Entrepreneurial Activity and Education: An Empirical Study

Bachelor Thesis

International Bachelor Economics and Business Economics

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 ABSTRACT:

In the past, researchers associated higher levels of education with increases in entrepreneurial activity. However, more recent findings suggest that, contrary to previously believed, higher education levels decrease entrepreneurial activity (as measured by business ownership rates). Therefore, this paper attempts to confirm whether formal education indeed lowers business activity levels. For this, this research focuses on dynamic indicators of new business activity, namely the entrepreneurial intentions (EI) rate and the total early-stage entrepreneurial activity (TEA) rate from the Global Entrepreneurship Monitor (GEM). Furthermore, the effects of entrepreneurial self-efficacy (ESE) as a possible mediator as well as subjective norms and the quality and type of education as possible moderators are investigated. Panel data from seventy-eight countries across the globe were used to build fixed-effects models to evaluate the relationship between education and entrepreneurial activity at the country level and assess the moderators' significance. No evidence was found for a negative relationship between education and EI nor for between education and TEA. Similarly, the influence of the moderators in the model for EI was non-significant. Nonetheless, in the model for TEA, all moderators were found to be significant. Furthermore, ESE was found to be a significant mediator in both relationships.

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1   Introduction

Since the importance of entrepreneurship was unveiled, policymakers have often tried to boost economic value creation by encouraging increased business ownership rates (BOR) in their countries (van Praag & van Stel, 2013). However, van Praag and van Stel (2013) argue that this is incorrect. The authors explain that there is indeed a positive relationship between entrepreneurial activity and economic value creation; however, it is only the best performing business owners who create the most value. Thus, van Praag and van Stel (2013) argue that the worst-performing business owners would add more to the economic value creation if they engaged in the market as employees instead. Therefore, they postulate and prove the existence of an optimal BOR for each country. Furthermore, they also find that countries with higher participation rates in tertiary education have more productive business ownership; hence, the optimal BOR decreases as the population's education level increases.

However, in their study, van Praag and van Stel (2013) only use tertiary education as the indicator for the (entrepreneurial) ability levels of the population. This disregards the importance of the abilities that people who only attend primary and/or secondary school may acquire compared to those who do not attend or complete either. Furthermore, van Praag and van Stel (2013) use BOR as their entrepreneurship indicator. This is what is known as a static indicator. However, past literature acknowledges that entrepreneurial activity is a process rather than a one-time experience (GEM, 2019; van der Zwan, Thurik, & Grilo, 2010). Therefore, I aim to address whether van Praag and van Stel's findings hold using a more dynamic view in this report. For this, I will employ two dynamic indicators of entrepreneurship from the Global Entrepreneurship Monitor, namely the entrepreneurial intentions (EI) rate and the total early-stage entrepreneurial activity (TEA) rate. Thus, the following research question is formulated:

"How does the level of formal education relate to entrepreneurial intentions and new entrepreneurial activity at the country level?"

Furthermore, I will also analyze how individuals' self-perception of their capabilities may mediate the relationship between education and entrepreneurship. Similarly, I also consider that subjective norms, the quality of education, and the degree to which entrepreneurship is embedded within an educational system varies per country. Therefore, I will assess to which degree these variables may moderate the relationship in question.

Most entrepreneurship programs and research focus on tertiary education. Therefore, by investigating the role that general formation education (i.e., primary, secondary, and tertiary education) plays in creating entrepreneurship in a country, I will significantly contribute to the existing literature. Furthermore, previous papers investigating the influence of education on entrepreneurship have focused on either developed or developing countries (e.g., Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011; Sluis, Praag, & Vijverberg, 2005; van Praag & van Stel, 2013). Contrary to them, this paper examines (recent) data from seventy-eight countries from all the continents and development stages, therefore exploring the universality of the optimal entrepreneurship rate proposed by van Praag and van Stel (2013). Moreover, this research's relevance is also practical. Evidence for a negative relationship between education and entrepreneurship entry would support the idea of an optimal BOR, therefore suggesting governments to stop encouraging a mindless increase in entrepreneurial activity through their policies. Similarly, by studying the moderators and mediator's influence above, this paper will help policymakers understand entrepreneurship better and provide them with some additional advantages to develop policies that indeed affect entrepreneurship.

To address the research question, I break down my paper into six main chapters. These are (1) introduction, (2) theoretical framework, (3) data and sample selection, (4) methodology, (5) results, and (6) discussion & conclusion. In the first chapter, I introduced and motived the topic of my research. Chapter two will discuss the theory behind EI, TEA, and the relationship between education and entrepreneurship. Furthermore, I will also discuss the role of subjective norms, entrepreneurial self-efficacy, the quality of the education in a country, and the degree to which entrepreneurship is embedded in the educational system in the education-entrepreneurship relationship. In chapter 3, I will specify the sources from which I collected the data for this study, and I will explain the criteria I use for the sample selection. Chapter 4 will discuss the variables used to perform the quantitative analysis of this paper and the analytical techniques employed for it. Next, in chapter 5, I discuss the results obtained from performing the analyses discussed in chapter 4. Finally, in chapter 6, I summarize my findings, discuss them in light of the existing literature, and answer my research question.

2   Theoretical framework

This section discusses entrepreneurship and using EI and TEA as indicators for entrepreneurial activity (section 2.1). Subsequently, I use the existing literature to hypothesize a negative relationship between the level of formal education in a country and entrepreneurial activity (section 2.2). After, in section 2.3, I consider the role self-perception of one's capabilities may play in mediating the relationship between the level of formal education in a country and entrepreneurship. Finally, in sections 2.4 and 2.5, I hypothesize the moderating role of subjective norms, the quality of education, and the type of education in the relationship between education and entrepreneurship at the country level.

2.1 Entrepreneurship

Entrepreneurship is a widely researched subject that has attracted the attention of scholars from several disciplines, such as economics, business administration, management, psychology, sociology, strategy, finance, marketing, and even geography (Carlsson, et al., 2013). The diversity among the fields studying entrepreneurship is understandable as they are as varied as the scope of topics one can study within entrepreneurship. Some of the most notable findings from past research are that entrepreneurial activity can significantly enhance the economic growth and development of countries; it creates jobs; encourages innovation; and promotes productivity (Acs & Audretsch, 1990; Neumark, Wall, & Zhang, 2011; Wennekers & Thurik, 1999). Yet, after researching entrepreneurship for over five decades, there is still debate on how it should be defined. In occupational choice models owning a business or being self-employed is enough to be recognized as an entrepreneur, whereas according to Schumpeter's theory, self-employed people should not be considered entrepreneurs unless they are innovators (Iversen, Jørgensen, & Malchow-Møller, 2008).

For this research, I will adhere to a definition closer to the one used by occupational choice models, i.e., entrepreneurship is "any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business" (GEM, n.d., para. 2). By acknowledging not only formal business activity (i.e., newly registered businesses) but also individuals' behavior before starting a new business venture (i.e., nascent entrepreneurship) as part of the entrepreneurial process, the Global Entrepreneurship

Monitor[1] (GEM) expands the scope of the conventional dynamic measure of entrepreneurship –a measure of entrepreneurship that focuses on quantifying entrepreneurship through the number of new (registered) firms rather than incumbent firms (van Praag & van Stel, 2013). Thereupon, the GEM's primary indicator for entrepreneurial activity is born, namely, the *total early-stage entrepreneurial activity* (TEA) rate. The TEA rate is calculated by measuring the percentage of the population aged 18-64 who is either a nascent entrepreneur or the owner-manager of a new company (three and a half years old or younger) (GEM, n.d.). Nonetheless, the GEM recognizes TEA as only one part of the entrepreneurial process.

First, the GEM (n.d.) proposes potential prerequisites for entrepreneurial activity, such as portraying specific attitudes towards entrepreneurship, to be recognized as a potential entrepreneur. Subsequently, (after possibly exhibiting entrepreneurial attitudes), an individual may develop actual intentions to engage in entrepreneurship – within the next three years. The GEM (2019) recognizes this as the entrepreneurial intent phase. Later on, if an individual takes part in starting up a business, (s)he becomes a nascent entrepreneur and hence enters the TEA phase. Afterward, when the business is registered, the individual becomes the owner-manager of a new firm. Eventually, if the company turns older than three and a half years old, (s)he becomes the owner-manager of an established firm. Thus, exiting the TEA phase. Finally, the GEM also recognizes the discontinuation of a business as part of the entrepreneurial process. They acknowledge that this may occur at any point after the firm's birth; thus, it may take place while in the TEA phase or after.

Krueger and Carsrud (1993) argue that studying entrepreneurial intentions (EI) is the core of understanding the entrepreneurial process. According to them, EI allow us to comprehend by what means and how much the antecedents to entrepreneurial activity influence its emergence. To define entrepreneurial intentions, I follow Nabi, Holden, and Walmsley's definition, i.e., EI are a "conscious awareness and conviction by an individual that they intend to set up a new business venture and plan to do so in the future" (2010, p. 538). A conscious state of mind usually guides the decision-making process –including the one corresponding to career choice– that leads to action (Bird, 1988). It is strongly believed that the more intense an intention is, the more likely it is for the behavior to be realized (Kor & Mullan, 2011; Sabah, 2016). That is why EI are considered a pivotal predictor for entrepreneurial activity (Bird, 1988; Nabi, Holden, & Walmsley, Entrepreneurial intentions

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[1] GEM is the largest international consortium with ongoing data collection about entrepreneurial dynamics in the world (GEM, n.d.).

among students: towards a re-focused research agenda, 2010). It is important to note that not all EI turn into action. Nonetheless, the GEM (2018) argues that business owners must have planned or at least deliberated on becoming entrepreneurs. Thus, EI can be considered the nearest indicator of entrepreneurial potential in a society (GEM, 2018).

One of the most notorious theoretical contributions to the study of human behavior prediction is Ajzen's (1991) Theory of Planned Behavior (TPB). The TPB focuses on an individual's intentions to engage in a behavior at a particular time and place. Nabi et al. (2011) evaluated and validated the TPB's power of prediction in countries with different development stages and cultures. Therefore, many researchers investigating entrepreneurial intentions opt to examine their formation using the TPB. According to the TPB, three main motivational factors affect intentions and, hence, behavior: the personal attitude toward the behavior (ATB), perceived behavioral control (PBC), and subjective norms (SN). Sabah (2016) notes that in the entrepreneurship context, these can be interpreted as follows:

1. *Attitude toward the behavior*. Individuals' attitude toward entrepreneurship is based on their favorable or unfavorable evaluation of being an entrepreneur. The more favorable a person perceives to become an entrepreneur, the stronger his or her intentions will be. According to the proposed model, an attitude is not an ingrained posture but rather something that can be learned (Krueger, 2000).
2. *Perceived behavioral control.* PBC refers to how easy or difficult a person finds to perform a specific behavior, e.g., working without supervision. This will determine how much control this person perceives to have over the behavior. In past literature, PBC seems to be the most influential antecedent of intention (Armitage & Conner, 2001). It is universally considered a significant factor when it comes to EI formation (Siu & Lo, 2013). Therefore, this will be revisited in section 2.3.
3. *Subjective norms.* SN deal with what an individual believes is the social consensus about a particular behavior, i.e., whether (s)he thinks people close to him or her approve of the behavior or not. In this case, colleagues, family, and friends may vary in importance depending on the individual and in which phase of life (s)he is.

The GEM (n.d.) claims that using their data for research is particularly interesting as they concentrate on individuals as observation units. Thus, they do not only look at the number of entrepreneurs but also how individuals' behaviors and beliefs affect general entrepreneurial activity. The GEM investigates both individual-specific (e.g., self-efficacy

perceptions, fear of failure, etc.) as well as national (e.g., entrepreneurship as a desirable career, a high social status awarded to the self-employed, etc.) behaviors and beliefs about entrepreneurship that may influence someone's decision to become an entrepreneur. For this research, besides investigating how education affects entrepreneurship entry, I am interested in investigating how some of these behaviors and beliefs impact entrepreneurship formation in different countries. Therefore, I will use entrepreneurial activity indicators that focus on individuals in the first phases of the entrepreneurial process, namely, the EI rate and the TEA rate from the GEM. The EI rate is composed of the percentage of the population aged 18-64 who either is a *latent entrepreneur*[2] or intends to start a business within the next three years. This indicator allows us to identify the entrepreneurial potential in a country. Additionally, to investigate the persistence of the impact of these behaviors and beliefs (if any) on nascent entrepreneurs and owner-managers of a new firm, I will use the TEA rate.

2.2 Entrepreneurship and education

The importance of education has long been established as vital for economic development. Its power to increase people's knowledge and skills (i.e., their human capital) makes it one of the most important investments in oneself (Schultz, 1960). Education does not only improve cognitive functions, but it also increases one's productivity and income (van der Sluis, van Praag, & Vijverberg, 2005). Therefore, researchers became curious about the role education played in entrepreneurship and its importance for entrepreneurs.

Van der Sluis, van Praag, and Vijverberg (2005) confirmed that an entrepreneur's human capital (acquired through education) was one of the most substantial drivers for entrepreneurial performance and success. This unraveled a new string of investigation about the (economic) returns for entrepreneurs. Van Praag, van Witteloostuijn, and van der Sluis (2013) found that entrepreneurs obtain higher payoffs from education than employees. The authors argue that this is due to the fewer organizational constraints they face, which allows them to control better the use of their human capital relative to employees. Additionally, Kolstad and Wiig (2015) find that an extra year of (primary) education significantly increases entrepreneurial profitability. They sustain that primary school provides the necessary set of (generalized) competencies that are the base for the wide range of skills entrepreneurs need to succeed. This seems to be compatible with the idea that entrepreneurs need generalized knowledge and skills to succeed in business (Lazear, 2004).

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[2] individuals who would prefer to be self employed (Gohmann, 2012)

Nonetheless, other authors find that even though highly educated people would experience the highest returns for their education as entrepreneurs, they still tend to prefer to become employees instead (Nabi, Holden, & Walmsley, Entrepreneurial intentions among students: towards a re-focused research agenda, 2010; Teixeira & Forte, 2017). This could be because highly specialized people tend to have the highest levels of education. Consequently, it is most attractive for them to work as specialists in a large company rather than to become entrepreneurs. Again, this is in line with Lazear's theory of entrepreneurship as he sustains that specialists should work for others. In contrast, according to Lazear (2004), entrepreneurs should become generalists (i.e., be knowledgeable in a wide range of subjects) to be able to determine who to hire to perform specific tasks. This leads to my first hypothesis:

H1   Entrepreneurial intentions are lower in countries with higher levels of formation education.

Furthermore, van Praag and van Stel (2013) note that only a fraction of the working force receives higher compensation as an entrepreneur rather than as an employee. Therefore, they argue that an optimal division of the labor force, as discussed in occupational choice models (i.e., a division of the workforce between wage-employment and entrepreneurship) must exist. Moreover, van Praag and van Stel (2013) explain that a business owner's returns are directly related to the economic value their enterprise creates. Only the top business owners create the most value as they have the highest performance levels (as measured by both income and growth). The authors indicate that, as expected from microeconomic theory, evidence shows that these top-performing business owners have higher levels of education. At the country level, these higher levels of human capital translate into more productive businesses. In turn, this means that fewer (larger) firms are needed to create the same amount of value, thus decreasing the optimal BOR (van Praag & van Stel, 2013). Therefore, H2 is formulated as follows:

H2   Total early-stage entrepreneurial activity is lower in countries with higher levels of formation education.

2.3 The mediating role of perceptions

As aforementioned, an individual's PBC plays a major role in forming their intentions to perform a specific behavior. Usually, self-efficacy is used to measure PBC since both relate to an individual's self-perceptions rather than his or her actual abilities or skills (Sabah,

2016). It has been established that general self-efficacy can positively impact different social-cognitive variables, such as intentions, their implementation, and self-regulation. Besides, self-efficacy does not only enhance goal setting, but it also provides motivation to persevere in pre-set goals. In other words, self-efficacy can help strengthen an individual's intention to become an entrepreneur and the likelihood to take action upon it (Luszczynska, Scholz, & Schwarzer, 2005). Therefore, several authors advocate for the importance of *entrepreneurial self-efficacy* (ESE) in the formation of EI (Barbosa, Gerhardt, & Kickul, 2007; McGee, Peterson, Mueller, & Sequeira, 2009). Essentially, ESE measures the degree to which an individual believes they can successfully start a business venture (McGee et al., 2009). Additionally, Kickul et al. (2009) confirm that ESE positively impacts entrepreneurial behavior in different stages of the entrepreneurial process.

Moreover, positive effects of education on ESE have been found (Mishra & Metilda, 2015; Shinnar, Hsu, & Powell, 2014). Shinnar, Hsu, and Powell (2014) argue that education can build up individuals' ESE assessment. They note that self-efficacy can be developed through the possibility to engage in specific tasks regularly and master them. Thus, allowing the enhancement of a person's confidence in their ability to execute similar tasks in the future successfully. Furthermore, by receiving feedback from teachers and peers, a person is subject to subjective norms. According to the social cognitive theory, this is also a way to strengthen and develop one's self-efficacy (Wood & Bandura, 1989).

Because of the positive relationship between ESE and entrepreneurial activity on the one hand and one between formal education and ESE, on the other hand, the following hypotheses are formulated:

H3   Entrepreneurial self-efficacy positively mediates the negative relationship between the level of formation education and entrepreneurial intentions at the country level.

H4   Entrepreneurial self-efficacy positively mediates the negative relationship between the level of formation education and TEA at the country level.

2.4 The moderating role of subjective norms

Subjective norms are an influential factor in the formation of intentions (Ajzen, 1991). The main reason for adding this element to the TPB model is the assumption that human behavior, to an extent, is modeled by the attitude of other people towards a specific behavior (Engle, et al., 2010). Sabah (2016) notes that these norms' impact has been questioned, as

some studies found SN to be non-systematic and insignificant. However, Armitage and Conner (2001) attribute this to poor SN measurement techniques. Furthermore, Krueger (2000) argues that the SN are weighted by one's willingness and keenness to behave according to these beliefs. Therefore, other authors argue that SN are especially effective in predicting behavior within collectivistic cultures (Liñán & Chen, 2009; Siu & Lo, 2013). Thus, H5 and H6 are formulated as follows:

H5   Social beliefs about entrepreneurship being a good career choice moderate the negative relationship between the level of formation education and entrepreneurial intentions at the country level. The negative relationship is weaker in countries with stronger social beliefs about entrepreneurship being a good career choice.

H6   Social beliefs about entrepreneurship being a good career choice moderate the negative relationship between the level of formation education and TEA at the country level. The negative relationship is weaker in countries with stronger social beliefs about entrepreneurship being a good career choice.

2.5   The moderating role of the quality and type of education

Despite the key role education plays in developing societies, not all countries have been able to establish a high-quality educational system. It is especially in undeveloped or developing countries where people do not have access to quality education or any kind of education for that matter (World Population Review, 2020). According to the World Economic Forum (WEF), quality education is pivotal for a country's economy to develop advanced production processes and do more than produce simple products. Nowadays, globalization puts extra pressure on countries to provide knowledgeable workers who can quickly adapt to the ever-changing global economy and production system as well as to perform complicated tasks if they want to stay relevant (World Economic Forum, 2017).

Furthermore, as previously discussed, a well-educated population means that the human capital level of a society is higher, therefore giving way for a more productive economy that allows for a higher optimum level of entrepreneurship. However, this also means that workers are better capacitated, thus permitting higher levels of specialization. As such, the optimal division of the labor force between wage-work and entrepreneurship is eased, and a country can more rapidly reach its optimal BOR. Thus, to consider the quality differences among educational systems per country, the following hypotheses are formulated:

H7   The quality of the educational system moderates the negative relationship between the level of formation education and entrepreneurial intentions at the country level. The negative relationship is stronger in countries with a high-quality educational system.

H8   The quality of the educational system moderates the negative relationship between the level of formation education and TEA at the country level. The negative relationship is stronger in countries with a high-quality educational system.

Moreover, some people were still unsure of the efficacy of education for entrepreneurship. Nowadays, there seems to be a consensus that even though entrepreneurship is not only about skills, at least some of the most important ones can be taught (Gorman, Hanlon, & King, 1997; Kuratko, 2005). Accordingly, many universities and institutes have developed training programs focused on entrepreneurship. It has been shown that entrepreneurship education and training can make students' attitudes towards entrepreneurship more positive (Autio, Keeley, Klofsten, Parker, & Hay, 2001), thus diminishing the negative effect of general education on entrepreneurship. Therefore, the following hypotheses are formulated:

H9   The embeddedness of entrepreneurship in the educational system moderates the negative relationship between the level of formation education and entrepreneurial intentions at the country level. The negative relationship is weaker in countries with an educational system in which entrepreneurship is firmly embedded.

H10 The embeddedness of entrepreneurship in the educational system moderates the negative relationship between the level of formation education and total early-stage entrepreneurial activity at the country level. The negative relationship is weaker in countries with an educational system in which entrepreneurship is firmly embedded.

3 Data and sample selection

In this section, first, I indicate the sources I use to collect the data for this study; then, I mention the data's origin and the years to which they relate (section 3.1). Subsequently, I discuss the criteria I use to select the sample (section 3.2).

3.1 Data sources

For this research, I use three primary data sources, namely the Global Entrepreneurship Monitor (GEM), the United Nations (UN), and the World Bank (WB). I selected these data sources based on the quality and quantity of their entrepreneurship and education data.

To examine the entrepreneurial activity in different countries, I use both the *Entrepreneurial Framework Conditions* and the *Entrepreneurial Behavior and Attitudes* datasets from the GEM. These datasets provide information on different conceptual frameworks for entrepreneurship, such as individual attributes, environmental conditions, social values towards entrepreneurship, and entrepreneurial activity measurements in over 100 countries in 2001–2019. Nonetheless, it should be noted that the data they provide is not complete for all countries and years.

Furthermore, to evaluate the amount of education imparted in each country, I use the Human Development Database of the UN. This database contains information on different human development dimensions of over 180 countries. These dimensions are measured through various indexes, such as the life expectancy index, the education index, and the GNI index. Similarly, this database also offers other broader indices on fundamental human development issues, such as poverty, gender disparity, and inequality—the Human Development Report written by the United Nations Development Program (UNDP) team explains them more in-depth.

Finally, I use the WB to access specific databases in a more standardized manner, such as the ILOSTAT database, TCdata360, and the World Development Indicators database. While the WB manages the latter two databases, the International Labour Organization oversees ILOSTAT. The ILOSTAT database specializes in providing information about labor statistics in more than 180 countries. Moreover, the TCdata360 contains open data on international competitiveness and trade measurements. Lastly, the World Development Indicators database provides cross-country statistics about the environment, economy, people, poverty & inequality, states & markets, and global link of more than 200 economies.

3.2 Sample selection

In this research, I aim to make a cross-country comparison of the effect education has on entrepreneurship. Given that the observation unit in this study is the country, and I aim to find a general effect, I seek to maximize diversity (London School of Economics, 2010). Thus, the countries I use (see Figure 3.1) were selected on the data availability for the main variables in this study. Furthermore, the data collected is from 2007-2017, thus, resulting in panel data. The reason to choose this period is that the data from one of the variables of interest, namely the quality of education, was only available for these years.

Moreover, to control outliers' influence, I only included a country in the sample if it had more than four observations (prior to the interpolation) for each entrepreneurial activity measurement variable. This threshold was chosen, given that I seek diversity, and imposing a stricter restriction would significantly drop the analysis sample size. Furthermore, this empirical analysis dataset contains information from 78 countries (see Appendix A for the detailed list), providing a total of 858 country-year observations. Finally, after selecting each country into the sample, I interpolated seven variables' data to reduce the number of missing values. These variables can be recognized as they carry an "i" in front of their name.

Figure 3.1   Map of countries included in the study (colored per continent).

4   Methodology

In this chapter, first, I specify the variables I will use for the empirical analysis of this research, how they are measured, and what their values represent (section 4.1). Similarly, I also briefly discuss the descriptive statistics at the end of section 4.1. In section 4.2, I discuss the different analytical techniques I use to evaluate the collected data, namely, the Hausman test, fixed effects regressions, mediation analysis, and moderation analysis.

4.1   Variables

4.1.1 Main variables

4.1.1.1 Entrepreneurial intentions (EI)

As aforementioned, to measure entrepreneurial intentions, I will use the EI rate from the GEM. This indicator is assessed through the 'Adult Population Survey' (APS), where at least 2000 individuals aged 18-64 are interviewed. The respondents who (are not yet involved in any entrepreneurial activity stage and) agree they are latent entrepreneurs and intend to set up a business in the next three years are considered to have entrepreneurial intentions. The EI rate ranges between 0-100, where 100 represents 100% of the 18-64 population in a country who are latent entrepreneurs and have intentions to set up a business within three years.

4.1.1.2 Total early-stage entrepreneurial activity (TEA)

Similarly, the TEA rate is also assessed through the APS. It is calculated by determining the 18-64 population percentage, who either is a nascent entrepreneur or owns-manages a new firm. The TEA rate fluctuates between 0-100, where 100 represents 100% of the (18-64) population who either own-manage a new venture or are nascent entrepreneurs.

4.1.1.3 Education index

Education is the primary explanatory variable for this research. For this paper, I use the education index from the human development index (HDI) to measure each country's education level. The education index is calculated by taking the mean of years of schooling (MYS) and expected years of schooling (EYS) in a country, as indicated by formula 1.

$$Education\ index = \frac{EYS+MYS}{2} \tag{1}$$

To transform the indices into units between 0 and 1, the UNDP first sets minimum and maximum values for the indicators. In the case of education, the UNDP (2019) sustains that societies do not need a formal education to survive. Therefore, for both MYS and EYS, the

minimum is set to 0 years. The maximum EYS are 18 since, in most countries, this is comparable to acquiring a master's degree. For MYS, the maximum is a projection that the UNDP has developed alongside other renowned institutions such as UNESCO and UNICEF. MYS is projected at a maximum of 15 years for 2025. The dimension indices are calculated as indicated by formula 2.

$$Dimension\ index = \frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value} \qquad (2)$$

4.1.3 Mediation variable

4.1.3.3 Perceived capabilities (PC)

The GEM measures ESE by asking individuals (who are not yet involved in any entrepreneurial activity stage) in the APS if they believe they have the necessary knowledge and skills to start a business. Identically to the previous GEM rates, the PC rate oscillates between 0-100, where 100 represents 100% of the 18-64 population in a country who believes they possess the essential skills and knowledge to set up a business.

4.1.4 Moderation variables

4.1.3.1 Entrepreneurship as a good career choice (EGCC)

To measure the moderating power of subjective norms in the relationship between education and entrepreneurship at the country level, I will employ the EGCC rate indicator from the GEM. This indicator is measured by calculating the percentage of the population aged 18-64 who agree that in their country, starting a business is considered a desirable career choice by most people (GEM, n.d.). As with previous GEM rates, the EGCC is also collected through the APS, and it ranges between 0-100, where 100 represents 100% of the 18-64 population in a country who agrees that entrepreneurship is a good career choice.

4.1.4.2 Quality

To measure the quality of education in each country, I will use the 'quality of the education system' indicator from the WEF. This indicator is measured on a 1-7 scale, where a score of 7 represents an educational system that (according to its population) addresses the needs of a competitive economy (World Economic Forum, n.d.).

4.1.4.3 Basic school

The basic school (BS) variable stands for the 'basic school entrepreneurial education and training' indicator from the GEM. This indicator measures "the extent to which training

in creating or managing small and medium-sized enterprises (SMEs) is incorporated within the education and training system at primary and secondary levels" (GEM, n.d., para. 23). This indicator is quantified in a 1-9 Likert scale, where 1 represents a completely false claim and 9 a completely true one. Unlike previous indicators, the BS indicator is not estimated through the APS but through the National Experts Survey (NES). This survey is held to gather the views from (sometimes local) additional experts.

4.1.2 Control variables

The set of control variables is based on the study by Wennekers, Thurik, van Stel, and Noorderhaven (2007). This study provides a detailed overview of entrepreneurship determinants, both demographic and economic, at the country level. Unfortunately, due to the lack of comparable data for several countries in this study, some variables, namely, the entrepreneurial income relative to the wage rate, the social security entitlements, the cost of capital, and the cost of assets, could not be included. All the other variables specified by Wennekers et al. (2007) are derived from the World Bank.

4.1.2.1 Gross Domestic Product (GDP) per capita

The logarithm of per capita GDP is included in the model as a control variable. It is relevant because countries with higher economic development (especially those who highly avoid uncertainty) will have more stable professional earnings, where the risk and opportunity cost of becoming an entrepreneur is higher. Therefore, making entrepreneurship more unattractive (Wennekers, Thurik, van Stel, & Noorderhaven, 2007). The WB measures this indicator in current thousands of U.S. dollars converted by the purchasing power parity (PPP) conversion factor.

4.1.2.2 Services

The services sector's share[3] tends to increase (relative to manufacturing) in more economically developed countries. Also, self-employment rates are noticeably higher in services (compared to the manufacturing sector). Thus, the more prominent the services sector is in an economy, the higher the entrepreneurial activity is expected to be (Wennekers, Thurik, van Stel, & Noorderhaven, 2007). The WB measures the services variable as the percentage of total employment that employment in services represents, where 100% would represent a labor market completely made up of service jobs.

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[3] "The services sector consists of wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; and community, social, and personal services" (World Bank, n.d., para. 3).

4.1.2.3 Unemployment

High unemployment rates can indicate austerity in a country, which often translates to stunted business opportunities, therefore discouraging entrepreneurship (Wennekers, Thurik, van Stel, & Noorderhaven, 2007). The WB quantifies the unemployment indicator as the percentage of the total labor force (who is available for and seeking employment) that do not have work. In this case, 100% would represent a country with complete unemployment.

4.1.2.4 GINI

The Gini index measures income disparity in a country. Some scholars sustain that due to the facilitated asset accumulation, which is necessary for business formation, countries with more inequality will have higher self-employment rates (Wennekers, Thurik, van Stel, & Noorderhaven, 2007). The WB estimates the Gini index as a coefficient between 0-100, where 0 represents perfect equality and 1 perfect inequality.

4.1.2.5 Workforce

The workforce variable is included to account for the age composition of the population. Wennekers et al. (2007) note that an aging population can be a threat to entrepreneurship since nascent entrepreneurship is highest among the 25-34 population. The workforce variable is calculated as the percentage of the population aged 15-64, i.e., the percentage of the population old enough to belong to the workforce.

4.1.2.6 Population density

According to Wennekers et al. (2007), more populated areas can bring about economies of scale, putting SMEs under pressure. Nonetheless, other supply-side factors and networks in urban areas can be favorable for new businesses, especially in the services sector. Therefore, the effect of this indicator on entrepreneurship is ambiguous. This indicator is measured as the number of people per square kilometer of land area.

4.1.2.7 Female

Several surveys have found that, in general, women are less likely to get involved in entrepreneurship. Therefore, a higher labor participation rate of women translates to a reduced BOR in the labor force. The WB measures this indicator as the percentage of the 15-64 population economically active, which is female.

Table 4.1   Descriptive statistics for the analysis of the 78 countries in this study (see Appendix A).

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Main variables					
Education index	858	0.74	0.12	0.38	0.95
iEI	676	20.50	14.58	0.98	79.08
iTEA	676	11.70	7.13	2.35	38.60
Year	858	2012	3.16	2007	2017
Mediating variable					
iPC	676	50.41	14.69	8.65	87.69
Moderating variables					
iEGCC	654	64.82	13.31	24.27	95.62
iQuality	831	3.99	0.99	1.94	6.24
iBasic School	568	2.04	0.38	1.15	3.43
Control variables					
Log of GDP per capita	852	9.92	0.87	6.59	11.85
Services	858	62.56	13.97	20.37	87.94
Unemployment	858	8.14	5.86	0.14	34.93
iGINI	628	37.08	7.99	23.70	63.40
Workforce	858	66.62	5.40	48.55	86.40
Population density	858	316.93	1115.94	2.71	7915.73
Female	858	58.31	16.38	14.22	86.17

Note. All variables with an 'i' in front of them are derived from interpolated data. The list of countries can be found in Table A.1 in Appendix A.

Last but not least, descriptive statistics can be found in table 4.1. There it can be noticed that the observed entrepreneurial intentions (n=676) in all 78 countries along the eleven years observed (n=858) averaged 20.50 percent (s=14.58). In other words, around 20.50 percent of the 18-64 population of all countries combined in the 2007-2017 period were latent entrepreneurs and had intentions to set up a business within three years. Furthermore, an average of 11.70 percent (s=7.13) of the 18-64 population of all countries combined in the 2007-2017 period either owned-managed a new venture or were nascent entrepreneurs (i.e., they participated in TEA). Moreover, the total education index measurements (n=858) averaged 0.74 units (s=0.12) in the sample countries.

4.2 Analytical techniques

To make the cross-country comparison during the 2007-2017 period (i.e., to examine the panel data), I built one Fixed Effects (FE) regression model for each of my entrepreneurial activity indicators. For both regressions, I used the education index as the main explanatory variable. Also, I included the control variables discussed above to account for the (time-varying) differences in each country (see equations 3 and 4). These main models are used to test hypotheses 1 and 2. The choice for FE is based on the Durbin-Wu-Hausman test, which discerns between the FE and the Random Effects (RE) models. The Hausman test resulted in a p-value of 0.0000 for both models, which means that the null hypothesis (stating that the difference in coefficients is not systematic, i.e., RE is the preferred model) can be rejected for both models at a 95% significance level.

Furthermore, FE models are useful for this study since they consider the relationship between the causal variable (X) and the outcome variable (Y) within an entity – in this case, within a country– over time, excluding the influence of time-invariant individual-specific predictor variables. Thus, FE allows excluding the influence of (time-invariant) country-specific characteristics such as a country's geographical position or its political system (which can influence economic development).

For the first hypothesis (proposing that EI are lower in countries with higher levels of formation education), the regression equation is formed as follows:

$$iEi_{it} = \alpha_0 + \beta_1 * Education\ index_{it} + \beta_2 * Log\ of\ GDP\ per\ capita_{it} +$$
$$\beta_3 * iGINI_{it} + \beta_4 * Female_{it} + \beta_5 * Workforce_{it} + \beta_6 * Services_{it} + \qquad (3)$$
$$\beta_7 * Population\ density_{it} + \beta_8 * Unemployment_{it} + \varepsilon_{it}$$

Similarly, for the second hypothesis (stating that TEA is lower in countries with higher levels of formation education), the regression equation is formed as follows:

$$iTEA_{it} = \alpha_0 + \beta_1 * Education\ index_{it} + \beta_2 * Log\ of\ GDP\ per\ capita_{it} +$$
$$\beta_3 * iGINI_{it} + \beta_4 * Female_{it} + \beta_5 * Workforce_{it} + \beta_6 * Services_{it} + \qquad (4)$$
$$\beta_7 * Population\ density_{it} + \beta_8 * Unemployment_{it} + \varepsilon_{it}$$

For both equation three and equation four, α_0 represents the constant term, the betas represent the coefficients for the preceding variable, and ε_{it} represents the error term.

Moreover, to investigate whether entrepreneurial self-efficacy positively mediates the relationship between education and the new business activity indicators at the country level (as proposed in H3 and H4), an improved approach to Baron and Kenny's (1986) mediation analysis will be performed. Mediation, according to Baron and Kenny (1986), is examined through a three-step process. First, the causal variable (X) should be significantly correlated with the outcome variable (Y). Second, the causal variable (X) should significantly affect the possible mediator (M). Third, to assess whether a mediation exists, the third variable (M) should affect the outcome variable (Y), and the causal variable (X) should no longer (or at least to a lesser scale) affect Y. If the effect completely vanishes then it is talked about a complete mediation whereas if the effect only diminishes it is considered a partial mediation. Finally, the p-value of the indirect effect is calculated with Stata v.13, Texas, USA, using the coefficient and standard error (SE) obtained from the analysis using the KHB-method. The KHB method compares the complete model with a reduced version of it, which replaces the mediators with the mediators' residuals from a regression of the mediators on the main variables of interest (Karlson, Holm, & Breen, 2012).

Recent researchers argue that Baron and Kenny's first condition (i.e., there is a significant relationship between the main explanatory variable X and the outcome variable Y) is not strictly necessary (Aguinis, Edwards, & Bradley, 2017; Shrout & Bolger, 2002). These authors suggest that if there is enough theoretical background about the relationship of interest, one only needs to look at the indirect effect's significance. This is what is now known as the improved approach to mediation analysis.

The models to be investigated are illustrated in Figure 4.1 and Figure 4.2. The PC indicator is depicted as the mediating variable, as that is how ESE is measured in this research. Furthermore, the indirect effect is the multiplication of *a* and *b*, whereas c' represents education's direct effect on the entrepreneurship indicator.
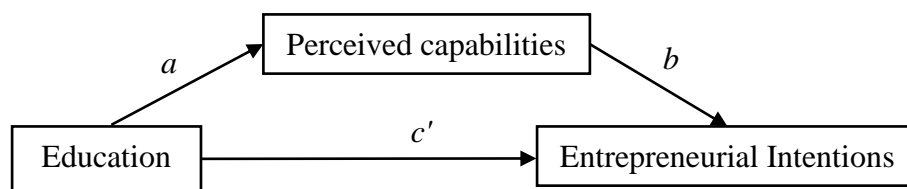

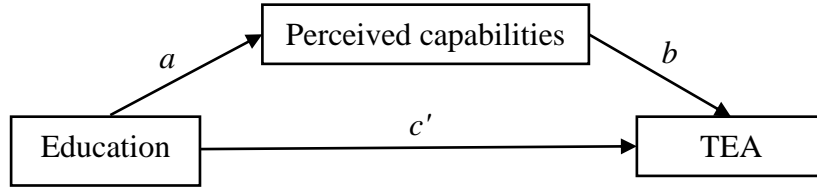Figure 4.91   Mediation analysis model for entrepreneurial intentions.

Figure 4.2   Mediation analysis model for total early-stage entrepreneurial activity (TEA).

Finally, to address hypotheses 5-10, I will consider three variables (namely, EGCC, Quality, and Basic School) as possible moderators of the relationships of interest. Moderation essentially assesses the circumstances under which an effect varies in size. To be specific, a moderator influences the direction or magnitude of the effect of the causal variable (X) on the outcome variable (Y). Thus, the variables above and their interaction with the education variable are included as additional explanatory variables in the models. The new regression equation for the relationship between EI and the Education index is formed as follows:

$$
\begin{aligned}
iEi_{it} = \ & \alpha_0 + \beta_1 * Education\ index_{it} + \beta_2 * iEGCC_{it} + \beta_3 * iEGCC_{it} * \\
& Education\ index_{it} + \beta_4 * iQuality_{it} + \beta_5 * iQuality_{it} * Education\ index_{it} + \\
& \beta_6 * Basic\ School + \beta_7 * Basic\ School * Education\ index_{it} + \\
& \beta_8 * Log\ of\ GDP\ per\ capita_{it} + \beta_9 * iGINI_{it} + \beta_{10} * Female_{it} + \qquad (5) \\
& \beta_{11} * Workforce_{it} + \beta_{12} * Services_{it} + \beta_{13} * Population\ density_{it} + \\
& \beta_{14} * Unemployment_{it} + \varepsilon_{it}
\end{aligned}
$$

Similarly, the regression equation for the relationship between TEA and the Education index, including the possible moderators, is constructed as follows:

$$
\begin{aligned}
iTEA_{it} = \ & \alpha_0 + \beta_1 * Education\ index_{it} + \beta_2 * iEGCC_{it} + \beta_3 * iEGCC_{it} * \\
& Education\ index_{it} + \beta_4 * iQuality_{it} + \beta_5 * iQuality_{it} * Education\ index_{it} + \\
& \beta_6 * Basic\ School + \beta_7 * Basic\ School * Education\ index_{it} + \\
& \beta_8 * Log\ of\ GDP\ per\ capita_{it} + \beta_9 * iGINI_{it} + \beta_{10} * Female_{it} + \qquad (6) \\
& \beta_{11} * Workforce_{it} + \beta_{12} * Services_{it} + \beta_{13} * Population\ density_{it} + \\
& \beta_{14} * Unemployment_{it} + \varepsilon_{it}
\end{aligned}
$$

5 Results

5.1 Fixed effects and moderation analyses

Table 5.1 shows the results for all the FE regression models. These are (1) the relationship between education and EI, (2) the relationship between education and EI including EGCC, Basic School, and Quality as moderators, (3) the relationship between education and TEA, and (4) the relationship between education and TEA including EGCC, Basic School, and Quality as moderators. The coefficient of education index represents the effect of education on the chosen entrepreneurial activity indicators. According to the results of model 1, a 0.1-point increase in the education index (i.e., a higher average of MYS and EYS) is associated with an increase in EI among the adult population in a country of 10.5% (s=15.8) per year. Although the coefficient is not negative, it is not statistically significant either. Therefore, I fail to reject the null hypothesis of H1 (i.e., formation education does not affect EI) at the 95% confidence level.

In model 2, the results for equation five can be observed. Here EGCC, quality, and basic school are included in the model, as well as an interaction term between each one of these variables and the education index. These variables are included to analyze their relationship with education and see if they could act as moderators of the relationship between education and EI. From the results in table 5.1, it can be observed that the coefficients for all three variables as well as all three interaction terms are insignificant. Therefore, I fail to reject the null hypotheses of H5, H7, and H9 –i.e., the proposed variables are not moderators of the relationship between education and EI– at a 95% confidence level.

Furthermore, in model 3, we can observe the FE regression results for the relationship between education and early-stage entrepreneurial activity. The education index's coefficient represents the effect of a higher average of years of education in a country on early-stage entrepreneurial activity for this sample. According to these results, if the education index of a country increases by a 0.1-point, its TEA rate increases by 31.6 percentage points as a result. Because this coefficient is highly significant (p<0.01), H2 –proposing that the TEA-rate is lower at the country level is lower with higher levels of education– is rejected at the 95% confidence level.

Last but not least, model 4 depicts the relationship between education and the TEA rate as moderated by the percentage of the people who agree that starting a business is considered a desirable career choice (EGCC), the quality of the educational system, and the extent to

Table 5.1　　Fixed effects regressions results for the relationships between early entrepreneurial activity indicators (i.e., entrepreneurial intentions (EI) and total early-stage entrepreneurial activity (TEA)) and the Education index.

	(1) iEI	(2) iEI +	(3) iTEA	(4) iTEA +
Education index	10.481	8.28	31.602***	0.509
	(15.833)	(52.164)	(8.319)	(28.196)
Moderators				
iEGCC		0.141		-0.548***
		(0.355)		(0.192)
iEGCC* Education index		-0.084		0.702***
		(0.461)		(0.249)
iQuality		3.271		7.763**
		(6.391)		(3.455)
iQuality * Education index		-2.440		-9.401**
		(8.579)		(4.637)
iBasic School		-5.187		-9.278*
		(9.781)		(5.287)
iBasic School * Education index		5.991		12.181*
		(12.319)		(6.659)
Control variables				
Log of GDP per capita	5.950*	7.492*	0.878	-0.705
	(3.364)	(4.045)	(1.768)	(2.121)
iGINI	0.173	0.038	0.089	0.072
	(0.212)	(0.250)	(0.112)	(0.126)
Female	-0.214	-0.226	0.132	0.082
	(0.173)	(0.189)	(0.091)	(0.099)
Workforce	-0.587	-0.465	0.013	-0.035
	(0.360)	(0.441)	(0.189)	(0.219)
Services	0.387*	0.320	-0.006	-0.028
	(0.216)	(.234)	(0.113)	(0.121)
Population density	0.097*	0.042	0.034	0.064*
	(0.054)	(0.062)	(0.029)	(0.032)
Unemployment	0.006	0.020	-0.124	-0.193**
	(0.148)	(0.163)	(0.078)	(0.085)
Constant	-38.740	-53.080	-36.329*	-37.881
	(40.742)	(61.128)	(21.408)	(26.077)
Obs.	525	440	525	454
R-squared	0.109	0.098	0.114	0.153

*** $p<0.01$, ** $p<0.05$, * $p<0.10$.
Note. Standard errors are in parenthesis, and variables with an 'i' in front of them are the interpolated version of the variable they are named after.

which entrepreneurship is integrated within the primary and secondary education system in a country (i.e., basic school). According to these results, the education index's influence on the TEA rate is no longer significant. Nonetheless, the coefficients of all three moderators and their interaction terms with the education variable are statistically significant. Therefore, this indicates that the three considered variables moderate the effect of education on entrepreneurial activity.

The interaction term's coefficient between the education index and EGCC indicates that if the EGCC rate increases by 1 percent, the effect of the education index on the TEA rate increases by 0.70 percentage points (s=0.19). Given that this coefficient is positive –thus, weakening a negative relationship between education and TEA– and significant to the 0.01 level, H6 is accepted at the 95% confidence level. Similarly, the interaction between the education index and the quality indicator shows that if the quality of the educational system in a country increased by one scale point, then the effect of education on the TEA rate would decrease by 9.40 percentage points (s=4.64). Thus, given the high significance of this coefficient ($p<0.05$) and its negative sign (enhancing a negative relationship between education and TEA), H8 is accepted at the 95% confidence level. Furthermore, the interaction term's coefficient between the education index and the basic school indicator is significant at the 0.10 significance level. The coefficient indicates that if the basic school indicator increased by 1 point in the Likert scale, then the effect of education on the TEA rate would increase by 12.18 percentage points (s=6.66). Given that the coefficient has a positive sign, meaning that a negative relationship between education and TEA would be weakened, we accept H10 at the 95% confidence level.

5.2 Mediation analysis

Table 5.2 shows the results for the ESE mediation analysis (as measured by the PC rate) on the relationship between the EI rate and the education index. There it can be observed that the first analyzed effect –namely, the one of the causal variable (i.e., the education index) on the outcome variable (i.e., the EI rate)– is not significant. Nonetheless, both the relationship between the education index and the PC rate as well as the relationship between the PC rate and the EI rate –as specified in steps two and three, respectively, of the mediation analysis– are significant. Furthermore, given that for this research, I adopt an improved approach of the Baron and Kenny analysis, this first effect's insignificance is

inconsequential as the main interest lies in the indirect effect. We can observe that the estimate for the indirect effect is found to be -12.26.

Additionally, I calculate the indirect effect's significance using its coefficient and SE obtained from the KHB analysis. The resulting p-value is 0.004, thus confirming the indirect effect's significance at a 0.01 significance level. Therefore, H3 stating that ESE positively mediates the relationship between education and EI at the country level is rejected at a 95% confidence level.

Table 5.2   Mediation analysis results of Perceived Capabilities (PC) on the relationship between the entrepreneurial intentions (EI) rate and the Education index using Structural Equation Modelling.

Path	Estimate	SE	95% CI
Education index → EI	10.481	15.833	[-20.635, 41.597]
Education index → PC	-48.559***	15.120	[-78.275, -18.843]
PC → EI	0.253***	0.048	[0.158, 0.347]
Education index → PC → EI	-12.264***	4.228	[-20.551, -3.977]

*** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 5.3   Mediation analysis results of Perceived Capabilities (PC) on the relationship between the total early-stage entrepreneurial activity (TEA) rate and the Education index using Structural Equation Modelling.

Path	Estimate	SE	95% CI
Education index → TEA	31.602***	8.319	[15.251, 47.952]
Education index → PC	-48.559***	15.120	[-78.275, -18.843]
PC → TEA	0.149***	0.025	[0.100, 0.198]
Education index → PC → TEA	-7.235***	2.409	[-11.958, -2.513]

*** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Similarly, Table 5.3 shows the results for ESE's mediation analysis on the relationship between the TEA rate and the education index. In this case, it can be observed that the effect of the first analyzed relationship –namely, the effect of the education index on the TEA rate– is significant. Even though it is desirable to find a significant relationship in this first step, it

is still inconsequential. In the table, it can be noticed that the indirect effect is estimated to be -7.24, and the p-value (calculated using the coefficient and SE of the indirect effect from the KHB analysis) is 0.003. Therefore, confirming the significance of the negative indirect effect at a 0.01 significance level. As a result, H4 stating that ESE positively mediates the relationship between education and TEA is rejected at a 95% confidence level.

6 Discussion & conclusion

Even though the literature indicates that a negative relationship between the education level of a country and its entrepreneurial activity should exist, the results of this research fail to corroborate it. Therefore, it remains questionable whether the findings by van Praag and van Stel (2013) are replicable when using dynamic indicators of entrepreneurship. Possibly, a reason for the insignificant results may be that even though more education leads to higher ability levels, which means that fewer firms are needed to produce the same economic value, it may not as easily translate to entrepreneurial entry (and exit). Since (1) people with higher education tend to have higher general self-efficacy levels, they are more confident in their ability to succeed if they enter the market (Mishra & Metilda, 2015). Additionally, (2) as Koellinger, Minniti, and Schade (2007) noted, overconfident entrepreneurs tend to wait too long to exit the market, and as a result, there are too many entrepreneurs.

Furthermore, the positive impact of education on the TEA rate may be due to the mix of developing and developed countries in this sample. Even though we seek to maximize diversity, an overrepresentation of developing countries in the sample could lead to an overestimation of the effect of education on entrepreneurship. Thus, the results could be portraying a prediction of entrepreneurship development in countries with low education levels, where an increase in human capital should lead to higher wages. In turn, this should bring about the refinement of consumers' demand, thus opening opportunities for more entrepreneurial activity (Wennekers, Thurik, van Stel, & Noorderhaven, 2007).

Moreover, the considered moderators for the relationship of interest, namely, subjective norms, the quality of the educational system, and the type of education imparted in a country (i.e., entrepreneurial training), were found to be non-significant in the case of EI. As already discussed, EI are our best shot at estimating the entrepreneurial potential in a society. However, due to its high subjectivity, it is very easy for measurement errors to take place. That could be a possible explanation for the lack of significant results in the models involving

EI. Nonetheless, all the three variables mentioned above were found to be significant moderators of the relationship between education and the TEA rate. This goes well in line with the discussed theory stating that SN can significantly influence an individual's behavior and that the quality and type of education can enhance the development of human capital achieved through education.

Finally, the results indicate that ESE is a powerful mediator for both the relationship between education and EI and the relationship between education and the total early-stage entrepreneurial activity. ESE is, therefore, an essential piece in the development of entrepreneurship in a country. However, its effect is different than expected. From the negative coefficient of education on ESE, it would seem like education, instead of helping increase ESE, deteriorates it. This could be because not everyone is meant to be an entrepreneur, and although education helps to build up skills, it can also help individuals identify their strengths and weaknesses. Therefore, countries with higher education levels most likely have higher self-awareness levels (Sucheta, 2019). Consequently, this facilitates the optimal division of labor between entrepreneurship and wage-work, leading to an optimal level of entrepreneurship.

In short, there are some discrepancies between the theory and the results found in this research. Looking back at the initial question:

"How does the level of formal education relate to entrepreneurial intentions and new entrepreneurial activity at the country level?"

Education seems not to affect the entrepreneurial intentions of people. Nonetheless, it appears that education levels do correlate with the total early-stage entrepreneurial activity rate. The results in this research support the idea that education can significantly influence entrepreneurship; however, the effect's direction was not the one expected. Furthermore, the moderators' influence on EI was non-significant. Nonetheless, in the model for TEA, all moderators were found to be significant. Therefore, these moderators still represent useful tools for policymakers to develop appropriate programs to reach the optimal entrepreneurial activity level in their respective countries. Lastly, ESE was found to be a significant mediator in both relationships. Therefore, incorporating ESE into research models can help advance our understanding of entrepreneurship and how entrepreneurial potential can effectively be turned into entrepreneurial reality.

Limitations & suggestions

This study's main limitation is that the influence of education on EI could not be explained. The question remains as to whether this is due to measurement errors in the data or whether the existing theory of the relationship between education and EI needs any adjustments. Furthermore, another potential limitation of this research is the amount of available data. Even though its effect was diminished by interpolating the usable data, it still represented a major setback for the number of countries that could be included in the sample.

Moreover, even though this paper considers the possible influence of subjective norms as a moderator of the relationship between education and entrepreneurship, other cultural differences that may influence entrepreneurship, such as optimism or uncertainty aversion, were not considered inside the model. Therefore, in the future, other researchers may want to include these variables in their research.

Finally, this research provides insight into how formal education relates to entrepreneurship's dynamic measures in its early stages. Possibly, including indicators for the latter stages of the entrepreneurial process in a similar study could approximate the results found by van Praag and van Stel (2013) more closely. Furthermore, given that developed countries tend to have higher education levels, imposing no distinction between them and developing countries may have led to an overestimation of the effect of education on entrepreneurship. Perhaps including an indicator for the levels of necessity versus opportunity entrepreneurship could provide a creative solution to this problem. Developed countries tend to have lower rates of necessity entrepreneurship, therefore making a relationship between necessity entrepreneurship and education could lead to interesting results.

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Appendix

Appendix A

Table A.1

The countries in the analysis sample

Country Name	Country Name
1. Algeria	45. Malaysia
2. Angola	46. Mexico
3. Argentina	47. Morocco
4. Australia	48. Netherlands
5. Austria	49. North Macedonia
6. Barbados	50. Norway
7. Belgium	51. Palestine
8. Bolivia	52. Panama
9. Bosnia and Herzegovina	53. Peru
10. Botswana	54. Poland
11. Brazil	55. Portugal
12. Canada	56. Qatar
13. Chile	57. Romania
14. China	58. Russia
15. Colombia	59. Saudi Arabia
16. Costa Rica	60. Singapore
17. Croatia	61. Slovakia
18. Denmark	62. Slovenia
19. Ecuador	63. South Africa
20. Egypt	64. South Korea
21. El Salvador	65. Spain
22. Estonia	66. Sweden
23. Finland	67. Switzerland
24. France	68. Thailand
25. Germany	69. Trinidad and Tobago
26. Ghana	70. Tunisia
27. Greece	71. Turkey
28. Guatemala	72. Uganda
29. Hong Kong	73. United Arab Emirates
30. Hungary	74. United Kingdom
31. Iceland	75. United States
32. India	76. Uruguay
33. Indonesia	77. Venezuela
34. Iran	78. Vietnam
35. Ireland	
36. Israel	
37. Italy	
38. Jamaica	
39. Japan	
40. Kazakhstan	
41. Latvia	
42. Lebanon	
43. Lithuania	
44. Luxembourg	