Entrepreneurial experience and growth aspirations: the moderating role of national research & development expenditure

Abstract This study examines the impact of entrepreneurial experience on growth aspirations and explores how a country's knowledge generation influences this relationship. Drawing on human capital theory, we firstly argue that diverse prior entrepreneurial experiences affect growth aspirations differently. Based on the knowledge spillover theory of entrepreneurship, we then propose that national R&D expenditure moderates the link between entrepreneurial experience and growth aspirations. Utilizing a multisource dataset from 83 countries spanning 2005–2020, our findings indicate that entrepreneurial experience is positively related to growth aspirations. Specifically, both serial and portfolio entrepreneurs exhibit higher growth aspirations compared to their novice counterparts. Our study also reveals that higher levels of national R&D expenditure strengthen the relationship between both types of experience and growth aspirations. Overall, this research contributes to the literature by demonstrating a positive direct effect of serial and portfolio entrepreneurial experiences on growth aspirations and revealing the enhancing moderating role of national R&D expenditure in this relationship.

Keywords growth aspirations · entrepreneurial experience · R&D · knowledge spillover

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1 Introduction

Entrepreneurs' aspirations for growth reflect their personal beliefs in the potential of their new firms (Levie and Autio, 2013). These aspirations are a crucial determinant of new venture growth (Baum et al., 2001; Davidsson et al., 2006) and have substantial implications for economic development (Acs et al., 2018; Decker et al., 2020). Therefore, policymakers are actively promoting the creation of ambitious new ventures expected to stimulate economic activity, employment, and innovation (Elert et al., 2019). At the same time, entrepreneurial growth aspirations constitute an important subject of study in entrepreneurship research (Estrin et al., 2022; Hermans et al., 2015). Researchers aim to comprehend what drives these aspirations, exploring several individual and environmental factors (Capelleras et al., 2019; Epure et al., 2024; Estrin et al., 2013, 2020). However, there remains a need to investigate how entrepreneurs' growth aspirations may differ based on their prior entrepreneurial experience and the innovative context in which they operate.

Firstly, previous research has examined the role of the entrepreneurs' general human capital, mainly in terms of formal education (Autio and Acs, 2010; Capelleras et al., 2019), yet little is known about the influence of the specific component of human capital represented by their prior entrepreneurial experience (Fuentelsaz et al., 2023). Specifically, research gaps exist in understanding whether these aspirations are different among novice entrepreneurs and habitual entrepreneurs. Novice entrepreneurs may have distinct growth ambitions compared to those who have previously operated businesses as serial or portfolio entrepreneurs (Parker, 2014; Plehn-Dujowich, 2010; Westhead, Ucbasaran, Wright, et al., 2005).

Secondly, knowledge regarding how the interaction of such individual experience with country-level factors may affect the entrepreneurs' growth ambitions remains limited (Capelleras et al., 2019). One significant contextual factor is a country's level of national research and development (R&D) expenditure, which is considered a key indicator of innovation creation (Amorós et al., 2019; Burke et al., 2021; Van Stel et al., 2019). Indeed, the interplay between national R&D expenditure and entrepreneurial experience in shaping growth aspirations remains largely unexplored (Kirschning and Mrożewski, 2023).

Addressing these research gaps will provide a more nuanced understanding of the complex relationship between entrepreneurial experience, national R&D investment, and growth aspirations. Therefore, this paper investigates how prior entrepreneurial experience influences the growth aspirations

of entrepreneurs, particularly differentiating between novice entrepreneurs and habitual entrepreneurs (Ucbasaran et al., 2006; Ucbasaran, Alsos, et al., 2008). By focusing on the unique experiences of serial and portfolio entrepreneurs (Parker, 2014; Plehn-Dujowich, 2010; Westhead, Ucbasaran, Wright, et al., 2005), we seek to uncover how their accumulated specific human capital shapes their growth ambitions. Importantly, we also explore how national R&D expenditure moderates the relationship between prior entrepreneurial experience and growth aspirations, revealing linkages between a country's knowledge generation and entrepreneurial ambitions (Kirschning and Mrożewski, 2023).

The central argument of this study revolves around the influence of entrepreneurial experience on growth aspirations and how this influence differs between novice entrepreneurs and habitual entrepreneurs. Drawing upon human capital theory, we posit that entrepreneurial experiences significantly impact growth aspirations primarily due to the accumulation of specific human capital (Carbonara et al., 2020; Ucbasaran et al., 2006; Ucbasaran, Alsos, et al., 2008). We then explore the moderating effect of national R&D expenditure, considering the Knowledge Spillover Theory of Entrepreneurship (KSTE) (Acs et al., 2009; 2013), which highlights the importance of a country's knowledge generation in fostering entrepreneurial ambitions (Kirschning and Mrożewski, 2023). The study contends that national R&D expenditure can amplify the impact of prior entrepreneurial experience on growth aspirations.

Empirically, we utilize a dataset that integrates individual-level information obtained from the Global Entrepreneurship Monitor (GEM) with country-level data from the World Development Indicators (WDI). This extensive database encompasses a large number of early-stage entrepreneurs from 83 countries, spanning from 2005 to 2020. Our hypotheses are tested using multilevel analysis, acknowledging the hierarchical structure in which individuals are nested within their respective countries. A series of robustness checks are performed to further validate our results for comparative purposes. Since capturing new knowledge generation with a single measurement (i.e. national R&D expenditure) might be challenging, we use a battery of additional measures and controls.

Overall, the study contributes to the existing literature by providing a more nuanced and contextualized understanding of the impact of entrepreneurial experience on growth aspirations. By distinguishing between first-time entrepreneurs and habitual entrepreneurs, it sheds light on how different experiences prepare entrepreneurs to have varying growth ambitions (Ucbasaran et al., 2006; Ucbasaran, Alsos, et al., 2008). Specifically, the findings demonstrate a positive direct effect of serial and portfolio entrepreneurial experiences on growth aspirations. Moreover, this research also offers insights into the

interplay between a country's knowledge creation and entrepreneurial aspirations (Kirschning and Mrożewski, 2023) by investigating the moderating effect of national R&D expenditure. In exploring this relationship, the study highlights the enhancing role of country R&D in the nexus between experience and aspirations.

The paper is organized as follows. Section 2 presents the theoretical framework and formulates the hypotheses. Section 3 describes the data, variables and empirical approach. Section 4 reports the results of the multilevel analysis. Finally, a discussion on the findings is presented in Section 5, together with the implications and future research directions.

2 Theory and hypotheses

2.1 *Entrepreneurial experience and growth aspirations*

Previous research indicates that entrepreneurs focused on achieving substantial firm growth contribute significantly more to economic development than the general entrepreneurship rate (Hermans et al., 2015). This has motivated increased interest in understanding the factors influencing ambitious entrepreneurial endeavors aimed at establishing high-growth firms (Estrin et al., 2022; Fuentelsaz et al., 2023; Guerrero et al., 2023). However, entrepreneurial ambitions vary widely among individuals, with several studies highlighting the role of human capital in shaping their growth aspirations (Autio and Pathak, 2010; Capelleras et al., 2019; Epure et al., 2024; Fuentelsaz et al., 2023). Nevertheless, most of this research has predominantly focused on general human capital, such as formal education, while overlooking the influence of diverse entrepreneurial experiences, which are a crucial source of specific human capital.

Human capital theory, as posited by Becker (1964), distinguishes between general and specific human capital. General skills are broadly applicable, while specific skills are context-dependent (Gimeno et al., 1997; Ucbasaran, Westhead, et al., 2008). Specific human capital, primarily acquired through experience, plays a pivotal role in shaping entrepreneurial behavior (Baptista et al., 2014; Estrin et al., 2016; Unger et al., 2011). Exploring specific entrepreneurial experiences offers insights into why habitual entrepreneurs may possess advantages over novices (Lechner et al., 2016). These experiences, characteristic of "habitual entrepreneurs" (Birley and Westhead, 1993; Parker, 2014; Ucbasaran et al., 2003), also elucidate why some entrepreneurs pursue higher growth trajectories (Grilli et al., 2023). Distinguishing between novice, serial, and portfolio entrepreneurs thus provides a nuanced understanding of how different types of entrepreneurial experiences shape growth aspirations.

Novice entrepreneurs are typically driven by a desire to turn their ideas into successful businesses, and they often have high levels of motivation and enthusiasm (Jiang et al., 2022). However, their lack of experience and knowledge to navigate the complexities of starting and growing a business (Mannor et al., 2016; Ruiz-Jiménez et al., 2021) can impact their growth aspirations. As they are still learning about the challenges of running a business, novice entrepreneurs tend to focus on developing their products or services and establishing a customer base (Westhead, Ucbasaran, Wright, et al., 2005). Additionally, first-time entrepreneurs may face greater uncertainty and risk (Podoynitsyna et al., 2012), which can impact their confidence and willingness to take bold steps to grow their businesses. As a result, they may have limited access to resources (Schjoedt, 2021), mainly relying on internal financing and a smaller network of contacts due to not having built an entrepreneurial track record.

Habitual entrepreneurship comprises two main categories: serial and portfolio entrepreneurial experiences. Several studies have portrayed habitual entrepreneurs as a homogeneous group without accounting for their unique characteristics (Carbonara et al., 2020; Lechner et al., 2016). However, while serial entrepreneurs have been involved in multiple businesses sequentially, portfolio entrepreneurs run multiple ventures in parallel (Parker, 2014; Plehn-Dujowich, 2010; Westhead, Ucbasaran, and Wright, 2005). Thus, serial entrepreneurs are defined as habitual entrepreneurs who exit one venture before starting a new one (Sarasvathy et al., 2013; Ucbasaran et al., 2006). In contrast, portfolio entrepreneurs continue managing their original business while also establishing, inheriting, or purchasing additional businesses (Dabić et al., 2023; Westhead and Wright, 1998). We now hypothesize how these experiences influence growth aspirations compared to novice entrepreneurs, providing a more detailed understanding of the factors driving entrepreneurial growth ambitions.

To begin, we posit that serial entrepreneurs are likely to demonstrate greater growth aspirations than novice entrepreneurs. Drawing inferences from lessons learned in their previous ventures, serial entrepreneurs can assess more accurately situations that they consider to be similar. This “learning by doing” explains why serial entrepreneurs improve their abilities over time (Corbett, 2005; Dabić et al., 2021), increase their initial skills endowments, and perform better through learning from their previous experience (Parker, 2013). Moreover, serial experience enables entrepreneurs to enhance their managerial and technical skills, cultivate more extensive social networks, and improve their market interpretation, thereby developing venture proposals that are more sophisticated for their subsequent start-ups (Guerrero

are Peña-Legazkue, 2019; McGrath and MacMillan, 2000; W. Stam and Elfring, 2008; Ucbasaran, Westhead, et al., 2008; Unger et al., 2011).

Additionally, serial entrepreneurs gain knowledge from exiting their previous endeavors (Lafuente et al., 2019), capitalizing on their previous positive or negative experiences in the search for new opportunities. This alertness allows them to have more spontaneous and radical choices, relying on their enthusiasm, driven mainly by their intuition, without any fear of changing lines of interest. Compared to novice entrepreneurs, this behavior characterizes them as being more confident and less risk-averse, willing to accept a new learning situation that requires finding new resources, and building new social capital related to their new ventures (Lechner et al., 2016).

Lastly, a serial entrepreneur familiarized with a specific technology or industry will prioritize the timing to exploit the identified opportunity as fast as possible (Fan et al., 2021). In contrast to inexperienced outsiders, serial entrepreneurs leverage their advantage from their industry insights and their business creation understanding (Lahiri and Wadhwa, 2021). Furthermore, their heuristic strategic decisions and mental shortcuts enable them to act in situations where information is not fully available (Ucbasaran, Alsos, et al., 2008), acting with a sense of urgency to exploit the opportunity while also expecting a reward for their advantageous opportunity identification.

Overall, serial entrepreneurs are more likely to exhibit higher growth aspirations compared to novice entrepreneurs. Accordingly, we posit the following hypothesis:

Hypothesis 1. Entrepreneurs with serial experience will achieve higher growth aspirations than those without entrepreneurial experience.

To follow, we propose that portfolio entrepreneurs will also achieve higher growth aspirations compared to first-time entrepreneurs. As the owners of multiple enterprises, portfolio entrepreneurs have diverse and rich entrepreneurial experiences and have been identified as leading fast-growing businesses (Storey, 2016; Westhead, Ucbasaran, and Wright, 2005). This allows them to accumulate substantial specific human capital that provides them with superior managerial skills and a deeper understanding of market dynamics, which in turn enhances their ability to recognize and exploit growth opportunities (Alvarez and Barney, 2007), further driving their growth aspirations.

Furthermore, portfolio entrepreneurs' ability to leverage and transfer knowledge and capabilities across their ventures enables them to efficiently exploit new business opportunities (Barney et al., 2011; Rosa, 1998). Compared to other entrepreneurs, they are more innovative and export-oriented (Robson et

al., 2012), and can adapt more rapidly to new market conditions (Kibria, 1994). Building on the concept of path dependence, portfolio entrepreneurs can more easily exploit new opportunities related to their current ventures due to their accumulated experience and established paths, which boosts their confidence and calculated risk-taking (Alvarez and Barney, 2007; Gruber, 2010; Kock and Gemünden, 2021). Their reputation as permanent entrepreneurs motivates them to constantly explore new opportunities (Lechner et al., 2016) while being vigilant to profit maximization from their current businesses (Ucbasaran, Alsos, et al., 2008). In fact, their diversification strategy, involving the movement of capital among various enterprises they own, facilitates new product development and business integration (Carter and Ram, 2003).

Additionally, the extensive social networks developed through their diversified business activities (Carter and Ram, 2003; MacMillan, 1986) enrich their human capital by providing access to valuable information, resources, and essential support for growth. Thus, the strong ties accumulated from their social capital cultivation will enable them to better administrate their limited time over their different businesses. In contrast to novice entrepreneurs, portfolio entrepreneurs may also effectively manage time constraints through strategic delegation and robust management practices (Lechner and Leyronas, 2009).

Finally, their past successes and available resources enable them to leverage existing assets and pursue new ventures with a higher degree of optimism and strategic risk management (Lechner et al., 2016). In effect, portfolio entrepreneurs may likely have higher optimism than novice entrepreneurs, as they expect to utilize and leverage resources from their existing business(es) to fund and grow new ventures (Carbonara et al., 2020). They constantly look outside the firm for growth opportunities via innovation, internationalization, or mergers and acquisitions (Rodgers et al., 2022). Their risk exposure is also different from other entrepreneurs as they manage the risk across their different businesses (Lechner et al., 2016), making them more risk-averse. .

Therefore, portfolio entrepreneurs are likely to be more ambitious in developing their new firms. We test this expectation with the following hypothesis:

Hypothesis 2. Entrepreneurs with portfolio experience will achieve higher growth aspirations than those without entrepreneurial experience.

2.2 Entrepreneurship and a country's knowledge stock generation

In 1956, Solow's economic growth model reflected a per capita view based on capital accumulation. Solow's later model (1957) pointed out that capital accumulation represents only a fraction of total economic growth, with the rest attributed to labor, including technological progress, as a constant. Although

this model set the ground for developing the neoclassical theories of economic growth, it partly explained growth as a result of "external forces"; hence, these models are termed "exogenous economic growth models." By contrast, endogenous economic growth models internalize these "forces," identified as the ideas and new technology that can be generated in an economy with the support of investment in new knowledge (Romer, 1986, 1990) and in human capital (Lucas Jr., 1988). A country's most important source of knowledge stock generation is often represented by national R&D expenditure (Van Stel et al., 2019). A key feature of knowledge stock generation is that it enables further knowledge creation, such that one discovery can lead to more discoveries recognized by other entrepreneurs (Parker, 2009).

However, endogenous economic growth models assume that the knowledge stock is automatically transformed into economic activities that foster growth without mentioning the actors that lead and engage in those economic activities. Specifically, their explanations neglect the role of entrepreneurs in recognizing this knowledge and transforming it into profitable economic opportunities (Acs and Sanders, 2013; Audretsch, 1995).

Optimal allocation of economic resources is also essential, as findings show that R&D expenditure has diminishing returns where investment opportunities are progressively exhausted (Medda, 2020; Michelacci, 2002). At the same time, raising the amount of resources dedicated to national R&D expenditure does not necessarily increase economic growth, given that not all entrepreneurs benefit equally from R&D (Estrin et al., 2014). Despite such market failures, countries allocate significant amounts of resources to R&D, funded by private and public institutions that expect to achieve higher economic growth (Audretsch and Caiazza, 2016; Audretsch and Fiedler, 2023). Unlike established firms, which can acquire the necessary resources for their activities, new ventures must often overcome enormous challenges to attain the required resources (Nason et al., 2019). To tackle these limitations, many new ventures adopt external resources to their firm R&D findings in order to generate innovations (Runst and Thomä, 2022; Di Minin et., 2021).

Researchers have applied different perspectives to understand how the components of an economy's generated knowledge stock interact with entrepreneurial activity to produce innovation (Acs et al., 2014). A relevant line of inquiry seeks to understand how knowledge stock at the country level spills over to individual firms (Acs et al., 2009; Braunerhjelm et al., 2010; Coe and Helpman, 1995). Englobing the incumbent actors' interconnection, the KSTE (Acs et al., 2009; Audretsch et al., 2021) acknowledges the role entrepreneurs play in innovation, balancing it with the relevant role of institutions and knowledge

generation; however, the theory has not deepened yet on the necessary conditions each of the components must fulfill to facilitate knowledge absorption (Acs et al., 2017; Ghio et al., 2015). A common factor among the different approaches is that innovation emerges from interactive systems, where all the components interact; as a result, the National Systems of Entrepreneurship Framework (Acs et al., 2014) raises the urgency to understand better how entrepreneurs shape their aspirations and behavior by their context. Considering the complex relations within a system, we propose to examine a specific stance that can provide a conduit to an entrepreneurial inclination to identify knowledge generation (Kirschning and Mrożewski, 2023) as an opportunity for venture growth. In this regard, we explore how the intensity of knowledge generated in a specific country can strengthen the entrepreneurs' visualization of opportunities, depending on their entrepreneurial experience, translating them through their entrepreneurial mindset into growth possibilities.

2.3 The moderating role of national R&D expenditure

We now argue that national knowledge generation, represented by a country's R&D expenditure, influences the relationship between entrepreneurs' previous experience and growth aspirations. National R&D expenditure, which mainly consists of public expenditure, university research, and private investment, effectively reflects the innovativeness of the context in which entrepreneurs develop their activities (Chung et al., 2022) and ultimately moderate their behavior (Koo and Lee, 2019). R&D is crucial not only at the national level but also within cities and regions, where it fosters virtuous circles of knowledge transfer and commercial exploitation (Audretsch and Caiazza, 2016; Belitski et al., 2021). Some regions, having advantages in knowledge stock generation, attract ambitious entrepreneurs (Audretsch and Lehmann, 2005). Proximity to various participants facilitates knowledge exchange, while long-distance collaborations also enhance this effect (Audretsch and Belitski, 2023). However, for the purpose of this paper, we focus on national R&D expenditure as a moderator of the link between prior entrepreneurial experience and growth aspirations (Estrin et al., 2022). Consequently, the benefits of experience on aspirations will not be uniform across different national contexts but influenced by the level of R&D investment.

While established firms benefit from new knowledge absorption due to their size and track record, small new ventures need to scale up and intensify internal knowledge generation to gain this advantage (Denicolai et al., 2014). A resourceful mechanism to attain this absorbing capacity emerges from the entrepreneur's ability to capture this information from their context (Audretsch and Caiazza, 2016; Mueller et al., 2020; Runst and Thomä, 2022). Therefore, we posit that specific human capital represented by

entrepreneurial experience is the primary enabling individual factor facilitating the recognition of contextual R&D expenditure as an opportunity for growth. Previous findings highlight that entrepreneurial experience fosters the capacity to acquire and organize complex information from new knowledge generation, akin to field expert information processing (Ucbasaran, Alsos, et al., 2008). Hence, opportunities within knowledge-rich contexts are likely to be seized upon mainly by entrepreneurs who have higher levels of specific human capital.

Specifically, serial entrepreneurs are more likely to exhibit a greater ability to grasp new opportunities emerging in knowledge-intensive national environments than their novice counterparts. This is because serial entrepreneurs base their actions on opportunity recognition and rapid exploitation, delineating them with lower levels of risk aversion and taking shorter periods of executing new activities than novice entrepreneurs (Alsos and Kolvereid, 1998). Their prior entrepreneurial experiences equip them with the ability to identify marketplace opportunities, exercising their skills in detecting unmet needs or market changes that can be capitalized upon (Dabić et al., 2023). In addition, their ability to quickly adapt to changing contexts allows them to benefit from new knowledge generation, transforming them into business opportunities (Lechner et al., 2016), even when substantial learning is required. In this regard, they capitalize on their accumulated entrepreneurial learning experiences showing successful strategies that facilitate innovation (Vaillant and Lafuente, 2019).

Furthermore, contexts with intense R&D investment generate more competitive environments, encouraging serial entrepreneurs' appetite for exploitable opportunities (Cerver-Romero et al., 2020; Westhead, Ucbasaran, and Wright, 2005). Advancements in new technologies based on recent scientific breakthroughs (Cohen and Levinthal, 1989), fostered by stronger R&D ecosystems, provide these entrepreneurs with the resources to fulfill their endeavors. Additionally, their ability to form and lead teams is enhanced in environments that attract top talent, a common feature of contexts with substantial R&D investments (Lerner, 2010). Such environments are particularly encouraging for serial entrepreneurs, as their proven track record and refined pitches position them favorably to secure funding for their ambitious growth plans (Colombo and Grilli, 2010).

In contrast, novice entrepreneurs with no previous experience would have lower growth aspirations in countries with higher R&D investment due to their unfamiliarity with performing in contexts generating constant change in the form of discoveries. Unlike serial entrepreneurs who have sharpened their skills in recognizing and exploiting opportunities in dynamic settings, novice entrepreneurs often struggle to adapt

swiftly to the rapid advancements fostered by substantial R&D activities. Their limited exposure to high stakes and innovation-driven contexts can hinder their confidence and ability to leverage new knowledge for entrepreneurial growth (Schott and Sedaghat, 2014). Moreover, the complexity and uncertainty inherent in such environments can overwhelm novice entrepreneurs, leading to a more cautious approach that dampens their growth aspirations.

Through their entrepreneurial experience, accumulated by their skill in opportunity recognition and rapid exploitation, lower risk aversion, and quick adaptation to changing contexts, serial entrepreneurs effectively capitalize on new knowledge and drive growth, particularly in high R&D environments. Accordingly, experienced serial entrepreneurs will exhibit a heightened propensity for amplified entrepreneurial growth aspirations when exposed to elevated levels of national R&D investment, in contrast to their less-seasoned counterparts, the novice entrepreneurs. Hence, we propose the following hypothesis:

Hypothesis 3. Higher levels of national R&D expenditure strengthen the relationship between entrepreneurs' serial experience and growth aspirations.

We propose that entrepreneurial experience, in general, enhances the ability to capitalize on knowledge generated from national R&D expenditure. However, the absorbing capacity might be differently captured depending on the type of entrepreneurial experience. Specifically, portfolio entrepreneurs, who manage multiple ventures simultaneously, are particularly adept at leveraging their accumulated social capital and domain-specific expertise to explore new possibilities and drive growth. The extensive network of strong ties they develop over time provides them with valuable resources, including access to information, funding, and strategic partnerships, which can be instrumental in recognizing and capitalizing on new opportunities (Lahiri and Wadhwa, 2021). This extensive network and their ability to strategically allocate resources across various ventures often portray them as a more innovative type of entrepreneur, capable of navigating complex and dynamic environments effectively (Carbonara et al., 2020). This propensity for innovation is further supported by their track record of successfully managing multiple businesses, which demonstrates their ability to balance short-term operational demands with long-term strategic goals (Westhead, Ucbasaran, and Wright, 2005).

In most cases, these entrepreneurs operate among sector-related firms creating synergies that position them advantageously within an industry. In addition, their proximity to their various companies enables them to be influenced faster by knowledge spillover flows. These spillovers, which occur when knowledge generated within one firm influences the innovation activities of nearby firms, are particularly valuable in

sectors characterized by high levels of R&D activity. By being closely connected to a network of sector-related firms, portfolio entrepreneurs are ideally positioned to capture and utilize these external knowledge flows to inform their strategic decisions and drive innovation within their own businesses (Cerver-Romero et al., 2020).

The ability to mobilize resources flexibly is another significant advantage that portfolio entrepreneurs hold over inexperienced entrepreneurs. Their extensive network and accumulated capital enable them to quickly allocate resources to promising new ventures or to scale existing operations in response to emerging opportunities. This dynamic resource allocation capability is crucial in high R&D environments, where the pace of innovation and technological change can rapidly alter market conditions. Unlike single-venture entrepreneurs or organizations strictly tied to specific R&D projects, portfolio entrepreneurs can pivot and reallocate resources efficiently, ensuring that they capitalize on the most commercially viable options derived from new knowledge (Audretsch and Caiazza, 2016). Subsequently, the learned understanding of the market where they develop their activities allows portfolio entrepreneurs to navigate more readily than novice entrepreneurs in contexts where new knowledge generation is constantly emerging.

The accumulated skills, knowledge, and networks that portfolio entrepreneurs have acquired, in the form of entrepreneurial experience, enable them to effectively leverage national R&D expenditure, enhancing their capacity to capitalize on new knowledge and drive growth Therefore, greater national R&D expenditure will have a more pronounced effect on increasing entrepreneurial growth aspirations among portfolio entrepreneurs compared to novice entrepreneurs. We test this with the following hypothesis:

Hypothesis 4. Higher levels of national R&D expenditure strengthen the relationship between entrepreneurs' portfolio experience and growth aspirations.

3 Method

3.1 Data and sample selection

We use a multilevel dataset in which individuals (i.e., entrepreneurs) are nested within countries. Individual-level data are gathered from the Global Entrepreneurship Monitor (GEM) Adult Population Survey (APS). The GEM APS individual survey data comprise a representative sample of the population in each participating country. Further descriptions about the project can be found in Bosma (2013) and Reynolds et al. (2005), and relevant examples of validation and generalizability can be found in Amorós et al. (2016), Autio et al. (2013), Epure et al. (2024) , and Estrin et al. (2013, 2016, 2022, 2024). Our sample consists of early-stage entrepreneurs who have established new businesses operating for less than 42

months, capturing responses from the adult population (aged 18–64) actively engaged in initiating and managing new business ventures (Autio et al., 2013; Capelleras et al., 2019; Epure et al., 2024).

We match the GEM data at country-year with country-level macroeconomic indicators sourced from the World Development Indicators (WDI). For our robustness tests, we also employ additional country-level data obtained from the Worldwide Governance Indicators (WGI), the United Nations Conference on Trade and Development (UNCTAD), the Heritage Foundation (HF), and the Fraser Institute. Our final sample comprises 117,911 observations from 83 countries for the years 2005–2020. Details regarding the composition of key variables are provided in Table A1 of the appendix.

3.2 Variables and measures

3.2.1 Dependent variable

Our dependent variable measures entrepreneurial growth aspirations. Entrepreneurial growth aspirations (EGAs) is crucial not only for understanding entrepreneurs' strategic ambitions and future business expansion plans but also for its predictive power in determining future firm performance (Covin and Wales, 2012). Prior research has provided evidence that growth aspirations can effectively explain subsequent actual firm growth, emphasizing their significance in entrepreneurial outcomes (Baum et al., 2001; Cassar, 2006; Davidsson et al., 2006; Delmar and Wiklund, 2008; Wiklund and Shepherd, 2003). We calculate entrepreneurial growth aspirations as the difference between the natural logarithms of the newly established entrepreneurs' expected number of employees in five years' time and the current number of employees (Capelleras et al., 2019; Epure et al., 2024; Estrin et al., 2013, 2020; Stam et al., 2012). Natural logarithms are used to normalize the distribution.

3.2.2 Individual-level predictors

Entrepreneurial experience was assessed through two types: serial experience; and portfolio experience. First, *serial experience* was measured by drawing from the GEM survey a combination of two questions: "whether, in the past 12 months, they had sold, shut down, discontinued, or quit a business that they owned-managed"; and "whether that business continued to exist after their departure" (Epure et al., 2024; Estrin et al., 2016). Individuals that answered "yes" to both were interpreted as having serial experience, and thus assigned the value 1; those answering "no" were assigned the value 0. Second, *portfolio experience* was measured using a binary variable that takes the value 1 if "the entrepreneur is already the owner-manager of another established existing firm, and 0 otherwise" (Capelleras et al., 2019).

The omitted category corresponds to *novice entrepreneurs*, who engage in entrepreneurial activities for the first time and do not possess any prior entrepreneurial experience.

3.2.3 Country-level moderator

Knowledge stock generation was measured by the *national R&D expenditure* as a percentage of annual GDP (R&D) (Amorós et al., 2019; Burke et al., 2021). We lag this data one year, since any discovery requires time to develop, although research findings suggest that this time is short—between one to two years (Medda, 2020). Importantly, we acknowledge that using national R&D expenditure as a proxy for new knowledge generation does not fully capture its sustained effects or the role of geographic proximity in knowledge spillovers (Kwon et al., 2022). To address this limitation, our approach incorporates additional robustness checks and supplementary exploration to this measurement. This ensures a more comprehensive assessment of knowledge generation in our analysis.

The moderating effect of national R&D expenditure is analyzed using the interaction of the individual-level predictors and the country-level predictor, as "An interaction between two variables implies that the effect of each variable depends on the value of the other variable" (Rabe-Hesketh and Skrondal, 2008, p. 37). This research presents a two-level model, in which entrepreneurial experiences at the first level could be affected by the second-level variable of the amount of national R&D expenditure. The evaluation explores which interaction has the strongest influence on entrepreneurial growth aspirations.

3.2.4 Control variables

Based on the literature, we control for several individual- and country-level variables. We include controls for demographic characteristics that have been found to affect new venture prospects (Parker, 2009). Specifically, we control for *age* (and its quadratic term to capture potential nonlinear effects) and *gender* as it has been found to have an influence on entrepreneurial aspirations (Capelleras et al., 2019; Epure et al., 2024; Estrin et al., 2013). Additionally, entrepreneurial outcomes are shaped by individuals' self-perceived capabilities, which stem from both general and specific human capital (Capelleras et al., 2019; Epure et al., 2024; Gruber et al., 2023; Van Praag, 2005). While our model predicts the impact of specific human capital (entrepreneurial experience), we also control for general human capital if the entrepreneur has *higher education* (holding a post-secondary degree) and zero, otherwise. Additionally, the model controls for three main entrepreneurs' socio-cognitive traits, including alertness to opportunities, perceived self-efficacy, and fear of failure as an inhibitor of entrepreneurial activity (Boudreaux et al.,

2019). Alertness to opportunities (*business opportunity*) is a dummy variable that takes the value one if respondents perceive that in the next six months there will be good business opportunities for starting a business in the area where they live, and zero otherwise. Perceived self-efficacy (*self-efficacy*) is a dummy variable that takes the value one if the respondents believe that they have the knowledge, skills, and experience required to start a new business, and zero otherwise. *Fear of failure* takes the value one if the respondent reports that fear of failure could prevent them from starting up a business, and zero otherwise. To elucidate between the potential confounding effects of market experience, process knowledge, and social interactions (Decker et al., 2020; Epure et al., 2024), we also control for *knows other entrepreneurs*, which is a dummy variable that takes the value one if the respondent knows other entrepreneurs personally who started up a business in the last two years, and zero otherwise.

We also incorporate controls for their engagement with new ventures, specifically whether they have personally invested funds into other entrepreneurial initiatives (Welter, 2001). *Business angel* takes the value one if the respondent, in the past three years, personally provided funds for a new business started by someone else, excluding any purchases of stocks or mutual funds. *Venture size* is included in our model to avoid biased estimates (Delmar et al., 2022). The model incorporates controls for *household income*, recognizing the potential correlation between growth aspirations and personal financial resources. We use a three-level income scale (Autio et al., 2013; Epure et al., 2024). Finally, at the individual level, we use a variable of *early-stage vs. nascent* that takes the value one if the respondent is the owner or manager of a business of more than three months but less than three and a half years and zero if the respondent is the owner or manager of a business of less than three months of activity.

To control for differences among countries, we included the national level of development, captured by the logarithmic GDP per capita based on purchasing power parity (PPP) in constant 2017 USD (GDP per capita PPP). We also introduced annual GDP Growth (expressed as the percentage variation from one year to the next) to reflect each country's economic performance cycles, given that economic recessions and crises influence growth aspirations (Koellinger, 2009). The third country-level control variable is Population Growth (also expressed as the percentage variation from one year to the next) to capture information reflecting long-term economic growth (Strulik, 2005). Additionally, we added time dummies to enable controlling for *years* in the sample period while excluding one as a reference category (Hair et al., 2014). *Industry controls* are also included in all our specifications to account for sectoral differences in

growth aspirations (Capelleras et al., 2019; Estrin et al., 2013). All variable definitions and data sources are presented in Table 1.

--- Insert Table 1 about here ---

3.3 Empirical model

Given the nature of the GEM dataset that includes individuals nested within countries, in the main model we perform a multilevel hierarchical linear analysis, allowing intercepts to vary across countries (see, e.g., Aguinis et al., 2013; Amorós et al., 2017; Autio et al., 2013; Epure et al., 2024; Estrin et al., 2013, 2020). This empirical strategy is appropriate for this type of dataset where potentially unobserved heterogeneity in cross-country-, time-, and individual dimensions may arise. Other standard multivariate methods may not account for independence of observations (Hofmann et al., 2000).

$$Y_{ijt} = \beta_0 + \beta_1 Age_{ijt} + \beta_2 Age2_{ijt} + \beta_3 Gender_{ijt} + \beta_4 Higher\_Educ_{ijt} + \beta_5 Serial\_Exp_{ijt} + \beta_6 Port\_Exp_{ijt} \beta_7 Household\_Income_{ijt} + \beta_8 Busang_{ijt} + \beta_7 Knowent_{ijt} + \beta_7 Self\_Efficacy_{ijt} + \beta_8 Fear\_Fail_{ijt} + \beta_9 Opport_{ijt} + \beta_{10} Employment_{ijt} + \beta_{10} Stage\_Dev_{ijt} + \beta_{16} R\&D\_Exp_{jt} + \beta_{16} GDPpppp_{jt} + \beta_{17} GDP\_Growth_{jt} + \beta_{18} Population\_Growth_{jt} + \nu it + \psi t + \mu_{ijt} + \varepsilon_{jt},$$

where Y_{ijt} is our measure for entrepreneurial growth aspirations of individual *i* within country *j* at year *t*; {Age_{ijt}, $Age2_{ijt}$, $Gender_{ijt}$, $Higher\_Educ_{ijt}$, $Serial\_Exp_{ijt}$, $Port\_Exp_{ijt}$, $Household\_Income_{ijt}$, $Busang_{ijt}$, $Knowent_{ijt}$ + $Self\_Efficacy_{ijt}$ + $Fear\_Fail_{ijt}$ + $Opport_{ijt}$ + $Employment_{ijt}$ + $Stage\_Dev_{ijt}$ + $R\&D_{jt}$} are the individual-level control variables; {$R\&D\_Exp_{jt}$} represents the country-level moderator; {$GDPpppp_{jt}$ + GDP_Growth_{jt} + $Population\_Growth_{jt}$ }accounts for the country-level controls. The combination of μ_{ijt} + ε_{jt} denotes the random part of the equation, where μ_{ijt} are the country-level residuals, and ε_{jt} are the individual-level ones. We also consider both industry and year fixed effects to control for potential time-related endogenous issues resulting from omitting additional industry specifications (νit) and possible temporal effects that may impact the extent of internationalization (ψt), respectively.

To deepen our understanding of the relationships between the key variables, we undertake a comprehensive analysis following methodologies outlined in relevant literature (Hair et al., 2014). We interpret size effects using standardized coefficients, which quantify the percentage change in growth aspirations associated with a one standard deviation increase in each predictor variable. Wald tests play a crucial role in determining the statistical significance of both coefficients and interaction effects.

Specifically, we use Wald tests to evaluate the individual and combined impacts of serial and portfolio entrepreneurial experiences with national R&D expenditure.

To explore potential multicollinearity issues, we use a variance inflation factor (VIF) and the tolerance values for all our variables in our full model. As presented in Table A2 in the appendix, all VIF values scored below the threshold of 10, meaning that we do find no indication of multicollinearity problems (Hair et al., 2006). Additionally, tolerance values for all variables exceed the threshold of 0.1, indicating an absence of multicollinearity concerns (Autio et al., 2013).

4 Results

4.1 Descriptive results

Table 2 provides descriptive statistics and correlations for the variables in our model. In this study on growth aspirations, the average expected new employment generation is 1.01 in natural logarithms, which corresponds to approximately 2.75 new jobs. The average proportion of entrepreneurs with serial experience is 3%, while the proportion for those with portfolio experience is 4%. This implies that the remaining entrepreneurs belong to the omitted category, which comprises novice entrepreneurs. These individuals engage in entrepreneurial activities for the first time and lack any prior entrepreneurial experience. Our primary measure of a country's knowledge generation is national R&D expenditure, expressed as a percentage of the country's GDP, which averages 1.01%, though this investment varies significantly across countries. Detailed information on the variation in the sample composition for each country is provided in Table A1.

Notably, 41% of the entrepreneurs are women, and 59% are men, while the average age is 38. Just 12% of entrepreneurs have previous investors' experience as business angels, meaning that most of the sample has not provided funds for any other new business. About two thirds of respondents (60%) consider there will be good opportunities for starting a business in the next six months. Similarly, 29% of the entrepreneurs reported that fear of failure would prevent them from starting a business, while 84% considered they had the necessary skills to start a business. Regarding household income, 44% of the entrepreneurs are in their respective country's high-income group. With regard to the entrepreneur's general human capital attainment, 43% of the entrepreneurs have attained higher education.

In terms of the country-level control variables, per capita GDP presents an annual mean of USD 26,995 where the country with the lowest per capita annual income is USD 1,584 and the country with the

highest per capita income is USD 116,284. For the total sample, the average GDP per capita growth was 2.67%, and the average annual population growth was 0.90%.

---Insert Table 2 about here---

4.2 Multilevel regression model results

Table 3 reports results from the multilevel random intercept models predicting entrepreneurial growth aspirations (EGA). Model (1) considers only the control variables at individual and country levels. Female entrepreneurs tend to have lower EGA. Other negative relations exist between EGA and factors such as age, fear of failure, and venture size. Positive relationships were observed with higher education, household income, business angel experience, knowing entrepreneurs, self-efficacy, and perceived opportunities. Additionally, at the country level, higher GDP per capita and GDP growth are linked to increased growth aspirations, aligning with prior research (Autio and Acs, 2010; Capelleras et al., 2019).

---Insert Table 3 about here---

In Model (2), all the control variables are included along with individual-level predictors that determine if the entrepreneur is a *serial* or *portfolio entrepreneur*. The results of this model provide evidence supporting our hypotheses regarding the impact of entrepreneurial experience on growth aspirations. Specifically, Hypothesis 1 posited that entrepreneurs with serial experience would achieve higher growth aspirations compared to those without any entrepreneurial experience. This hypothesis is confirmed, as evidenced by the positive and statistically significant coefficient. Similarly, Hypothesis 2 suggested that entrepreneurs with portfolio experience would exhibit higher growth aspirations than those without entrepreneurial experience. This hypothesis is also confirmed, with a positive and highly significant coefficient.

To further contextualize the effects of entrepreneurial experience, we utilize the results from Model (2) with standardized variables. The findings reveal that a one standard deviation increase in serial experience (0.17) is associated with a 2.19% increase in growth aspirations. Similarly, a one standard deviation increase in portfolio experience (0.19) corresponds to a 4.73% increase in growth aspirations.

Wald tests confirm the significance of these effects. The test for serial experience yields a chi-square value of 64.50 ($p = 0.0000$), and for portfolio experience, a chi-square value of 299.52 ($p = 0.0000$). Additionally, the joint test for the difference between serial and portfolio experience shows a chi-square value of 32.18 ($p = 0.0000$). Although both types of entrepreneurial experience significantly impact growth aspirations, portfolio experience has a larger and more statistically significant effect.

In Model (3), we incorporate national R&D expenditure as a moderator variable to explore its influence on growth aspirations. The results indicate that national R&D expenditure does not have a direct effect on growth aspirations. Specifically, the coefficient for national R&D expenditure is negative, close to zero, and statistically not significant. This suggests that higher levels of national investment in R&D do not directly enhance entrepreneurial growth aspirations. This outcome implies that while R&D expenditure is crucial for overall innovation and economic development, it may not translate directly into heightened growth aspirations among entrepreneurs. Instead, the effects of national R&D expenditure might be more complex, as we later analyze when exploring its indirect effects.

We further explore the role of national R&D expenditure as a moderator variable of entrepreneurial experience in models (4) and (5), aligning with the formulations of hypotheses 3 and 4. The results provide robust support for both hypotheses. The analysis confirms Hypothesis 3, which posits that higher levels of national R&D expenditure strengthen the relationship between entrepreneurs' serial experience and growth aspirations, demonstrating a statistically significant positive interaction effect. This finding indicates that serial entrepreneurs, who already benefit from accumulated experience and learning, see an additional increase in their growth aspirations when operating in environments with substantial national R&D investment. Similarly, Hypothesis 4 suggests that higher levels of national R&D expenditure enhance the relationship between entrepreneurs' portfolio experience and growth aspirations. Our results confirm this hypothesis as well, showing a significant positive interaction effect. This implies that portfolio entrepreneurs, who manage multiple ventures and leverage diverse experiences, are further motivated by higher levels of national R&D expenditure.

Model (6) supports these findings, showing consistency with models (4) and (5) when both types of interactions are analyzed simultaneously. This reinforces the robustness of our results and the significant moderating role of national R&D expenditure on the relationship between entrepreneurial experience and growth aspirations.

Moreover, the moderating effect of national R&D expenditure enhances these relationships, as presented in Model (6). For entrepreneurs with serial experience in countries with higher national R&D expenditure, the effect on growth aspirations is increased by an additional 1.3%. Likewise, for entrepreneurs with portfolio experience in countries with higher national R&D expenditure, the effect on growth aspirations is enhanced by an additional 2.6%.

To test these results, we perform Wald tests and confirm the significance of these interaction effects. The interaction of serial experience with national R&D expenditure yields a chi-square value of 18.04 ($p = 0.0000$), while the interaction of portfolio experience with national R&D expenditure produces a chi-square value of 81.64 ($p = 0.0000$). Additionally, a joint Wald test for the interaction effects yields a chi-square statistic of 7.96 ($p = 0.0048$), confirming their significant difference. Our findings indicate that national R&D expenditure significantly moderates the impact of both serial and portfolio entrepreneurial experience on growth aspirations. Notably, the effect is more pronounced for portfolio entrepreneurial experience, demonstrating a larger enhancement in growth aspirations compared to serial experience. Figures 1 and 2 represent graphically the two interaction effects.

--- Insert Figure 1 & 2 about here ---

4.3 Robustness checks

To address potential concerns regarding the robustness of our findings, we conducted additional checks by incorporating several national-level controls: the National Governance Indicators, the Economic Liberalization Index from the Heritage Foundation, and the Economic Freedom Index from the Fraser Institute, as presented in Table 4. Controlling for these variables enhances the robustness of our results by accounting for critical factors that can influence growth aspirations, such as institutional quality, economic policies, and regulatory environments. These controls help mitigate the risk of spurious correlations between national R&D expenditure and growth aspirations by isolating the effects of governance quality, economic freedom, and regulatory conditions. The consistency of our results, after accounting for these comprehensive controls, reinforces the validity of our original findings and emphasizes the moderating role of national R&D investment in shaping entrepreneurial growth aspirations.

---Insert Table 4 about here---

To further enhance the robustness of our findings, in Table 5, we calculated the averages for national R&D expenditure over 3-, 5-, and 10-year periods, rather than lagging the variable by one year. This approach reflects different time spans needed for innovations to impact growth aspirations. By using these extended averages, we aimed to capture the more sustained effects of R&D expenditure on entrepreneurial activity. Even when using these longer-term averages, we confirm our initial results. Notably, we also observed that the direct effect of R&D expenditure on growth aspirations becomes significant when evaluated as an average over a 5- or 10-year period.

---Insert Table 5 about here---

Furthermore, we introduced additional measures to proxy new knowledge generation, reported in Table 6. Specifically, we included the Frontier Technology Readiness (FTR) index, which assesses a country's readiness to use, adopt, and adapt frontier technologies. This comprehensive index evaluates a country's preparedness to adopt and leverage cutting-edge technologies, encompassing factors such as ICT deployment, human capital (including skills and education levels), R&D initiatives, industrial involvement in high-tech sectors, and accessibility to financial resources. Additionally, we employed the natural logarithm of patent applications as a proxy, capturing the innovative output and technological advancements within each country. The alignment of our findings across these diverse metrics reinforces the robustness of our initial findings.

---Insert Table 6 about here---

5 Discussion

5.1 Discussion of findings

The decision to grow a new firm is a strategic choice with long-term implications for future performance (Gilbert et al., 2006). Therefore, understanding how entrepreneurs develop their beliefs about firm growth is a significant topic in entrepreneurship research (Decker et al., 2020; Estrin et al., 2022; Hermans et al., 2015). This study enhances our understanding of how growth aspirations are formed by investigating the direct impact of an entrepreneur's specific human capital and the moderating role of a country's knowledge generation capacity in this relationship. We demonstrate that growth aspirations are not only shaped by the specific type of entrepreneurial experience an entrepreneur possesses but also that they can be further boosted by acquiring new, valuable knowledge related to innovation (Estrin et al., 2022).

More specifically, the study identified two main findings. First, previous entrepreneurial experience does influence growth aspirations. Our analysis reveals significant positive associations for both serial and portfolio entrepreneurial experiences. This suggests that prior entrepreneurial experience endows individuals with critical skills, comprehensive knowledge, and enhanced confidence, which collectively contribute to higher growth aspirations. This aligns with the literature suggesting that experienced entrepreneurs are better at recognizing and exploiting opportunities (Alsos and Kolvereid, 1998; Dabić et al., 2023).

We acknowledge previous findings exploring the entrepreneur's human capital formation as a predictor of entrepreneurial growth aspirations (Autio and Acs, 2010; Capelleras et al., 2019), and we add to this knowledge the understanding of how different types of entrepreneurial experience contribute toward shaping entrepreneurial growth aspirations. Although both types of entrepreneurial experiences—serial and portfolio—accumulate in the entrepreneurs' learning process, they are distinct in shaping their growth aspirations. Serial entrepreneurs demonstrate higher growth aspirations due to their ability to apply lessons from previous ventures, enhancing their managerial skills, market interpretation, and social networks, thereby equipping them to better assess and capitalize on new opportunities (Corbett, 2005; Dabić et al., 2021; Guerrero and Peña-Legazkue, 2019; Vaillant and Lafuente, 2019). In contrast, portfolio entrepreneurs exhibit elevated growth aspirations by leveraging their diverse and rich entrepreneurial experiences, transferring knowledge across multiple ventures, and utilizing extensive social networks to efficiently exploit new business opportunities. They opt for diversification strategies and business integration and swiftly adapt to market changes, and manage risks through strategic delegation and robust management practices (Alvarez and Barney, 2007; Carter and Ram, 2003; Lechner et al., 2016; Ucbasaran, Alsos, et al., 2008).

The study's second finding concerns how different types of entrepreneurial experiences can enable entrepreneurs to absorb external research and development (R&D) resources, which can enhance the expected growth of their new ventures. Although the link between knowledge generation and entrepreneurship is not new in the literature (Amorós et al., 2019; Kirschning and Mrożewski, 2023; Van Stel et al., 2019), here we have considered for the first time the moderating effects of the national R&D investment on ambitious entrepreneurship, specifically on growth aspirations. At a country level, nations dedicating intense resources to research and development will foster an environment of innovation, prone to discovering new technologies and new knowledge generation. Additionally, significant investments in this sector will spill over different economic areas, evidencing a higher concentration of researchers and specialists, enhancing patenting behavior, attracting high technological companies, fostering the creation of innovative start-ups, and boosting entrepreneurial activity. A context with these characteristics will ultimately propitiate business expansion opportunities. We have explored in this research that, among all of these factors, experienced entrepreneurs increase their growth aspirations when developing their activities in these contexts. By experiencing firsthand a market's reaction to introducing a new business, they acquired an advantage over first-time entrepreneurs in staying ahead in the face of new technologies'

development and change in market trends. This environment will trigger serial entrepreneurs' appetite for exploiting new business opportunities and their understating of the benefits that emerge from an agile reaction in response to opportunity identification.

However, among those experienced entrepreneurial attainments, it is portfolio entrepreneurs who might feel motivated to achieve higher growth aspirations in an innovative environment, as observed by the interaction between portfolio experience and national R&D expenditure. In effect, the positive moderating effect of R&D investment is greater for portfolio entrepreneurs than for their serial counterparts. Our interpretation of this finding is that their accumulated specific human capital enhances their ability to integrate and apply new knowledge effectively. Their broad exposure to various industries and markets equips them with the skills and expertise needed to navigate and capitalize on the opportunities presented by R&D investments more efficiently than serial entrepreneurs. Furthermore, portfolio entrepreneurs, by managing multiple ventures simultaneously, have developed advanced capabilities in resource mobilization and utilization. They are adept at leveraging the knowledge spillovers and new technologies emanating from R&D investments across their diverse business interests. This allows them to extract maximum value from R&D expenditure, potentially translating into higher growth aspirations compared to serial entrepreneurs. Moreover, the strong ties cultivated with their networks facilitate quicker access to information related to emerging trends and new technologies and simultaneously enhance their possibilities for new partners and resources, given their reputation as permanent entrepreneurs. This advantage also enables them to make more informed decisions and effectively manage potential synergies and expansion opportunities in their businesses. As a result, we highlight the relevance of attaining portfolio entrepreneurial experience as an enabler force to absorb external R&D expenditure.

5.2 Theoretical implications

Our study provides new insights into human capital theory in entrepreneurship, focusing on how different entrepreneurial experiences affect growth aspirations. While existing literature highlights the influence of general human capital on entrepreneurial growth (Autio and Acs, 2010; Capelleras et al., 2019; Fuentelsaz et al., 2023), it tends to overlook the impact of specific experiences. Our research demonstrates that the serial and portfolio experiences of early-stage entrepreneurs, indicative of their specific human capital, are positively associated with higher growth aspirations compared to those of novice entrepreneurs.

This relationship underscores the critical role of learning by doing in enhancing the entrepreneurs' specific human capital attainment (Becker, 1964; Corbett, 2005; Dabić et al., 2021; Parker, 2013). By

engaging in multiple ventures, either sequentially or concurrently, serial and portfolio entrepreneurs develop advanced managerial skills, market knowledge, and extensive social networks, crucial components of human capital (Becker, 1964; Corbett, 2005). These enhanced capabilities not only strengthen their confidence but also improve their ability to exploit new opportunities, thereby driving higher growth aspirations (Alvarez and Barney, 2007; Dabić et al., 2023). This finding aligns with and extends the existing literature by illustrating how specific types of entrepreneurial experiences contribute to the human capital formation process, providing support for the notion that experiential learning significantly influences entrepreneurial outcomes (Unger et al., 2011; Venkataraman and Shane, 2000).

Hence, the first implication is that we extend human capital theory by providing a more comprehensive portrait of specific human capital as an antecedent to entrepreneurial growth aspirations. Our findings highlight the importance of considering the type of entrepreneurial experience when evaluating its impact on growth aspirations, thereby offering a nuanced understanding of how human capital influences entrepreneurial outcomes.

Our paper also extends prior research to show that the connection between the specific human capital of entrepreneurs and their growth aspirations depends on the innovative nature of an economy, represented by the country's level of R&D expenditure (Burke et al., 2021). Specifically, our results indicate that the positive association between entrepreneurial experience and growth aspirations is amplified in contexts with higher levels of national R&D expenditure. Serial and portfolio entrepreneurs, with their accumulated entrepreneurial and managerial skills, are particularly adept at absorbing and leveraging the new technological advancements and market information produced by national R&D activities. This interaction suggests that experienced entrepreneurs act as key agents in transforming knowledge spillovers into tangible entrepreneurial opportunities, heightening their growth aspirations.

Therefore, the second implication is that we enrich the KSTE (Acs et al., 2013) by emphasizing the pivotal role of the knowledge environment in shaping entrepreneurial growth aspirations. National R&D expenditure provides a conducive environment that enhances the capacity of experienced entrepreneurs to capitalize on new knowledge, driving higher levels of high-growth entrepreneurial activity (Acs et al., 2009; Audretsch et al., 2014). By highlighting the importance of external knowledge flows within the national entrepreneurial context, our study reveals their significant contribution to enhancing the growth potential of early-stage firms, particularly those run by entrepreneurs with portfolio entrepreneurial experience. Thus,

our study draws attention to the role of knowledge spillovers within the external environment in helping early-stage firms strengthen their growth potential.

5.3 Policy implications

The findings of this study carry significant policy implications, which can be directed towards individual entrepreneurs and their context. The importance of nurturing experienced entrepreneurs has been highlighted, particularly concerning their role in driving aspirations for greater growth in new ventures. Consequently, actively promoting the expansion of experienced entrepreneurs becomes a desirable national goal and of the interest to policymakers.

Encouraging experienced entrepreneurs' propagation is just part of the measures policymakers can take. As experienced entrepreneurs represent the most agile actors in an environment to take action on recognizing business opportunities, some specific measures in their context would enhance this behavior. The first and most evident one is promoting conditions that encourage the increase of national R&D expenditure, sourced from private and public sources, taking into consideration experienced entrepreneurs' knowledge on market demands (Caiazza et al., 2020). To achieve this, governments can allocate increased funding through grants, subsidies, and tax incentives while fostering public–private partnerships to pool resources and prioritizing R&D infrastructure, education, and skilled workforce development. Long-term funding commitments, international collaboration, sector-specific strategies, and robust intellectual property protection further stimulate R&D expenditure (Sterlacchini, 2008). Setting R&D funding targets, raising public awareness, and continuous policy evaluation ensure a comprehensive approach to driving innovation, economic growth, and competitiveness.

This approach to fostering experienced entrepreneurs involves the mentioned measures and also a country's dedication to establishing effective platforms for knowledge transfer and utilization, as highlighted by Audretsch and Caiazza (2016). This goal can be achieved by reinforcing networking systems that facilitate seamless knowledge exchange and aligning them with institutions that actively promote innovation. These institutions could encompass R&D labs, support for research collaborations, the establishment of additional incubators and accelerators, and incentives for creating research centers within businesses. The promotion of entrepreneurial networks can bridge the gap between insights gained by experienced entrepreneurs and those just starting their entrepreneurial journey.

Specific actions aimed at nurturing experienced entrepreneurs should concentrate on prioritizing education, fostering skilled talent, and acknowledging the advantages of accumulating a pool of

experienced entrepreneurs in a given context. Furthermore, strategic initiatives to augment R&D funding allocation and establish efficient channels for knowledge transfer emerge as pivotal areas for policy intervention. Consequently, a supportive environment should cultivate a culture of innovation and collaboration across all participants involved in generating new knowledge, thereby fostering the expansion of an "entrepreneurial society" (Audretsch and Fiedler, 2023).

5.4 Limitations and further research

This study has limitations that offer opportunities for future research. First, besides national R&D expenditure, there are various alternative measures of knowledge generation, such as the number of annual patents, human capital dedicated to knowledge generation (researchers, scientists, and inventors), the proportion of a highly educated population (Iftikhar et al., 2022), refereed scientific publications, and the percentage of innovations in high technologies (Zahlan, 2007). However, many countries do not have rigorous methodologies for tracking these alternative measures, so that national R&D expenditure might be more accurate for a country comparative analysis. Our approach is also consistent with previous studies in this field (Van Stel et al., 2019). In future studies, national investment in R&D could be split into its four components: business enterprises (for-profit, firm-based); government R&D expenditure; higher education R&D; and private nonprofit R&D. This could enhance understanding of how different investment sources affect knowledge transfer (Amorós et al., 2019; Coccia, 2010; Martins and Hukampal Singh, 2023).

It should also be noted that investment in R&D is not immediately translated into discoveries ready to be adopted in the markets; on the contrary, a maturation process is required. Therefore, further developments in this line of investigation could consider the life cycles of R&D projects and the stages in which entrepreneurs are more susceptible to adopting them as business opportunities. Moreover, the research recognizes the significant role of entrepreneurs in identifying opportunities within their context. However, in the case of many high-tech start-ups, their founders also acquire new knowledge by actively participating in virtual platforms that go beyond their local geographic scope. This distinction emphasizes the need to explore further the differences between innovative ecosystems and the utilization of digital platforms to expand the understanding of new ventures' innovative absorption (Cuvero et al., 2023).

While our research aligns well with recent studies looking at the R&D expenditure flows from a comparative lens suggesting that the creation of knowledge at the national level has a positive impact on the utilization of that knowledge when predicting entrepreneurial outcomes, including growth aspirations (e.g. Amorós et al., 2019; Burke et al., 2021; Gu et al., 2024; Van Stel et al., 2019), we are aware that

knowledge flows can be understood as limited in space and the complementary implications this may entail to our comparative research (Kwon et al. 2022). Therefore, future studies could further explore individual-contextual heterogenous dynamics at the regional levels.

Finally, the results depend on data availability, with most individual-level data being represented by binary variables, thereby limiting the comprehensiveness of the information they offer. However, previous authors in this domain have validated these data as useful for entrepreneurial studies (Acs et al., 2014; Álvarez et al., 2014; Coduras and Autio, 2013), and they are commonly used in other social science studies.

5.5 Conclusion

This study delves into the relationship between entrepreneurial experience, R&D investment, and growth aspirations. Both serial and portfolio entrepreneurs demonstrate higher growth aspirations compared to their novice counterparts. In doing so, our study extends human capital theory to show that different previous experiences have differing effects on growth aspirations. Our exploration of the moderating role of national R&D expenditure also highlights the interconnectedness of a country's knowledge generation and entrepreneurial growth aspirations. Thus, the paper also enriches existing research on the knowledge spillover of entrepreneurship by adding an important contextual moderating factor to the link between individual experiences and growth aspirations.

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Table 1. Variables definitions and data sources.

Variable	Definition	Source
Individual-level variables		
Entrepreneurial Growth Aspirations	Entrepreneurial growth aspirations, difference between (the natural logarithms of) entrepreneurs' expected number of employees in the next five years and the current number of employees.	GEM
Serial Experience	Has the entrepreneur sold, shut down, discontinued, or quit a business that they owned/managed in the past 12 months, and did that business continue to exist after their departure? Dummy: 1 = yes, 0 = no.	GEM
Portfolio Experience	Does the entrepreneur currently own/manage an existing business that is older than 42 months? Dummy: 1 = yes, 0 = no.	GEM
Gender	Dummy: 1 = female, 0 = male	GEM
Age	Current age of participant in years.	GEM
Higher education	Dummy variable: 1 = respondent holding a post-secondary education degree, 0 = otherwise.	GEM
Household Income	Dummy variable: 1 = highest household income tier of the respondent, 0 = middle and lowest household income tier. This is an originally categorial variable that classifies the household income tier of the respondent (lowest=1; middle=2; highest=3). For empirical purposes we have converted this variable to a binary one.	GEM
Business Angel	In the past three years, has the entrepreneur personally provided funds for a new business? Dummy: 1 = yes, 0 = no.	GEM
Knows other entrepreneur	Dummy variable: 1 = respondent personally knows someone who started a business in the past two years, 0 = otherwise.	GEM
Self-efficacy	Dummy variable: 1 = respondent answered "yes" to "Do you have the knowledge, skill, and experience required to start a new business?", 0 = otherwise.	GEM
Fear of failure	Dummy variable: 1 = respondent answered "yes" to "Would fear of failure prevent you to start-up a business?", 0 = otherwise.	GEM
Business opportunity	Dummy variable: 1 = respondent answered "yes" to "In the next six months, will there be good opportunities for starting a business in the area where you live?", 0 = otherwise.	GEM
Early stage vs. Nascent	Dummy variable: 1 (early stage) = if the individual is the owner-manager of a business of more than 3 months but less than 3 years and a half of activity, 0 (nascent) = if the individual is the owner-manager of a business in the first 3 months of activity.	GEM
Venture Size	Logarithm of the current number of employees (not counting the owners).	GEM
Country-level variables		
GDP per capita (PPP)	GDP per capita at purchasing power parity (constant 2017 international $). In log.	WDI
GDP growth	Annual percentage growth in GDP.	WDI
Population growth	Annual population growth, expressed in percentage change.	WDI
National R&D expenditure	Yearly national research and development expenditure, as a percentage of country GDP. (One year lag)	WDI
National R&D expenditure averages over time (robustness)	3-Year Average: Average R&D expenditure as a percentage of GDP over three years, capturing short-term fluctuations. 5-Year Average: Average R&D expenditure as a percentage of GDP over five years, indicating medium-term trends. 10-Year Average: Average R&D expenditure as a percentage of GDP over ten years, showing long-term investment patterns.	WDI
Patent application (robustness)	Number of patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office. In log.	WDI
Frontier technology readiness index (robustness)	The index assesses a country's readiness to use, adopt, and adapt frontier technologies using principal component analysis (PCA). It includes indices of ICT deployment (internet users, download speed), skills (expected years of schooling, high-skill employment), R&D activity (scientific publications, patents), industry activity (high-tech manufacturers, digital services exports), and access to finance (domestic credit to the private sector).	UNCTAD
National Governance (robustness)	Composite measure that measures six key indicators to assess the quality of governance in a country: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.	WGI
Economic liberalization index (Heritage) (robustness)	Index of economic freedom from the Heritage Foundation operationalized as a composite measure of the following equally weighted quantitative and qualitative factors: property rights, government integrity, government spending, tax burden, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, and financial freedom. The index can take values from 0 to 100.	HF
Economic freedom index (Fraser) (robustness)	Index from the Fraser Institute measuring degree of economic freedom present in five major areas: government size, legal system and security of property rights; sound money, freedom to trade internationally, and regulation. The index can take values from 0 to 1.	FI

Notes: GEM – Global Entrepreneurship Monitor Adult Population Survey (https://www.gemconsortium.org) for the individual-level variables. WDI – World Bank's World Development Indicators (https://data.worldbank.org/products/wdi) for the country-level variables. WGI – Worldwide Governance Indicators (www.govindicators.org) – UNCTAD United Nations Conference on Trade and Development (https://unctadstat.unctad.org) – HF Heritage Foundation (https://www.heritage.org/index/) – FI Fraser Institute (https://www.fraserinstitute.org) for robustness checks.

Table 2 Descriptive statistics and correlation matrix

No.	Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
1	EGA	1.01	1.14	**1**																						
2	Serial experience	0.03	0.17	**0.02**	**1**																					
3	Portfolio experience	0.04	0.19	**0.09**	**-0.03**	**1**																				
4	National R&D expenditure	1.01	0.91	**-0.09**	**-0.01**	0.00	**1**																			
5	Gender	0.41	0.49	**-0.11**	**-0.02**	**-0.05**	**-0.05**	**1**																		
6	Age	38	11	**-0.06**	**-0.01**	**0.08**	**0.11**	0.00	**1**																	
7	Higher education	0.43	0.50	**0.11**	0.00	**0.03**	**0.15**	**-0.04**	**0.02**	**1**																
8	Household income	0.44	0.50	**0.08**	**0.01**	**0.06**	**0.02**	**-0.11**	**0.01**	**0.22**	**1**															
9	Business angel	0.12	0.33	**0.09**	**0.09**	**0.05**	**-0.04**	**-0.08**	**-0.02**	**0.06**	**0.09**	**1**														
10	Know entrepreneur	0.65	0.48	**0.05**	**0.03**	**0.03**	**0.04**	**-0.06**	**-0.06**	**0.11**	**0.10**	**0.10**	**1**													
11	Self-efficacy	0.84	0.37	**0.07**	**0.02**	**0.05**	**-0.03**	**-0.06**	**0.03**	**0.07**	**0.06**	**0.04**	**0.14**	**1**												
12	Business opportunity	0.60	0.49	**0.10**	**0.01**	**0.01**	**-0.03**	**-0.02**	**-0.06**	**0.02**	**0.04**	**0.04**	**0.14**	**0.12**	**1**											
13	Fear of failure	0.29	0.45	**-0.05**	**0.01**	**-0.02**	**-0.01**	**0.05**	**0.01**	**-0.02**	**-0.06**	**-0.02**	**-0.04**	**-0.16**	**-0.10**	**1**										
14	Venture Size	0.55	0.89	**-0.32**	**0.05**	**-0.03**	**0.08**	**-0.09**	**0.02**	**0.07**	**0.13**	**0.09**	**0.07**	**0.02**	-0.01	**-0.02**	**1**									
15	Early stage vs. Nascent	0.51	0.50	**-0.46**	**0.01**	**-0.09**	**0.04**	**0.02**	0.00	**-0.05**	**0.03**	**-0.01**	**0.02**	**-0.02**	**-0.04**	0.00	**0.45**	**1**								
16	GDP per capita	26,995	16,787	**0.02**	**-0.02**	0.00	**0.58**	**-0.07**	**0.14**	**0.26**	**0.05**	**-0.01**	**0.04**	**0.04**	**-0.04**	**-0.02**	**0.06**	**-0.04**	**1**							
17	GDP growth	2.67	3.57	**0.01**	**0.02**	0.00	**-0.11**	-0.01	**-0.05**	**-0.07**	**0.02**	**0.02**	**-0.03**	**-0.05**	**0.09**	**-0.04**	**0.06**	**0.03**	**-0.27**	**1**						
18	Population growth	0.90	0.73	**0.02**	**0.02**	**0.02**	**-0.27**	**0.02**	**-0.06**	**-0.09**	**-0.05**	**0.04**	0.00	**0.02**	**0.11**	**-0.03**	-0.01	0.01	**-0.36**	**0.21**	**1**					
19	National Governance	0.43	0.75	0.00	**-0.02**	**0.01**	**0.54**	**-0.04**	**0.15**	**0.22**	**0.03**	**0.02**	**0.05**	**0.06**	**-0.01**	**-0.04**	**0.02**	**-0.05**	**0.81**	**-0.26**	**-0.29**	**1**				
20	Economic liberalization index	67	8.81	**0.12**	0.00	**0.01**	**0.24**	**-0.02**	**0.12**	**0.21**	**0.04**	**0.06**	**0.05**	**0.06**	**0.04**	**-0.04**	0.01	**-0.10**	**0.59**	**-0.19**	**-0.08**	**0.79**	**1**			
21	Economic freedom index	7.31	0.72	**0.03**	**-0.02**	**0.02**	**0.28**	**-0.02**	**0.12**	**0.16**	**0.03**	**0.03**	**0.06**	**0.06**	0.00	**-0.04**	**-0.09**	**-0.01**	**0.62**	**-0.17**	**-0.14**	**0.80**	**0.85**	**1**		
22	Frontier Technology Readiness	0.61	0.22	**-0.05**	**-0.01**	-0.01	**0.80**	**-0.05**	**0.15**	**0.23**	**0.04**	**-0.03**	**0.06**	**-0.01**	**-0.06**	**0.02**	**0.05**	0.01	**0.79**	**-0.27**	**-0.47**	**0.75**	**0.44**	**0.47**	**1**	
23	Patent applications	36,807	149,385	**-0.08**	0.00	-0.01	**0.64**	**-0.02**	**0.07**	**0.10**	**0.02**	**-0.02**	**0.04**	**-0.06**	**-0.06**	**0.03**	**0.10**	**0.11**	**0.27**	**-0.01**	**-0.24**	**0.17**	**-0.05**	**-0.08**	**0.66**	**1**

Notes: Correlation coefficients displayed in bold are significant at 0.1%.

Table 3. Multilevel random intercept model predicting entrepreneurial growth aspirations

Dep. Var.: Entrepreneurial Growth Aspirations	(1)	(2)	(3)	(4)	(5)	(6)
Serial experience (H1)		0.129***	0.129***	0.063***	0.129***	0.057**
		(0.016)	(0.016)	(0.023)	(0.016)	(0.023)
Portfolio experience (H2)		0.249***	0.249***	0.249***	0.112***	0.109***
		(0.014)	(0.014)	(0.014)	(0.021)	(0.021)
National R&D expenditure (lag 1 year)			0.005	0.004	-0.002	-0.004
			(0.019)	(0.019)	(0.019)	(0.019)
Serial experience*R&D (H3)				0.069***		0.075***
				(0.018)		(0.018)
Portfolio experience*R&D (H4)					0.137***	0.139***
					(0.015)	(0.015)
Gender	-0.178***	-0.174***	-0.174***	-0.174***	-0.174***	-0.174***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age	-0.008***	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age squared	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Higher education	0.123***	0.123***	0.123***	0.123***	0.122***	0.123***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Household income	0.148***	0.143***	0.143***	0.143***	0.143***	0.143***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Business Angel	0.212***	0.200***	0.200***	0.200***	0.200***	0.200***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Know entrepreneur	0.073***	0.070***	0.070***	0.070***	0.070***	0.070***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Self-efficacy	0.095***	0.090***	0.090***	0.090***	0.089***	0.089***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Business opportunity	0.113***	0.112***	0.112***	0.112***	0.112***	0.112***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Fear of Failure	-0.064***	-0.062***	-0.062***	-0.062***	-0.062***	-0.062***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Early stage vs. Nascent	-0.739***	-0.730***	-0.730***	-0.729***	-0.729***	-0.729***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Venture size (ln)	-0.274***	-0.274***	-0.274***	-0.275***	-0.274***	-0.275***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GDP PPP (ln)	0.131***	0.132***	0.130***	0.130***	0.131***	0.131***
	(0.029)	(0.029)	(0.031)	(0.031)	(0.031)	(0.031)
GDP Growth	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population growth	0.044***	0.037***	0.037***	0.037***	0.037***	0.036***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Intercept	0.704**	0.694**	0.715**	0.714**	0.708**	0.707**
	(0.288)	(0.288)	(0.303)	(0.303)	(0.302)	(0.303)
Years Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117,911	117,911	117,911	117,911	117,911	117,911
Number of groups	83	83	83	83	83	83

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses

Table 4. Robustness checks: Control for institutional factors

Dep. Var.: Entrepreneurial Growth Aspirations	(1)	(2)	(3)	(4)
Institutional control variables	Baseline	National governance	Economic liberalization index	Economic freedom index
Serial experience (H1)	0.057**	0.058**	0.056**	0.060**
	(0.023)	(0.023)	(0.023)	(0.024)
Portfolio experience (H2)	0.109***	0.108***	0.109***	0.116***
	(0.021)	(0.021)	(0.021)	(0.022)
National R&D expenditure (lag 1 year)	-0.004	0.009	-0.028	-0.002
	(0.019)	(0.019)	(0.020)	(0.019)
Serial experience*R&D (H3)	0.075***	0.075***	0.075***	0.074***
	(0.018)	(0.018)	(0.018)	(0.018)
Portfolio experience*R&D (H4)	0.139***	0.140***	0.140***	0.137***
	(0.015)	(0.015)	(0.015)	(0.016)
Gender	-0.174***	-0.174***	-0.175***	-0.174***
	(0.006)	(0.006)	(0.006)	(0.006)
Age	-0.009***	-0.009***	-0.008***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)
Age squared	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Higher education	0.123***	0.122***	0.124***	0.122***
	(0.006)	(0.006)	(0.006)	(0.006)
Household income	0.143***	0.143***	0.141***	0.143***
	(0.006)	(0.006)	(0.006)	(0.006)
Business Angel	0.200***	0.201***	0.200***	0.202***
	(0.008)	(0.008)	(0.008)	(0.009)
Know entrepreneur	0.070***	0.070***	0.070***	0.072***
	(0.006)	(0.006)	(0.006)	(0.006)
Self-efficacy	0.089***	0.089***	0.090***	0.089***
	(0.008)	(0.008)	(0.008)	(0.008)
Business opportunity	0.112***	0.112***	0.112***	0.114***
	(0.006)	(0.006)	(0.006)	(0.006)
Fear of Failure	-0.062***	-0.063***	-0.062***	-0.060***
	(0.006)	(0.006)	(0.006)	(0.006)
Early stage vs. Nascent	-0.729***	-0.730***	-0.731***	-0.735***
	(0.006)	(0.006)	(0.006)	(0.007)
Venture size (ln)	-0.275***	-0.274***	-0.274***	-0.269***
	(0.004)	(0.004)	(0.004)	(0.004)
GDP PPP (ln)	0.131***	0.232***	0.052	0.116***
	(0.031)	(0.035)	(0.033)	(0.036)
GDP Growth	0.007***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
Population growth	0.036***	0.039***	0.034***	0.043***
	(0.010)	(0.010)	(0.010)	(0.010)
National Governance (WGI)		-0.179***		
		(0.032)		
Economic liberalization index (HF)			0.011***	
			(0.002)	
Economic freedom index (Fraser)				-0.012
				(0.021)
Intercept	0.707**	-0.214	0.792***	0.910***
	(0.303)	(0.338)	(0.307)	(0.332)
Years Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	117,911	117,911	117,440	111,993
Number of groups	83	83	80	72

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses

Table 5. Robustness checks: national R&D expenditure averages over time

Dep. Var.: Entrepreneurial Growth Aspirations	(1)	(2)	(3)	(4)	(5)	(6)
R&D specification	Avg. 3 years		Avg. 5 years		Avg. 10 years	
Serial experience (H1)	0.117***	0.044**	0.116***	0.043**	0.119***	0.045**
	(0.014)	(0.020)	(0.014)	(0.019)	(0.014)	(0.019)
Portfolio experience (H2)	0.231***	0.095***	0.227***	0.087***	0.227***	0.089***
	(0.013)	(0.018)	(0.013)	(0.018)	(0.013)	(0.017)
3 years average National R&D expenditure	-0.008	-0.019				
	(0.018)	(0.018)				
Serial experience*R&D (H3)		0.088***				
		(0.016)				
Portfolio experience*R&D (H4)		0.152***				
		(0.014)				
5 years average National R&D expenditure			-0.081***	-0.093***		
			(0.019)	(0.019)		
Serial experience*R&D (H3)				0.090***		
				(0.016)		
Portfolio experience*R&D (H4)				0.160***		
				(0.014)		
10 years average National R&D expenditure					-0.087***	-0.101***
					(0.022)	(0.022)
Serial experience*R&D (H3)						0.098***
						(0.017)
Portfolio experience*R&D (H4)						0.169***
						(0.015)
Gender	-0.175***	-0.175***	-0.171***	-0.172***	-0.168***	-0.168***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Age	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.000*	0.000	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Higher education	0.134***	0.134***	0.136***	0.136***	0.135***	0.135***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Household income	0.140***	0.139***	0.140***	0.139***	0.140***	0.139***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Business Angel	0.186***	0.186***	0.184***	0.184***	0.184***	0.183***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Know entrepreneur	0.067***	0.067***	0.064***	0.064***	0.062***	0.062***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Self-efficacy	0.089***	0.088***	0.089***	0.088***	0.088***	0.087***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Business opportunity	0.110***	0.110***	0.109***	0.109***	0.107***	0.107***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Fear of Failure	-0.055***	-0.055***	-0.056***	-0.056***	-0.056***	-0.055***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Early stage vs. Nascent	-0.712***	-0.711***	-0.709***	-0.708***	-0.708***	-0.707***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Venture size (ln)	-0.282***	-0.282***	-0.283***	-0.284***	-0.283***	-0.283***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
GDP PPP (ln)	0.099***	0.101***	0.119***	0.121***	0.116***	0.118***
	(0.027)	(0.027)	(0.025)	(0.025)	(0.025)	(0.025)
GDP Growth	-0.004***	-0.004***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population growth	-0.062***	-0.063***	-0.068***	-0.068***	-0.068***	-0.069***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Intercept	1.183***	1.175***	1.043***	1.032***	1.066***	1.050***
	(0.259)	(0.259)	(0.244)	(0.244)	(0.238)	(0.238)
Years Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	137,583	137,583	140,679	140,679	144,578	144,578
Number of groups	92	92	95	95	96	96

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses

Table 6. Robustness checks: Additional proxies to new knowledge generation (Patent application and Frontier Technology Readiness Index FTR)

Dep. Var.: Entrepreneurial Growth Aspirations	(1)	(2)	(3)	(4)	(5)	(6)
Alternative measures	Baseline		Frontier Technology Readiness		Patent Application	
Serial experience (H1)	0.129***	0.057**	0.122***	-0.031	0.124***	0.029
	(0.016)	(0.023)	(0.013)	(0.030)	(0.015)	(0.037)
Portfolio experience (H2)	0.249***	0.109***	0.211***	-0.098***	0.243***	-0.055
	(0.014)	(0.021)	(0.013)	(0.028)	(0.014)	(0.036)
Lag1 year National R&D expenditure	0.005	-0.004				
	(0.019)	(0.019)				
Serial experience*R&D (H3)		0.075***				
		(0.018)				
Portfolio experience*R&D (H4)		0.139***				
		(0.015)				
Frontier Technology Readiness (FTR)			0.217***	0.178**		
			(0.082)	(0.082)		
Serial experience*FTR (H3)				0.307***		
				(0.054)		
Portfolio experience*FTR (H4)				0.593***		
				(0.048)		
Patent Applications (ln)					0.011	0.009
					(0.007)	(0.007)
Serial experience*Patent (H3)						0.015***
						(0.005)
Portfolio experience*Patent (H4)						0.046***
						(0.005)
Gender	-0.174***	-0.174***	-0.169***	-0.169***	-0.163***	-0.164***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Age	-0.009***	-0.009***	-0.006***	-0.006***	-0.008***	-0.007***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.000**	0.000**	0.000	0.000	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Higher education	0.123***	0.123***	0.139***	0.138***	0.134***	0.134***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Household income	0.143***	0.143***	0.139***	0.138***	0.139***	0.139***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Business Angel	0.200***	0.200***	0.181***	0.181***	0.182***	0.182***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)
Know entrepreneur	0.070***	0.070***	0.059***	0.059***	0.059***	0.059***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Self-efficacy	0.090***	0.089***	0.084***	0.083***	0.088***	0.088***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Business opportunity	0.112***	0.112***	0.102***	0.102***	0.106***	0.106***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Fear of Failure	-0.062***	-0.062***	-0.058***	-0.057***	-0.058***	-0.058***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Stage of firm development	-0.730***	-0.729***	-0.296***	-0.717***	-0.275***	-0.713***
	(0.006)	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)
Venture size (ln)	-0.274***	-0.275***	-0.717***	-0.296***	-0.714***	-0.275***
	(0.004)	(0.004)	(0.006)	(0.003)	(0.006)	(0.003)
GDP PPP (ln)	0.130***	0.131***	0.020	0.020	0.092***	0.091***
	(0.031)	(0.031)	(0.028)	(0.028)	(0.028)	(0.028)
GDP Growth	0.007***	0.007***	-0.004***	-0.004***	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population growth	0.037***	0.036***	-0.067***	-0.067***	-0.051***	-0.052***
	(0.010)	(0.010)	(0.008)	(0.008)	(0.008)	(0.008)
Intercept	0.715**	0.707**	1.910***	1.922***	1.109***	1.126***
	(0.303)	(0.303)	(0.255)	(0.255)	(0.262)	(0.262)
Years Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117,911	117,911	142,510	142,510	126,753	126,753
Number of groups	83	83	103	103	92	92

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses

Figure 1. Moderating effect of national R&D expenditure on the relationship between serial experience and entrepreneurial growth aspirations.

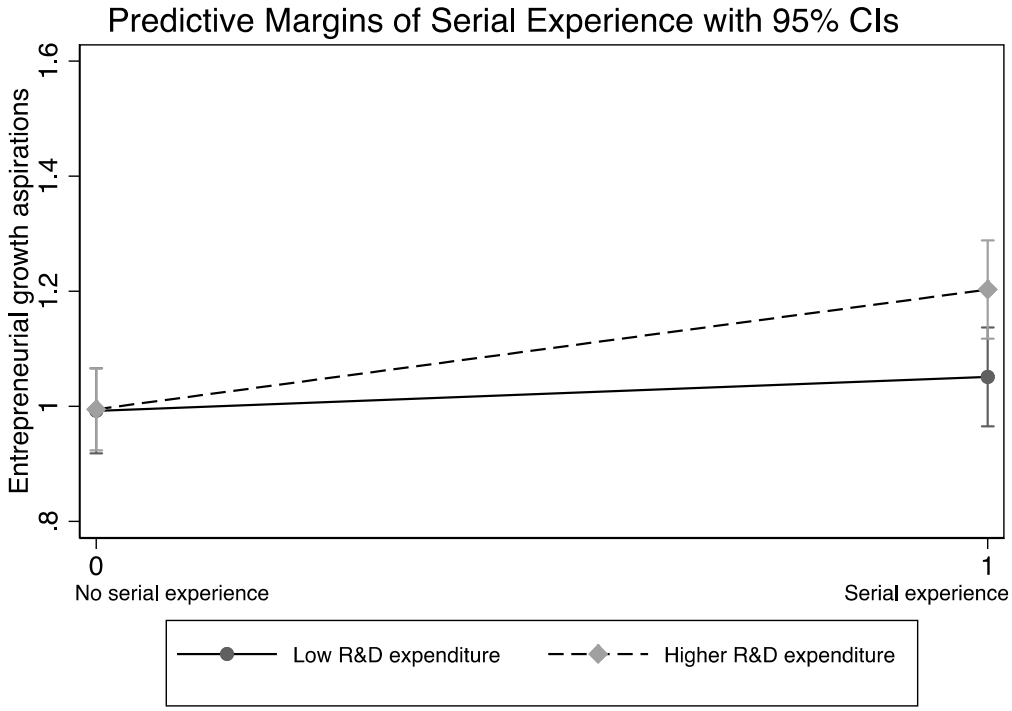
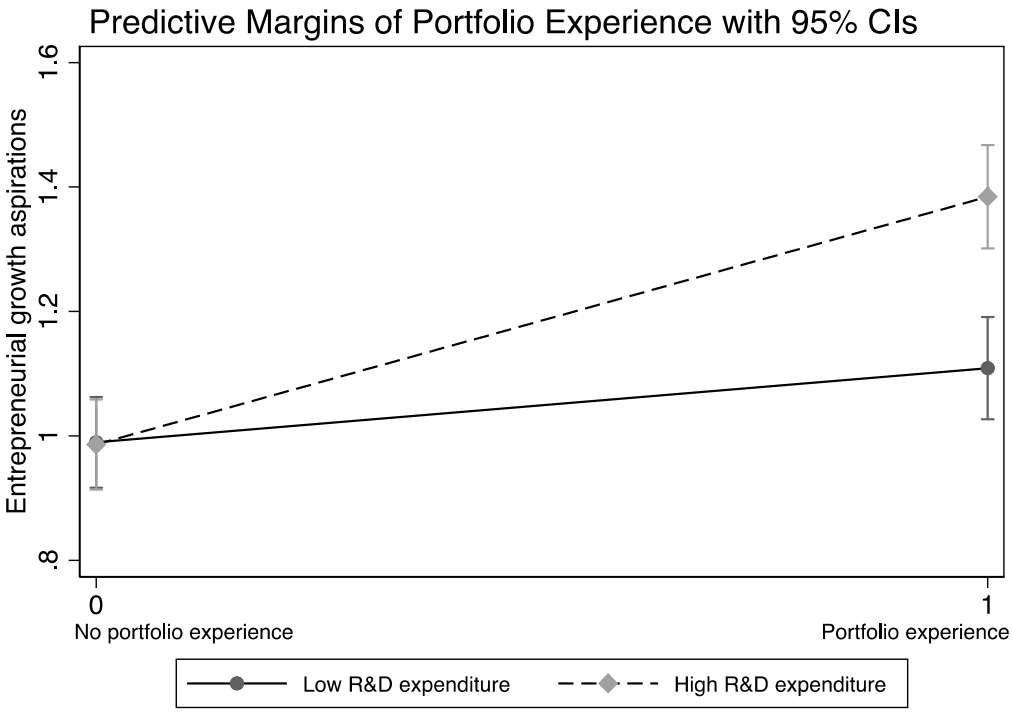


Figure 2. Moderating effect of national R&D expenditure on the relationship between portfolio experience and entrepreneurial growth aspirations.



Appendix A

Table A1. Sample composition.

No.	Country	Frequency	Entrepreneurial growth aspirations	Serial experience	Portfolio experience	National R&D expenditure
1	Argentina	1,552	0.98	0.03	0.04	0.57
2	Armenia	235	1.35	0.06	0.05	0.19
3	Australia	502	1.14	0.03	0.06	2.12
4	Austria	805	0.77	0.03	0.04	2.92
5	Belarus	35	1.69	-	-	0.60
6	Belgium	423	0.77	0.03	0.04	2.14
7	Bolivia	289	0.64	0.06	0.03	0.16
8	Bosnia and Herzegovina	301	0.99	0.06	0.01	0.24
9	Botswana	778	1.42	0.04	0.02	0.42
10	Brazil	7,576	0.52	0.02	0.02	1.17
11	Bulgaria	111	0.65	0.04	0.03	0.84
12	Burkina Faso	731	1.21	0.03	0.08	0.19
13	Canada	1,505	1.10	0.06	0.05	1.71
14	Chile	13,776	1.36	0.03	0.04	0.36
15	China	3,693	0.75	0.02	0.02	1.81
16	Colombia	8,300	1.70	0.03	0.02	0.24
17	Costa Rica	471	1.01	0.04	0.01	0.50
18	Croatia	1,077	1.33	0.03	0.02	0.84
19	Cyprus	439	0.85	0.02	0.03	0.56
20	Czech Republic	392	1.13	0.02	0.05	1.61
21	Denmark	513	0.61	0.02	0.03	2.68
22	Ecuador	2,306	0.85	0.03	0.08	0.37
23	Egypt	1,175	1.03	0.05	0.02	0.65
24	El Salvador	503	0.86	0.04	0.05	0.08
25	Estonia	872	1.25	0.03	0.05	1.66
26	Finland	709	0.71	0.02	0.04	3.35
27	France	528	1.02	0.02	0.04	2.19
28	Georgia	141	1.04	0.03	0.04	0.19
29	Germany	1,947	0.90	0.02	0.05	2.83
30	Greece	1,164	0.46	0.01	0.04	0.86
31	Guatemala	3,746	1.03	0.02	0.04	0.03
32	Hong Kong	186	0.97	0.04	0.04	0.77
33	Hungary	930	0.95	0.01	0.02	1.19
34	Iceland	328	0.43	0.02	0.02	2.68
35	India	1,549	0.67	0.13	0.03	0.70
36	Indonesia	917	0.45	0.03	0.06	0.18
37	Iran	1,633	1.00	0.04	0.04	0.40
38	Ireland	1,253	1.26	0.03	0.06	1.35
39	Israel	684	0.91	0.05	0.02	4.37
40	Italy	465	0.67	0.02	0.04	1.30
41	Japan	428	1.24	0.02	0.07	3.17
42	Kazakstan	425	1.33	0.03	0.02	0.17
43	Korea	1,592	0.76	0.03	0.02	3.92
44	Kuwait	274	1.63	0.08	0.03	0.19
45	Latvia	1,240	1.40	0.02	0.05	0.62
46	Lithuania	475	1.15	0.02	0.03	0.88
47	Luxembourg	338	1.15	0.04	0.07	1.23
48	Macedonia	462	0.99	0.03	0.03	0.32
49	Madagascar	692	0.38	0.02	0.07	0.01
50	Malaysia	894	0.65	0.05	0.03	1.21
51	Mexico	2,468	1.05	0.03	0.01	0.40
52	Netherlands	1,680	0.67	0.02	0.05	1.96
53	Norway	811	0.66	0.01	0.04	1.73
54	Pakistan	219	0.87	0.02	0.06	0.34
55	Panama	1,947	0.70	0.01	0.01	0.12
56	Peru	2,149	1.09	0.02	0.04	0.10
57	Philippines	667	0.49	0.05	0.03	0.12
58	Poland	1,349	1.13	0.02	0.02	1.00
59	Portugal	706	0.91	0.03	0.02	1.37
60	Puerto Rico	286	1.09	0.01	0.01	0.43
61	Qatar	331	2.26	0.05	0.02	0.53
62	Romania	646	1.44	0.02	0.04	0.44
63	Russia	616	1.12	0.02	0.01	1.06
64	Saudi Arabia	70	0.46	0.01	-	0.07
65	Serbia	75	0.51	0.04	0.01	0.52
66	Singapore	527	1.34	0.02	0.02	1.99
67	Slovakia	1,260	1.36	0.06	0.04	0.80
68	Slovenia	786	0.94	0.01	0.02	2.05

69	South Africa	2,025	1.15	0.02	0.01	0.70
70	Spain	9,971	0.56	0.01	0.05	1.24
71	Sweden	1,087	0.85	0.03	0.04	3.27
72	Switzerland	488	0.75	0.01	0.05	2.91
73	Thailand	3,022	0.55	0.03	0.09	0.53
74	Trinidad & Tobago	778	1.12	0.01	0.02	0.05
75	Tunisia	173	1.55	0.05	0.03	0.63
76	Türkiye	3,091	1.63	0.05	0.06	0.82
77	Uganda	585	0.60	0.03	0.06	0.26
78	United Arab Emirates	642	1.38	0.11	0.01	1.15
79	United Kingdom	3,154	0.80	0.02	0.02	1.61
80	United States	2,912	1.31	0.04	0.05	2.79
81	Uruguay	1,673	1.22	0.04	0.02	0.38
82	Vietnam	279	0.43	0.04	0.03	0.37
83	West Bank & Gaza Strip	78	0.19	0.04	-	0.36

Note: N=117,911

Table A2. Multicollinearity test on variables

Variable	VIF	Tolerance
Serial experience	1.02	0.984759
Portfolio experience	1.03	0.971484
National R&D expenditure	1.56	0.63903
Gender	1.08	0.929515
Higher education	1.18	0.84799
Household income	1.12	0.896393
Business angel	1.05	0.95384
Know entrepreneur	1.09	0.919711
Self-efficacy	1.08	0.928186
Business opportunity	1.07	0.938231
Fear of failure	1.05	0.953527
Venture Size	1.34	0.747256
Stage of firm development	1.37	0.732428
GDP per capita	1.95	0.513322
GDP growth	1.9	0.526915
Population growth	1.25	0.79726

Notes: VIF values greater than 10 indicate reasons for concern due to collinearity among variables. Tolerance values less than 0.10 indicate collinearity among variables. Our variables do not suffer from collinearity. We do not include age squared as by the construction both variables are highly correlated and inflate the VIFs (Estrin et al., 2020).