occupation for people over 65 years old (Appendix II, Fig. 1). This can be associated with the fact that pensions are not enough for people in these countries to survive with dignity and consequently, they may tend to look for full-time or part-time jobs in the job market instead of starting a new venture. It could also be partially explained because keeping active widens the

social and human capital of seniors, increasing their probability of creating a new venture. More research must be done to understand the reasons behind this.

Related to gender variable, the gender gap continues to be an issue in many OECD countries after 65 (OECD, 2021) and our results agree with other authors as being a senior woman decreases the probability of starting a new venture by opportunity (Driga et al., 2009; Minniti et al, 2005; Weber & Schaper, 2004). There are fewer opportunities for entrepreneurship for senior women (+ 65) in these countries. Some policy implications of these results are that the government should continue fighting against the male stereotype of entrepreneurs (Bruni et al., 2004), facilitating women's access to education (Delmar & Holmquist, 2004), and improving the financing conditions of entrepreneurial ventures led by women.

According to our results about perception and attitudes related to human capital and skills to be an entrepreneur are more important than previous experience to start a new business, which is consistent with other authors (Saiz-Alvarez & Coduras-Martinez, 2020; Vodă et al., 2020; Coduras et al., 2018; Velilla et al., 2018), as knowing other people that are starting new ventures or perceiving having the proper abilities and skills increase the probability to engage in entrepreneurial activity. However, fear of failure is a barrier for senior entrepreneurs by opportunity. This is also in line with other authors (Vodă et al., 2020), Coduras et al., 2018; Mancilla & Amorós, 2015; Bosma & Schutjents, 2011). This result suggests that the government should facilitate networking, even with younger entrepreneurs and other agents in the entrepreneurial ecosystem as well as create educational programs for older entrepreneurs (including financial education, and digital skills). Although some researchers suggested that previous experience as an entrepreneur increases the probability of starting a new business (Vodă et al., 2020; Saiz-Álvarez & Coduras-Martinez, 2020), our research shows that for seniors older than 65, entrepreneurial experience is not relevant. This finding requires more research.

Contextual factors are relevant for senior opportunity entrepreneurs, as HDI influences the entrepreneurial activity of this group. This finding is in line with some authors (Saiz-Alvarez & Coduras-Martinez, 2020; Amorós et al., 2023) who showed a negative relationship between HDI and the creation of new ventures. Given the aging of the population in many OECD countries, this will affect the creation of new companies, innovation, job creation, and economic growth (Maâlaoui & Razgallah, 2019; Almodovar-Gonzalez et al., 2019) policymaker should work to better understand the factors that motivate seniors to create new ventures and to develop programs to incentive them.

Practical and policy implications

Among the implications, it is worth highlighting, firstly, the fundamental role of education in promoting entrepreneurship among this group. Its effect is to increase the probability of opportunity entrepreneurship, probably because more educated individuals are more prepared to succeed in the labor market. This is why we believe that education should be promoted by governments. The promotion of education, especially if it is related to entrepreneurial activity, is key to encouraging

entrepreneurship in the senior segment. In the same line of argumentation, the increase in income, which is usually associated with an improvement in the education of individuals, also facilitates entrepreneurship by opportunity.

A greater focus on public policies in this field is needed. The results of investment in education are observed in the medium and long term, so these must be evaluated over time. However, government educational programs related to adult education with training cycles linked to innovation, entrepreneurship, the use of new technologies that enable digital business models (González-Padilla et al., 2023), and sources of financing can have a positive influence on the entrepreneurial activity of seniors.

A second implication is that being a woman negatively influences entrepreneurship by opportunity. This may be linked to gender inequality in the labor market for this age segment in developed countries. It is therefore essential to establish measures that facilitate the opportunity motivation of women. To strengthen women's entrepreneurial culture and increase their opportunities for entrepreneurship, the development of gender equality policies in the countries is key, as well as giving them better treatment in the funding of their ventures, and better educational programs. These policies leading to economically empowering senior women could help to reduce the gender-based violence that exists in this age segment in many countries (Guaita-Fernández et al., 2024). For this reason, it would be advisable to carry out an additional analysis around gender equality for the creation of new companies.

Third, the occupational factors have particularly important policy implications, given that, in most developed countries many people decide to retire after 65. So, government must create incentives programs to keep people active and promote entrepreneurship for them not only to increase income but also to help them achieve their dreams, self-fulfillment or to get an adequate level of social activity (Weber & Schaper, 2004; Heimonen et al., 2012; Wainwright et al., 2015; Matos et al., 2018; Guerrero & Serey, 2019; Soto-Simeone & Kautonen, 2021). These incentives could be developed by applying some Artificial Intelligence tools available to governments to predict the behavioral output of this age group (Saura et al., 2022). Besides, promoting self-employment and entrepreneurship among seniors can be considered as a strategy associated with national economic development (Matos et al., 2018). For instance, many European states have increased the retirement age and limited the possibility of early retirement to ensure active aging. It is also remarkable the positive impact of generating occupation via entrepreneurial activity for seniors, so the government should promote that people continue active after 65, giving them reasonable incentives. Moreover, senior entrepreneurs' motivations, aspirations, and context are different from entrepreneurs in other age segments and these differences must be leveraged to create specific policies to support them entering in the process of creating a new venture. Finally, the perceived availability of entrepreneurial skills and a good social network contribute to increasing the social capital of individuals and facilitating their entrepreneurship. So, these factors should be enhanced by governments both through improved (informal and formal) entrepreneurial training, as well as by fostering networking among individuals.

Finally, the multilevel analysis carried out shows that the level of development in the OECD countries analyzed - measured by the HDI - is an important factor in explaining opportunities for senior entrepreneurship in the OECD countries. As the territories have a better health and education system, as well as a higher per capita

income, their level of development leads older people to a reduction in entrepreneurial opportunity activity. This means that, given the foreseeable aging of the population, the developed countries face a potential reduction in entrepreneurial activity that must be addressed. The importance of the HDI shows that governments must adapt their policies to the situation of every country - region or territory - as well as to the sociodemographic and attitudinal characteristics of individuals, to promote their entrepreneurial spirit, thus generating economic growth and employment.

Theoretical implications

An interesting theoretical implication reflected in the research is the irrelevant impact of previous entrepreneurial experiences on the creation of new businesses for this specific group segment. This contradicts previous studies (Kibler et al., 2011). Maybe, other elements such as aspirations, achieving dreams, keeping social activity, or self-fulfillment are more relevant for people older than 65. More research should be done on this topic to identify which individual factors are relevant to enhancing entrepreneurship activities in the senior groups.

It is also very relevant to the fact that for people older than 65 living in this sample of OECD countries, having an occupation seems to be a driver to finding new opportunities to create a venture. This result also undermines other authors that identify that occupations reduce the time available to start a new business, and so reduce the entrepreneurial activity rate (Oelckers, 2015; Singh & De Noble 2003; Halabisky, 2012). This could be partially explained considering that having an occupation helps to identify more opportunities in the market that then can be materialized in a new venture, or because keeping active widens the social and human capital of seniors, increasing their probability of starting up new businesses.

Limitations and areas of future research

This research has some limitations. All the data used comes primarily from the GEM database – except for the HDI which comes from the United Nations database – for a limited set of twelve countries and five years, so the results obtained must be considered short-term and limited in geographic scope. In addition, there are institutional factors (social security, percentage of pension funds coverage, etc.) that could be relevant and have not been included in this study. The incorporation of other countries and other contextual variables will help to expand the quantitative evidence obtained in this article in future research.

Concerning potential areas for future research, further deepening of the entrepreneurial context and institutions in OECD countries, as well as for each one of the individual countries, it is needed to understand how internal factors act within the established environment and how they influence senior entrepreneurship. As it has been remarked in previous paragraphs, other potential research areas are the identification of the reasons why for people older than 65 living in OECD countries, having an occupation seems to be a driver to find new opportunities to create a venture, or why entrepreneurial experience seems not to be relevant for creation of a new company.

Conclusions

The main contribution of our research is the identification and quantification of the external and internal determinants of senior entrepreneurship (+65) by opportunity, in several OECD countries. In addition, it also aims to contribute to the development of government programs to promote senior entrepreneurship in the area, to serve as an example to other territories, and to deepen the understanding of the entrepreneurial activity of older individuals.

OECD governments should try to favor senior entrepreneurship to reduce the existing pressure on the social welfare system and ensure its sustainability. During the last decades, OECD labor markets have been improving and becoming more flexible. The transformation of labor has increased the pressure on the labor market, particularly in the senior segment, subjecting them to high exclusion risk. In addition, in some countries, the situation of age discrimination in the workplace starts to appear, generating a high social and economic impact. Digital transformation of the economy also adds a level of risk for the seniors, as they may not be suitable for the positions available in the markets. Therefore, it is remarkably interesting to understand the characteristics and nature of senior entrepreneurial activity, to create a legal framework, as well as high-impact public policies in the countries. The increase in entrepreneurial activity would also contribute to creating wealth, reduce the pressure on this segment of the population in the labor market, and complement public employment policies and corporate practices of inclusion and diversity.

Appendix

Appendix I: Retirement age for the different countries in this research

Country	Retirement Age
AU	59.0
CA	60.0
CH	65.0
CL	65.0
EE	64.3
FR	62.0
NL	66.7
PL	65.0
SE	62.0
SI	65.0
UK	66.0
US	62.0

Source: OECD (2021)

Appendix II: Net replacement rate and percentage of people over 65 years old that have a full-time/part-time job

Country	Net replacement rate	% of people older 65 that have a full-time/part-time occupation
AU	47.6%	23.9%
CA	49.3%	33.9%
CH	45.4%	15.9%
CL	35.6%	43.0%
EE	56.1%	30.1%
FR	70.7%	10.2%
NL	87.8%	12.8%
PL	42.5%	12.9%
SE	54.6%	17.8%
SI	58.8%	4.6%
UK	28.5%	16.1%
US	46.9%	38.2%

Source: Own elaboration

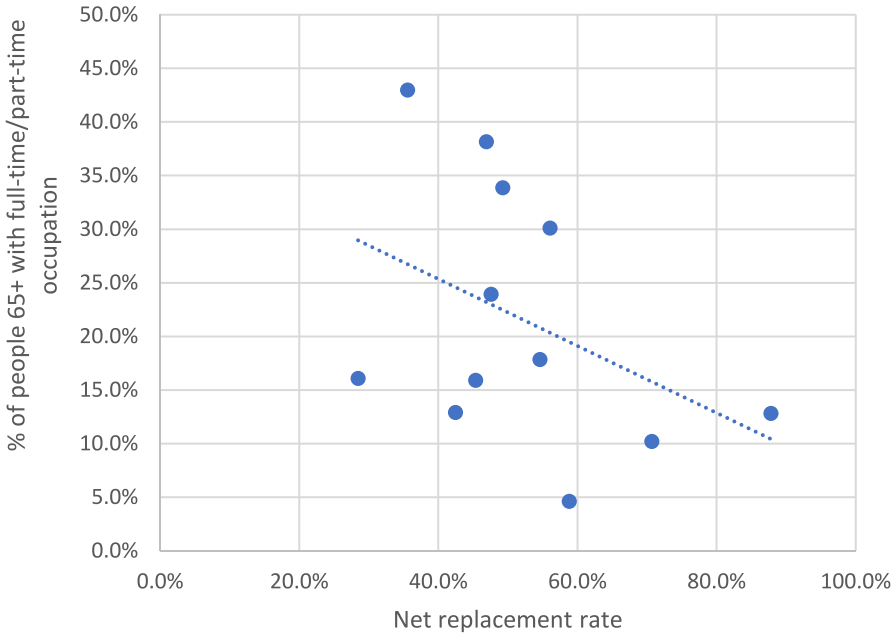

Fig. 1 Elder population with employment vs. net replacement rates. Source: Own elaboration

Data Availability The data that support the findings of this study are available from the corresponding author upon request.

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