The institutional foundations of entrepreneurs' capabilities: A dynamic capabilities perspective

David Urbano
Universitat Autonoma de Barcelona

Sebastian Aparicio
Universitat Autonoma de Barcelona

Sohvi Heaton
Baylor University

Christopher Boudreaux
Florida Atlantic University

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Abstract Using data from 90 countries from the Global Entrepreneurship Monitor and the World Bank, we examine the country-level determinants of entrepreneurs' sensing, seizing, and transforming capabilities, three clusters of dynamic capabilities. Our findings reveal that both the quality of entrepreneurship education and an autonomous culture promote entrepreneurs' capabilities. However, these relationships differ depending on the country type (innovation-driven, efficiency-driven, and factors-driven countries). These insights can support the development of policies that promote entrepreneurs' capabilities, enabling them to tailor their strategies to a country's stage of development and its institutions.

Keywords: Dynamic capabilities; institutions; entrepreneurship; entrepreneurs' capabilities, country context.

1 Introduction

In dynamically competitive enterprises like startups, the entrepreneurial manager plays a crucial role in transforming the organization and establishing and sustaining superior financial performance (Teece, 2012). Entrepreneurial capabilities—particularly those related to sensing, seizing, and transforming—are foundational to dynamic capabilities and are essential for the market-creating (and co-creating) processes inherent in capitalist economic systems (Teece, 2012, p. 1395). These capabilities facilitate new business establishments (Bowman & Ambrosini, 2003), market entry (King & Tucci, 2002), and business model innovation (Hock-Doepgen, Heaton, Clauss, Block, 2024).

Yet, our current understanding of entrepreneurial capabilities that drive and sustain entrepreneurship remains limited (Zahra et al., 2006). Because the focus has been at the firm-level of analysis, we know little about the country-level factors that support entrepreneurs' capabilities. This is unfortunate. Country factors can foster the development of dynamic capabilities because dynamic capabilities depend on an interconnected system of resource providers, customers, and institutions (Dunning & Lundan, 2010). Considering country factors has implications for questions such as how in practice entrepreneurs develop dynamic capabilities across borders and what role culture and education play in dynamic capabilities development.

The importance of country-level factors in the development of entreprenerus' capabilities cannot be overstated, "Firms cannot have effective dynamic capabilities when the nation-states in which they are embedded don't themselves have the ability to sense opportunities and threats, respond with high-quality decisions, then transform institutions and infrastructure, as necessary" (Teece, 2020). Similarly, Dunning and Lundan (2010, p. 1227) noted, the economic context, "defines the main instruments whereby firms... encounter uncertainties in the environment', and should thus be 'explicitly incorporated into any analysis of dynamic capabilities." Technologically advanced environments can lead to more innovation and sensing capabilities. Innovations often occur in regions well equipped with technological infrastructure (Feldman & Florida, 1994). A limitation of these studies is that they ignore the institutional context on dynamic capabilities development. The institutional context explains cross-national differences in dynamic capabilities.

The purpose of our study is to analyze how country-level factors affect entrepreneurs' capabilities. We consider entrepreneurs' capabilities as a system of interconnected elements and activities (Teece, 2018, p.364) and propose that the institutional environment plays a significant role in the development of entrepreneurs' capabilities (Klofsten et al., 2021). Countries with different institutions vary in their resource allocation. For example, the institutions (including embedded norms) of China and the West are incompatible (Teece, 2020). While firms in developed economies do experience environmental dynamism, the scale and scope of such dynamism pales in comparison with the comprehensive changes of the rules of the game experienced by firms in China (Peng et al., 2007, p. 206). To examine these theoretical relationships, we test our hypotheses through a longitudinal, cross-country analysis of 90 countries during the period 2002 to 2013, using data from the Global Entrepreneurship Monitor (GEM) and the World Development Indicators (WDI) of the World Bank.

Our study contributes to the literature in a few ways. First, we respond to the literature's calls for comprehensive studies exploring entrepreneurship as a multi-level phenomenon—influenced by factors across multiple levels of analysis (e.g., Shepherd, 2011; Kim et al., 2016). While research suggests that institutions influence entrepreneurial action (e.g., McMullen et al., 2008; Bjørnskov & Foss, 2008), few studies connect the interplay of variables across distinct levels of analysis (Boudreaux et al., 2019). Our study investigates the relationship between country-level institutions and the dynamic capabilities of entrepreneurs while adjusting for the moderating impact of the country-level institutional context.

Second, we shed light on entrepreneurs' capabilities' country-level antecedents . Few studies have explored how geographic locations and contexts influence their dynamic capabilities (Roundy & Fayard, 2019). By broadening dynamic capabilities arguments to the country-level and distinguishing between factor-driven and innovative countries, our conceptual framework adds to the understanding of firm dynamic capabilities and the institutional context. Lastly, our data enables us to conduct a more detailed study, integrating various contexts to explore dynamic capabilities development in diverse institutional environments.

2 Conceptual Framework

2.1 Sensing, seizing and transforming capabilities

Dynamic capabilities are, “the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece, Pisano, & Shuen, 1997, p. 516). Dynamic capabilities are the learned processes that allow companies to add value, resilience, and adapt to shifts in the environment (Teece et al., 1997). Sensing is the identification of market opportunities (which change constantly), seizing deals with the capacity of mobilization of resources, and transforming means generating products and processes that create value for the company, market, and society (Teece et al., 1997, 2007). Teece et al. (1997) and Teece (2007) have explained the roles of sensing, seizing, and transforming as characteristics that firms require to adapt to the changing environment. These three features embody the dynamic capabilities framework.

The dynamic capabilities framework places entrepreneurial managers at the center of the process because they develop and manage dynamic capabilities over time (Ghosh et al., 2022; Zhara et al., 2006). These dynamic capabilities reflect the entrepreneurial facet of management. Like entrepreneurship, dynamic capabilities also focus on how firms adapt to environmental change and exploit opportunities (Hitt et al., 2001).

Dynamic capabilities not only allow firms to identify and exploit opportunities, but they also involve strategic actions to create competitive advantages. These actions include calibrating opportunities and diagnosing threats, directing resources, and reshaping organizational structures and systems to create and address technological opportunities and competitive threats (Teece, 2012). Entrepreneurship is about creation. Yet, dynamic capabilities are about establishing and maintaining advantages (Hitt et al., 2001).

2.2 Institutional base of dynamic capabilities

Dynamic capability studies have overly focused on the technological dimension as an environmental context (Fainshmidt et al., 2016). However, scholars have begun to acknowledge dynamic capabilities' social and cultural embeddedness—companies do not identify or develop opportunities in isolation (Teece, 2018). Rather, they depend on an interconnected system of resource providers, customers, and social and cultural forces. Institutions can enhance or constrain the exploration and exploitation of capabilities (Dunning & Lundan, 2010). For example, Vasudeva (2009) found that the combined level of statism and corporatism of a country shapes knowledge-building opportunities (Teece, 2020).

Dynamic capabilities are a system of nested elements and activities (Teece, 2018, p.364). They are the essence of a workable ecosystem theory and can provide insight into: (1) the likelihood of achieving evolutionary fitness and (2) how to achieve it through co-evolution with stakeholders and environments (Petricevic & Teece, 2019, p. 1498). The dynamic capabilities framework recognizes the need to align with all aspects of the business environment (Teece, 2020). Vibrant entrepreneurial ecosystems contain a range of support services such as incubators and business development centers (Roundy & Fayard, 2019). This infrastructure helps firms adapt their services to improve their seizing capability (Roundy & Fayard, 2019; Spigel, 2017).

Teece (2020) argues that the nexus between institutions and managerial choices should focus on other interactions. Petricevic and Teece (2019) highlight the importance of incorporating macro-level variables into the analysis, "Dynamic capabilities alone at the enterprise level may not be sufficient to achieve evolutionary fitness, aligned with the macro-level. Coordinated, multi-stakeholder (or innovation ecosystem) responses may be required"

(Petricevic & Teece, 2019, p. 1503). Similarly, Teece (2020, p. 135) emphasizes the significance of country-level factors in shaping firm-level dynamic capabilities:

> “Firms cannot have effective dynamic capabilities when the nation-states in which they are embedded don’t themselves have the ability to sense opportunities and threats, respond with high-quality decisions, then transform institutions and infrastructure, as necessary. Some measure of government backing may be needed to level the playing field. The key is to avoid protective measures that generate short-term profits while leaving the firm weaker once the protection is removed.”

Therefore, country contexts underpin a firm's distinctive processes and VRIN (valuable, rare, imperfectly imitable, and non-substitutable) resources that enhance the company's overall competitive advantage, making it challenging for competitors to emulate (Teece, 2014, p. 24).

Likewise, Dunning and Lundan (2010, p. 1227) observed that the country context "defines the primary tools through which firms... face uncertainties in the environment" and, therefore, should be "explicitly integrated into any examination of dynamic capabilities." Technologically advanced environments can lead to more innovation and sensing capabilities. Innovations often occur in regions endowed with technological infrastructure (Feldman & Florida, 1994). Institutions can also play a pivotal role in reducing uncertainty and developing dynamic capabilities (Beckert, 1999). Some institutions can inhibit dynamic capabilities (Acemoglu et al., 2003). For example, sensing, seizing, and reconfiguring activities, given their unorthodox nature, are deviations from norms in contexts where social institutions impose greater monitoring and sanctioning constraints (Taras, Kirkman, & Steel, 2010). Thus, firms will be unable to freely pursue entrepreneurial activities in these institutional settings.

Although studies have helped to clarify and articulate many of the key contextual factors required to encourage entrepreneurial activity (Aparicio et al., 2022, Bruno & Tyebjee, 1982; Pennings, 1980; Urbano et al., 2019), studies need to also consider the institutional context that develops dynamic capabilities (Lessard, Teece, & Leih, 2016). The dynamic capabilities literature has focused on identifying what dynamic capabilities are and how they contribute to a firm's capacity to adapt to change (Pisano, 2017). Yet, studies have paid little attention to capability development related questions.

3 Hypothesis Development

In this section, we develop our hypotheses regarding how two institutions—entrepreneurship education and autonomous culture—affect dynamic capabilities. We also posit that this relationship depends on the country's development stage (factor-driven, efficiency-driven, and innovation-driven economies). Figure 1 summarizes these relationships.

FIGURE 1 ABOUT HERE

3.1 Entrepreneurship education and entrepreneurs' dynamic capabilities

The primary reason we expect entrepreneurship education to encourage dynamic capabilities is because it enhances learning. Learning is a process underlying dynamic capabilities (Zollo & Winter, 2002). It is important for organizational processes or routines (Teece et al. 1997). Learning also promotes repetition and experimentation, which enables better and quicker task performance. Learning itself is a higher-order capability or dynamic capability (Zollo & Winter, 2002). Thus, the process of learning is a crucial element in dynamic capabilities development and evolution.

At the macro-level, the management of learning can also facilitate dynamic capability development. The knowledge spillover theory of entrepreneurship (Acs, Audretsch, and Lehmann 2013; Audretsch and Link 2019) consists of understanding economic development as a process where entrepreneurs absorb knowledge in the context (i.e., region or country) and transform it into new ventures. This indicates the importance of building networks to exchange knowledge. Complex network theory also emphasizes the learning capability of complex networks. Silicon Valley's robustness is due to the learning capabilities of the system, supported by venture capital firms (Ferrary & Granovetter, 2009).

In summary, we expect entrepreneurship education to encourage dynamic capability development. This is because entrepreneurship education encourages learning, repetition, experimentation at the micro-level, all of which promote dynamic capabilities. At the macro-level, entrepreneurship education enhances the knowledge spillover theory of entrepreneurship, which absorbs new knowledge and promotes networks that encourage dynamic capabilities. Therefore, we develop the following hypothesis:

Hypothesis 1: There is a positive relationship between entrepreneurship education and the strength of dynamic capabilities.

3.2. Autonomous culture and entrepreneurs' dynamic capabilities

We also expect the strength of dynamic capabilities to depend on cultural factors. This is because dynamic capabilities are context-dependent, and culture plays a key role in understanding context (Bitencourt et al., 2020, p. 117). Culture is one of the most crucial environmental factors in which entrepreneurs operate. Because culture is difficult to replicate and can be valuable, it serves as the potential to enhance—or constrain—dynamic capabilities.

Culture rewards certain behaviors and penalizes others. We therefore expect some cultures to have greater potential for dynamic capabilities than others. Vibrant entrepreneurial ecosystems with cultures that support risk-taking help to improve a firm's sensing capabilities (Roundy & Fayard, 2018). Cultures that value entrepreneurial behaviors increase their propensity to introduce innovation, whereas cultures that reinforce conformity and control are not likely to support risk-taking behavior (e.g., Hofstede, 1980). As a result, a more individualistic and autonomous culture is an attribute commonly associated with entrepreneurship (Dansereau, 1989). Cultures with knowledge and learning processes that have horizontal dissemination help promote effective dynamic capabilities in organizations (Bitencourt et al., 2020, p.113). Therefore, we suggest the following hypothesis:

Hypothesis 2: There is a positive relationship between the degree of inclination towards autonomous culture and the strength of dynamic capabilities.

3.3 The moderating role of development stage

There is a growing consensus that the competitive environment influences dynamic capabilities' development (Eisenhardt & Martin, 2000). In turbulent environmental conditions, a firm must rely on its dynamic capabilities—the ability to create, maintain, and renew its bases of competitive advantage (Teece et al., 1997). Companies must use their capabilities to sustain competitive advantage in rapidly changing environments.

3.3.1 Entrepreneurship education and dynamic capabilities in developing countries.

In developing countries, integrated hierarchical organizations (e.g., business groups) dominate (Guillen, 2000; Khanna & Palepu, 1997). As such, innovative firms have less incentive to increase the transparency of competitive practices. Therefore, other firms find it more difficult to identify and imitate organizational innovations in developing countries (Fainshmidt et al., 2016). In this environment, ordinary capabilities may be sufficient to create competitive advantage (Teece, 2014). People can learn ordinary capabilities or best practices. A few recent field experiments in developing countries have estimated the impact of business training and advice in enterprises and found significant effects of some forms of training on performance (e.g., Bloom et al., 2013). Inexperienced founders in developing countries may be less successful due to the lack of elementary knowledge. This knowledge includes information like guidance on their relative advantages and perils, environmental regulations, and patent laws. Entrepreneurship education is also more effective in developing countries with high power distance (Bae et al., 2014; Urbano & Aparicio, 2016). Basic business education (e.g., capital budgeting, data analysis) helps improve management, especially in developing nations (Bloom & Van Reenen, 2010).

3.3.2 Entrepreneurship education and dynamic capabilities in developed countries

In developed countries, education is only one mechanism that entrepreneurs use to access resources. Because coursework typically prepares individuals to be employees rather than entrepreneurs (Birch et al*.,* 2017), education might discourage capability development in innovation-driven economies. Since the "rules of the game" are well defined (He & Cui, 2012) and organizations compete based on market-based competencies in developed countries, information asymmetries among market participants are low (Fainshmidt et al., 2016). Dunning, and Lundan, (2010, p. 1238) argue that in innovation-driven countries, where market-based transactions dominate, firms are likely to gain easier access to the innovations that have allowed other firms to gain lower transaction costs or to provide higher value.

The relationship between education in entrepreneurship and dynamic capabilities may be stronger in a factor-driven economy than in more advanced economies such as those efficiency- and innovation-driven countries. Therefore, we develop the following hypothesis:

Hypothesis 3: The positive association between entrepreneurship education and dynamic capabilities is stronger in factor-driven countries than in other countries.

3.3.3 Autonomous culture and dynamic capabilities in developing countries.

We propose that a country's developmental stage will also moderate the relationship between autonomous culture and the strength of dynamic capabilities. A more autonomous culture allows organizations greater local autonomy and thus improves the ability to scan the environment and to quickly accomplish reconfiguration and transformation ahead of competition. Change is costly. Therefore, firms must develop processes to minimize low payoff change. Decentralization and local autonomy assist processes of calibrating the requirements for change and of effectuating the necessary adjustments (Teece & Pisano, 1994). Organizations with greater local autonomy are less likely to be blindsided by market and technological developments (Teece, 2007). Teece (2007) further articulates that in dynamic environments, firms must achieve a delicate balance between having considerable autonomy (to make decisions rapidly) and remaining connected to activities that they must coordinate. This is what Simon (2002) called *near decomposability*. Therefore, implementing near decomposability is an important micro-foundation of dynamic capabilities (Simon, 2002).

3.3.4 Autonomous culture and dynamic capabilities in developed countries

The growing body of literature on international business has given attention to subsidiary autonomy. Cultural differences between developing and developed countries help explain a range of MNE strategies such as subsidiary management (Roth & O'Donnell, 1996) and an MNE's capability to transfer core competencies (Bartlett & Ghoshal, 1989). Studies have found mixed evidence for the effect of autonomous culture on entrepreneurship. Some have found that decentralization helps develop capabilities in developing countries more than in developed countries. Others find that delegating autonomy to subsidiaries may help MNEs from emerging economies overcome negative heritages associated with home institutions. Therefore, autonomous management of human resources is often employed in innovation-driven economies (Wang, Luo, & Lu, 2014). Bloom, Sadun, and Van Reenen (2010) found a greater degree of delegation in developed countries because they faced increasing competition in which local managers' ability to respond quickly is more valued.

The literature on strategic entrepreneurship (Ireland, Hitt, & Sirmon, 2003) also suggests that the autonomous environment is as an enabler of both opportunity-seeking and advantage-seeking behaviors, and there is a differential effect of autonomous culture on entrepreneurship between developing and developed countries. Using Global Entrepreneurship Monitor data on 29 countries, Hessels, Gelderen, and Thurik (2008) found that entrepreneurial activity was more influenced by the autonomy motive in developed countries than in developing ones. Similarly, higher individualism is positively associated with entrepreneurial activity in developed countries (Busenitz & Lau, 1996). Entrepreneurial activities are more frequent in developed countries than developing ones (Wennekers et al., 2005). Thus, extant evidence seems to suggest that autonomous culture influences entrepreneurs' capabilities more in developed countries than in developing ones. Therefore, we propose:

> **Hypothesis 4**: The positive association between autonomous culture and dynamic capabilities is weaker in factor-driven countries than in other countries.

4 Data and Methods

4.1 Data

To test the hypotheses, we construct a sample from three secondary data sources: the Adult Population Survey (APS) and the National Expert Survey (NES), both from Global Entrepreneurship Monitor (GEM); and the World Development Indicators (WDI) of the World Bank. The GEM, a widely used data set in entrepreneurship (Álvarez, Urbano, & Amorós, 2014; Bosma, 2013; Boudreaux et al., 2019; 2023). It contains information dating back to 1999. The GEM project surveys entrepreneurs in terms of various characteristics and contextual information. The sample size per country and year is 2,000 adults (Reynolds et al., 2005) and data permit cross-country comparisons (Bosma, 2013). The NES asks experts about a country's entrepreneurship characteristics. This is more accurate than a random sample of individuals. Studies have used this country-level input (e.g., Ewald, Virva, & Stenholm, 2018; Li, 2018). The questionnaire contains nine different entrepreneurial framework conditions (finance, government policies, government programs, entrepreneurial education and training, R&D transfer, commercial and professional infrastructure, internal market openness, physical infrastructure and services, and cultural and social norms).

Our cross-country data allow us to compare variations in dynamic capabilities across countries. We use data from 90 countries throughout a 12-year period (2002–2013). However, there are some missing data for certain periods and countries. Following the literature (e.g., Autio, Pathak, & Wennberg, 2013; Hessels et al., 2011; Stephan & Uhlaner, 2010), we create an unbalanced data panel that includes the countries that participated at least once during the period. In addition to the GEM data, we also use information from the World Development Indicators (WDI) of the World Bank, which we include as control variables.

4.1.1 Dependent Variable

We use the NES to construct three factors that correlate with our variables of interest. Following Kump et al. (2019), we construct entrepreneurs' dynamic capabilities based on three dynamic capabilities (Teece, 2007): (1) the perception of available opportunities in the market (i.e., sensing); (2) the knowledge and capacity to react when those opportunities exist (i.e., seizing); (3) the ability and determination to turn those opportunities into new ventures (i.e., transforming). Table 1 in the appendix reports the exact questions used in the GEM survey.

Because the dynamic capabilities variables might be correlated with each other, the assumption of linear independence of single dynamic capabilities variables is likely inappropriate. We therefore use principal component analysis to identify factors comprising single variables that cluster together. After testing for question consistency over time, we select nine single variables from the GEM (APS and NES) datasets related to dynamic capabilities. We conduct exploratory factor analysis using Varimax-rotation with Kaiser normalization. The rotated matrix generates a 3-factor solution with acceptable level results (Kaiser–Meyer–Olkin measure of sampling adequacy = 0.707, $p < 0.000$). Table A2 in the online appendix contains these factors and their loadings.

Building upon the theoretical definitions of dynamic capabilities, we derive measures of entrepreneurs' dynamic capabilities from GEM. As previously discussed, Teece (2007) identifies three clusters of dynamic capabilities: sensing, seizing, and transforming capabilities. Sensing capability pertains to the capacity to recognize and create opportunities (Teece, 2007, p.1323). The three items for sensing capability include (i) identifying promising entrepreneurial opportunities, (ii) recognizing untapped market potential, and (iii) individuals' capacity to pursue entrepreneurial opportunities. This last variable, followed by good opportunities for entrepreneurship, had the highest loadings for the sensing factor. The second factor, seizing, also has three items: (i) knowledge about starting and managing a small business, (ii) quick reaction to good opportunities, and (iii) the ability to organize the resources required for a new business. The highest loading was for knowledge about starting and managing a small business. We measure the variables for the first two factors using a Likert scale from 1 (completely false) to 5 (completely true). The third factor, transforming, has three items: (i) total early-stage entrepreneurial activity (TEA –i.e., the percentage of adult population who have a firm between 0 and 42 months of functioning), (ii) entrepreneurship driven by opportunity identification (i.e., those entrepreneurs who were pulled into the market transforming opportunities into new businesses), and (iii) innovative entrepreneurial activity (i.e., those entrepreneurs who brought new products into the market). TEA has the highest loading for the transforming factor. The data reduction technique enables us to observe the need to distinguish sensing, seizing, and transforming, as well as the relevance of considering them as heterogeneous, both conceptually and empirically.

Our dynamic capabilities measures captures the entrepreneurial orientation of a firm or the firm’s willingness to deviate from norms (Guerrero et al. 2021; Heaton et al. 2019; Mthanti and Ojah 2017; Wales 2016). According to Audretsch and Link (2019), entrepreneurs are the mechanism that mobilizes knowledge to transform those opportunities into new ventures. Studies have validated these measures (Pinho and Thompson 2017; Amorós et al. 2013).

4.1.2 Independent Variables

Our key independent variables are the quality of entrepreneurship education and autonomous culture. We measure the quality of entrepreneurship education by the question asking experts to assess the extent to which the national education system addresses entrepreneurship. We proxy for autonomous culture with a question in the NES, asking whether the national culture emphasizes self-sufficiency, autonomy, and personal initiative. The literature has recognized the effect of culture on opportunity and innovative entrepreneurship (Aparicio et al., 2022; Stephan & Pathak, 2016; Uhlaner & Thurik, 2007; Urbano et al., 2019). Specifically, De Clercq et al. (2013) have linked culture and entrepreneurship using NES data.

We operationalize a country's developmental stage[1] as three dichotomous variables that represent factor-, efficiency-, and innovation-driven countries. Factor-driven economies compete through low-cost efficiencies in natural resource-based activities or labor-intensive manufacturing. Efficiency-driven countries produce raw materials coming from the manufacturing industry, and other sophisticated services such as banking and insurance services. Innovation-driven countries possess a more complex infrastructure and system of production that allows more efficiency than countries in the other development stages. These nations bring high social benefits and welfare (Porter, 1990).

4.1.3 Control Variables

We include several country-level variables to improve our model estimation. Drawing on Arin, Huang, and Minniti (2015), we included GDP per capita in constant 2005-dollar values, labor-force participation, and percentage of female population from the WDI database. Following Aparicio et al. (2016), Estrin et al. (2013) and Verheul et al. (2006), we include the

[1] GEM adopts the World Economic Forum's classification of economies by economic development level – i.e., factor-driven economies, efficiency-driven economies, and innovation-driven economies.
•Factor-driven economies are the least developed. Subsistence agriculture and extraction businesses dominate, with a heavy reliance on unskilled labor and natural resources.
•Efficiency-driven economies are increasingly competitive, with more-efficient production processes and increased product quality.
•Innovation-driven economies are the most developed. In this phase, businesses are more knowledge-intensive, and the service sector expands (https://www.gemconsortium.org/wiki/1367).

funding availability in each country. The funding availability is another NES variable measuring the perception of whether “there is sufficient debt funding available for new and growing firms.” By using the APS, we adjust for indirect entrepreneurship experience through the aggregate number of individuals who personally provided funds for a new business. We control for the perception of failure as one such variable (Wennberg et al., 2013). Lastly, we included time and country-fixed effects. Table A3 (in the Online Appendix) reports the country classification, and Table A1 defines the variables.

4.2 Methods

To test our hypotheses, we use a dynamic longitudinal panel data research design. This requires us to control for unobserved biases in the model. To accomplish this, we use dynamic panel estimators (Arellano & Bond, 1991). We use the generalized method of moments (GMM) estimator instead of static panel models because the static panel data technique could bias our estimates when conditions violate the strict exogeneity assumption. The model follows:

$$DC_{it} = \beta_0 + \delta DC_{i,t-1} + \sum_{k=1}^{2} \beta_k \, IF_{k,i,t} + \vartheta FDC_{i,t} + \sum_{m=1}^{4} \gamma_m \, FDC_{i,t} * IEF_{m,i,t} + \sum_{j=1}^{4} \varphi_j \, CV_{j,i,t} + \mu_{i,t} + e_{i,t} \quad (1)$$

where $DC_{i,t}$ represents the sensing, seizing, and transforming capability of the current period; $DC_{i,t-1}$ is the same variable lagged one period; $IF_{k,i,t}$ are the institutional variables (i.e., entrepreneurship education and autonomous cultural values) in the current period; $FDC_{i,t}$ is a dummy variable representing those nations that are part of factor-driven countries; $CV_{j,i,t}$ represents the seven j control variables, namely GDP per capita, labor force, female population, funding availability, direct and indirect entrepreneurship experience, failure perception, and the group of countries that transition from one development stage to another; $u_{i,t}$ are non-observable individual effects; and $e_{i,t}$ is the random error, which is assumed to have a normal distribution.

By using static panel models to estimate Eq. (1) and admitting (or not admitting) the correlation between non-observable individual effects and the determinants of dynamic capabilities, as well as allowing for the existing correlation between $u_{i,t}$ and $DC_{i,t-1}$ and between $e_{i,t}$ and $DC_{i,t-1}$, we would have obtained biased and inconsistent estimated parameters. In this regard, the correlation of non-observable individual effects and the error in seizing capabilities lagged one period can lead to biased results. To solve this problem, we use dynamic estimators that consider the dependent and independent variable lags as instruments (Arellano & Bond, 1991). Because it eliminates the correlation between $u_{i,t}$ and $DC_{i,t-1}$, it eliminates unobservable individual effects. In addition, using lagged dependent and independent variables creates orthogonal conditions, eliminating the correlation between $e_{i,t}$ and $CD_{i,t-1}$. Dynamic data models have the advantage of adjusting for endogeneity between explanatory variables and static panel models (Arellano and Bond, 1991). Thus, Arellano and Bond (1991) propose taking the first-difference estimator as well as lagged dependent and independent variables in levels as instruments. According to Blundell and Bond (1998), two problems may affect the GMM estimators: (1) high autocorrelation in which the dependent variable is related to its past; (2) high autocorrelation among subgroups of the dependent variable and a high number of cross-sections (i.e., available years in the panel). Therefore, by considering a system of stepped variables and first-differences, Blundell and Bond (1998) proposed a new estimator. The system GMM estimates the model in equation 1.

We assess the restriction validity by using the Sargan-Hansen test (Cameron & Trivedi, 2005). For valid over-identification restrictions, we must fail to reject the null hypothesis. Furthermore, given that we use a one period lag, we test for the existence of the first-order autocorrelation (Arellano-Bond test for AR[1]). The null hypothesis is that there is no autocorrelation while the alternative hypothesis is that autocorrelation does exist. The results indicate there is no autocorrelation.

5 Results

5.1 Main results

Table 1 reports the descriptive statistics and correlations among the independent variables. The variance inflation factor (VIF) values are all below 1.65. This indicates that multicollinearity is not a concern. The average value of entrepreneurship education is 1.87. This is less than the median. The average value for autonomous culture is 2.86. This suggests that there is typically a supportive culture in terms of self-sufficiency, autonomy, and personal initiative. The correlation matrix shows that dynamic capabilities (sensing, seizing, and transforming) are associated with greater entrepreneurship education and autonomous culture.

TABLE 1 ABOUT HERE

Tables 2-4 report the results of the dynamic panel data regressions. We used robust standard errors to adjust for heteroscedasticity and serial correlation. The last four rows report the results for each of the tests (R^2, Arellano-Bond p-value for AR[1], Sargan-Hansen test). We find no evidence of autocorrelation or invalid over-identification restrictions.

TABLES 2-4 ABOUT HERE

Each column in Tables 2-4 reports the estimated values of the factors that explain sensing, seizing, and transforming capability, respectively. Column 1 reports the results of the model assessing the internal and external factors affecting dynamic capabilities while controlling for GDP per capita and labor force. Column 2 reports the same variables but adds a dummy variable for factor-driven economies. Column 3 reports the moderating effect of country developmental stage. Column 4 includes a dummy for efficiency-driven countries. Column 5 includes an interaction between our main independent variables and development stage. The last two columns report innovation-driven countries and include an interaction with entrepreneurship education and autonomous cultural values.

Recall that hypothesis 1 stated there is a positive association between entrepreneurship education and the strength of dynamic capabilities. Models 1-6 of Table 2 report a positive and statistically significant relationship ($\beta_1 = 0.306$, $p < 0.10$ in Model 1; $\beta_1 = 0.301$, $p < 0.10$ in Model 2; $\beta_1 = 0.312$, $p < 0.10$ in Model 3; $\beta_1 = 0.368$, $p < 0.10$ in Model 4; $\beta_1 = 0.407$, $p < 0.10$ in Model 5; and $\beta_1 = 0.375$, $p < 0.10$ in Model 6). Model 7 of Table 2 reports a positive but statistically insignificant relationship. Tables 3 and 4 repeat the same analysis but use seizing and transforming as the measures of dynamic capabilities, respectively. In contrast to the results for sensing, we do not uncover a statistically significant relationship between entrepreneurship education and dynamic capabilities. Thus, we find evidence to support hypothesis 1 for the measure of sensing only.

Hypothesis 2 stated that there is a positive association between autonomous culture and the strength of dynamic capabilities. The coefficient on autonomous culture is positive and statistically significant in all models in Tables 2 and 3. However, we do not find any statistically significant relationship between autonomous culture and the strength of dynamic capabilities for the transforming measure of dynamic capabilities. Thus, we find evidence to support hypothesis 2 for sensing and seizing but not transforming.

Hypothesis 3 proposed that country developmental stage positively moderates the relationship between the quality of entrepreneurship education and the strength of dynamic capabilities. More specifically, we expect the association to be stronger in factor-driven countries than in their counterparts. The coefficient on the interaction term is positive and statistically significant ($\beta_1 = 8.854$, $p < 0.01$) in model 3 of Table 2. However, we do not find evidence of a statistically significant relationship for the dynamic capabilities measures of seizing and transforming. Hence, we find evidence to support hypothesis 3 but only for the sensing measure of dynamic capabilities.

Lastly, hypothesis 4 states that the developmental stage of a country negatively moderates the relationship between autonomous culture and dynamic capabilities, meaning that the association is weaker in factor-driven countries than in their counterparts. The coefficient on the interaction term is negative and statistically significant ($\beta_1 = -9.551$ $p < 0.01$) in model 3 of Table 2. However, the coefficient on the interaction is positive and statistically significant for the measures of seizing and transforming in Tables 3 and 4. Therefore, we find evidence to support hypothesis 3 but only for the sensing measure of dynamic capabilities.

5.2 Robustness Checks

5.2.1 Additional country variable indicators

To assess the sensitivity of our findings, we performed six robustness checks. First, we reran the analysis with additional indicators of the country variables. Following Carree et al. (2007) and Wennekers et al. (2005), we tested for a pure non-linearity between entrepreneurial activity and developmental stage. In factor-driven countries, entrepreneurial activity based on necessity issues may increase; however, across those innovation-driven countries, this relationship might reverse, indicating a higher proportion of entrepreneurship motivated by opportunity reasons. This argument corresponds to the analytical model provided by Wennekers et al. (2010), who suggest either a U- or an L-shaped effect of developmental stage on early-stage entrepreneurial activity. We find evidence of pure nonlinearity; yet the mitigating role of income levels (approached through GDP per capita) remains statistically insignificant (see Tables 2, 3, and 4).

5.2.2 Include independent and control variables.

Second, we tested whether the results are similar if we include the independent and control variables associated with education and institutions (i.e., entrepreneurship education, autonomous cultural values, funding availability, and previous entrepreneurial experience). We observed that the dynamic component (dynamic capabilities lagged one period) remains stable across the results in columns (2) and (3), which is like the approach by Erken, Donselaar, and Thurik (2016) and Islam (1995). Likewise, when we introduce the moderators, the structure of the dynamic model remained stable.

5.2.3 Crises periods

Third, it is possible that entrepreneurs' and SMEs' dynamic capabilities respond to crises periods (Weaven et al., 2021). To explore this possibility, we initially excluded the time-fixed effects from our empirical strategy. The estimates of the lagged dynamic capabilities and the control variables for the models in columns (1) and (2) were similar to those reported in the other columns. This suggests that the model structure is strong in crisis or boom periods. Tables A1-A3 in the online appendix report these results. Even after including a dummy variable for countries that had a political or an economic crisis during the period of our sample (Duggar et al., 2009; Reinhart & Rogoff, 2011), we observed that all key variables remain constant across models. This suggests that any potential problems resulting from a crisis do not affect the relationship with dynamic capabilities.

5.2.4 Additional variables related to culture.

Fourth, we included other variables related to culture. Studies suggest that certain cultural characteristics (e.g., language, religion) might create gaps between women's and men's entrepreneurial capabilities (Audretsch et al., 2013; Hoogendoorn, Rietveld, & van Stel, 2016; Terjesen, Hessels, & Li, 2016). As religion and language might be correlated with culture (Audretsch et al., 2013), we followed Hechavarría et al's (2018) classification, in which English, Spanish, Scandinavian, and Arabic speaking countries create variations in entrepreneurship within a society. Tables A4-A6 in the online appendix report these results, and the findings are similar.

5.2.5 Alternative dependent variable

Fifth, we replaced the dependent variable with another one: entrepreneurial exit (or discontinuity) using GEM's definition (Bosma, 2013). This allows us to capture the influence of entrepreneurship education and autonomous cultural on the entrepreneurial process from the identification of opportunities to the creation of the new venture. This is also consistent with the dynamic capabilities approach (Teece, 2014). However, studies found that different formal (e.g., bankruptcy) and informal institutions (e.g., supportive culture) relate to business closure (Ucbasaran et al., 2013; Vaillant and Lafuente, 2007). Therefore, we checked whether our institutional variables have an influence on the exit of businesses. Table A7 in the online appendix reports that our variables have no association with discontinuity. Therefore, we are confident that our institutional variables explain entrepreneurs' dynamic capabilities.

5.2.6 Dummy variable

Lastly, we included a dummy variable for factor-driven countries to allow for a rough check on whether country developmental stage affects the estimates. The results remain stable. The interaction with entrepreneurship education and autonomous culture does not change the direct effect of the main variables or the lagged estimation of entrepreneurs' sensing, seizing, and transforming capabilities.

6 Discussion

We have investigated how variations in country institutions impact entrepreneurs' dynamic capabilities. Expanding on previous empirical research that connects country-level institutions and entrepreneurship (e.g., Boudreaux et al., 2019), we utilized a comprehensive cross-country and cross-individual dataset over time, employing dynamic longitudinal panel methods. To summarize: entrepreneurship education and autonomous culture are associated with greater dynamic capabilities. Entrepreneurship education tends to have a stronger relationship with dynamic capabilities in factor-driven economies, and autonomous culture has a weaker relationship with dynamic capabilities in factor-driven economies.

6.1 Implications for culture and dynamic capabilities

Our findings make several contributions to the literature on the role of culture for dynamic capabilities. While the literature examining diverse institutional factors impacting entrepreneurship continues to grow (Bruton et al., 2010; Busenitz et al., 2000; McMullen et al., 2008; Tang et al., 2021), there has been a limited focus on linking institutions like culture with entrepreneurs' dynamic capabilities. Our study revealed the institutional mechanisms that underline the cross-country variation in entrepreneurs' dynamic capabilities.

We found that autonomous culture had a positive association with sensing and seizing capabilities but not with transforming capabilities. In other words, how well a country can ensure a climate that empowers individuals has an impact on the development of dynamic capabilities. These results support the argument that some cultures are more likely to develop dynamic capabilities than others. For example, Williamson (2016, p. 207) also found that in China, the horizontal flexibility that comes with huddle-and-act problem solving is based on personal relationships (consistent with the Chinese emphasis on guanxi), rather than on formal processes. This social dimension suggests that once individuals agree on a solution, they feel a strong duty to implement their part quickly to avoid disappointment.

Our results are also consistent with the finding that a supportive culture helps autonomous and initiative-taking individuals to transform their ideas into new businesses (Stephan and Uhlaner, 2010). Thus, our findings provide evidence of the impact of institutions on dynamic capabilities, highlighting a significant yet underexplored influence.

6.2 Implications for entrepreneurship education and dynamic capabilities

Furthermore, we addressed the call to investigate the interplay between institutional and cultural factors and their impact on entrepreneurship (Cullen et al., 2014; Li and Zahra, 2012). In addition to the cultural autonomy, we found that a country's institutional support for entrepreneurship education is associated with greater dynamic capabilities. This is particularly true for the sensing capability in developing countries. These findings suggest that it is necessary for entrepreneurship programs to promote the capacity to react to opportunities. In this case, as Honig (2004) claims, entrepreneurship education should encompass different strategies aimed at providing tools for future entrepreneurs to face uncertainty and the changing environment. Like Nabi *et al.* (2017), our results indicate that entrepreneurial and business skills acquired in schools and universities enable students to identify and use opportunities.

Our findings also help reconcile the inconsistent observations about the role of education in entrepreneurship. Entrepreneurship educators often argue that 'entrepreneurs are made, not born,' implying that we can teach dynamic capabilities and enhance an individual's self-perception and potential for entrepreneurship (Krueger & Brazeal, 1994; Popescul, 2017). However, this contradicts the observation that many successful entrepreneurs had little formal education (e.g., Steve Jobs and Bill Gates). Our findings suggest that the importance of entrepreneurship education varies across countries. Similarly, van Stel and van der Zwan (2019) found little relationship between education and entrepreneurship in developed countries due to a sizable proportion of the population with (access to) higher education. In factor-driven counties, entrepreneurs are likely to require more education, as they often lack professional experience. They also require mentorship regarding various sources of funding (Ács, Szerb, & Lafuente, 2018).

6.3 Implications for country development stage

Our study focused on country-level factors that align best with a country's development stage. Our research highlights that entrepreneurship education and cultural autonomy influence dynamic capabilities. Additionally, we observe that factor-driven societies benefit from educational influences on dynamic capabilities. This establishes a contextual boundary within the dynamic capability's framework. Since dynamic capabilities are context-specific, it is crucial for researchers to consider the relevant contingencies before predicting and testing outcomes (Peteraf, Di Stefano, & Verona, 2013: 1407). Our findings help entrepreneurship scholars in predicting and testing the outcomes of dynamic capabilities across countries.

Our findings also enrich the dynamic capabilities literature by detailing the boundary conditions that illustrate the importance of ordinary capabilities and cultural factors in the progression of dynamic capabilities. We find a positive relationship between the two factors, aligning with previous research (Drnevich & Kriauciunas, 2011). Country characteristics and ordinary capabilities can be a source of competitive advantage under certain conditions (e.g., the type of development stage). Culture is more important for the development of dynamic capabilities in innovation-driven countries, while ordinary capabilities like education matter more for factor-driven economies. In innovation-driven economies, countries have well-developed ordinary capabilities like education and skill training. Because factor-driven economies lack many important country resources (World Bank, 2004), the ordinary capabilities that augment a country's human capital become crucial to improve efficiency.

This suggests that the importance of entrepreneurship education is stronger in developing countries. This differential effect between developed and developing countries is consistent with findings from other studies. For example, Giannantonio and Hurley-Hanson (2016) argue that an increasing number of successful entrepreneurs in developed countries lack education. Instead, they prefer making money and learning while doing it. In contrast, the World Bank (2011) has recognized the importance of education in entrepreneurship in developing countries and noted that developing countries are increasing economic development by enhancing education. However, this does not affect transforming capabilities the same as with sensing and seizing. Perhaps, getting the right transformation to adapt the product regardless of the (developing versus developed) context requires other capabilities like innovation, communication, and information (Bocken & Geradts, 2020; Kurtmollaiev, 2020).

Like North (1990), our results show that countries with a higher developmental stage provide better institutional environments. This drives capability development. In this case, North (1990) defines two types of societies. On the one hand, there are those open societies that tend to have better institutions and a supportive culture; on the other, there exist limited societies with inequalities, extractive political institutions, and chaotic interactions. In the latter case, people distrust governmental action and government's capacity to control different situations (e.g., crisis, violence, corruption). For instance, Engelen, Schmidt, and Buchsteiner (2015) find that firms in developing countries find it difficult to manage the uncertainty caused by weak institutional structures. In contrast, advanced economies create solid and supportive environments that encourage people to contribute to society by providing different (social) solutions through entrepreneurship.

6.4 Limitations and Future Research

Beyond the theoretically compelling combination of variables included in our study, we could have included additional country-level controls. For example, studies have examined the degree of economic freedom and the extent of the rule of law as nation-level factors involved in capabilities (Amorós et al., 2017; Stenholm et al., 2013). Studies have also included informal institutions like family or religion (Aldrich & Cliff, 2003; Audretsch, Bönte, & Tamvada, 2013). These institutions might moderate the effects of national culture on dynamic capabilities in a manner like entrepreneurship education.

Dynamic capabilities are complex. They refer to a set of complex routines and activities that characterize a company's relationship to its environment. They are also multi-dimensional and reside across a nested hierarchy of levels: individual, firm, and ecosystem levels (Kay et al., 2018). These levels can be important in determining or constituting a given dynamic capability. Future studies might also treat culture in a more sophisticated way. One potential area of exploration would be the juxtaposition of a national culture with an organizational culture. Although our national cultural variable interacted with a social institution to have powerful effects on dynamic capabilities, the combinative effects with organizational culture merit investigation.

Lastly, our analysis provides insight into the cultural and institutional drivers of dynamic capabilities. We thus have a better understanding of how entrepreneurial activity occurs under diverse local conditions. We hope that the dynamic capabilities perspective will continue to explain elusive phenomena that affects firms, stakeholders, and society. Consensus among various perspectives will provide a more complete theoretical framework for explaining dynamic capabilities across varying contexts through institutional lenses.

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Tables and Figures

Figure 1 Proposed model

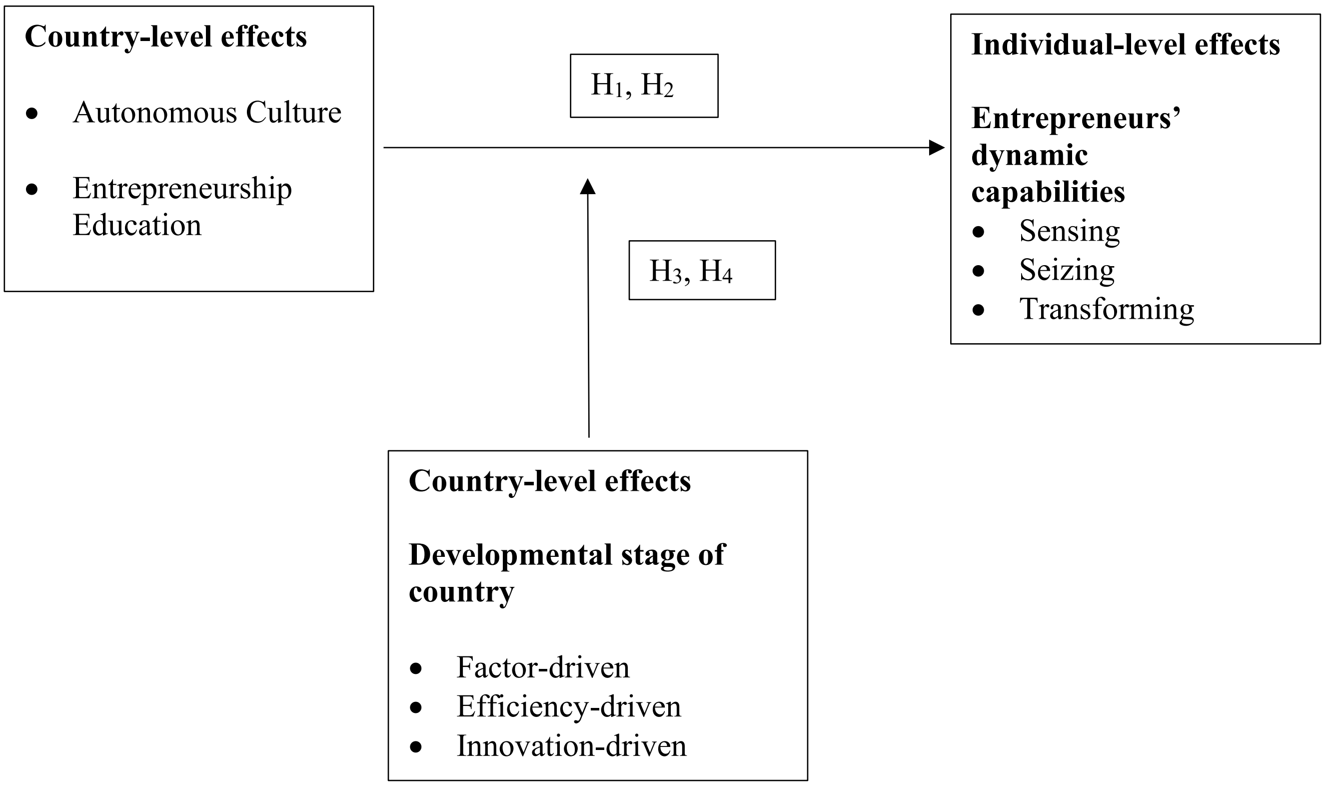

Table 1 Descriptive statistics and the correlation matrix

	Variables	Observations	Mean	Std. Dev.	1	2	3	4
1	Sensing	479	3.49E-10	1.000	1			
2	Seizing	479	1.03E-09	1.000	0.000	1		
3	Transforming	479	-2.31E-10	1.000	0.000	0.000	1	
4	Entrepreneurship Education	479	1.868	0.332	**0.412**	**0.265**	**0.161**	1
5	Autonomous Cultural Values	478	2.863	0.537	**0.197**	**0.305**	**0.339**	**0.281**
6	Funding availability	479	2.743	0.515	**0.134**	**0.244**	**-0.512**	0.073
7	Indirect Entrepreneurship Experience	479	4.808	3.944	**0.623**	**0.304**	-0.041	**0.415**
8	GDP pc	467	27218.370	16499.760	**0.245**	**0.120**	**0.716**	**0.318**
9	Labor force (15-64)	479	69.731	8.251	**0.184**	**0.306**	**0.138**	**0.222**
10	Female Population	479	50.479	2.476	**-0.196**	**-0.185**	0.031	-0.060
11	Failure Perception	478	33.096	8.533	**0.130**	**-0.257**	**0.187**	0.023
		5	**6**	**7**	**8**	**9**	**10**	**11**
5	Autonomous Cultural Values	1						
6	Funding availability	-0.084	1					
7	Indirect Entrepreneurship Experience	**0.190**	**0.150**	1				
8	GDP pc	**0.173**	**-0.337**	**0.250**	1			
9	Labor force (15-64)	0.042	0.043	**0.242**	**0.384**	1		
10	Female Population	-0.075	**-0.131**	**-0.161**	**-0.197**	-0.027	1	
11	Failure Perception	-0.026	**-0.250**	0.053	**0.124**	0.037	0.030	1

Correlations in bold are significant at $p < 0.01$. Note: Std. Dev., standard deviation.

Table 2 Estimation results for sensing capabilities across countries

Dependent Variable:	Sensing						
Model:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Sensing (1 year lag)	0.514***	0.515***	0.509***	0.488***	0.492***	0.475***	0.478***
	(0.054)	(0.052)	(0.053)	(0.054)	(0.055)	(0.056)	(0.058)
Entrepreneurship Education	0.306*	0.301*	0.312*	0.368**	0.407*	0.375**	0.193
	(0.155)	(0.157)	(0.160)	(0.160)	(0.223)	(0.159)	(0.178)
Autonomous Cultural Values	0.349***	0.348***	0.346***	0.394***	0.338***	0.416***	0.440***
	(0.103)	(0.105)	(0.102)	(0.102)	(0.111)	(0.105)	(0.164)
Country Stage of Development (Factor driven)		0.227	11.624***				
		(0.376)	(2.176)				
Entrepreneurship Education x Factor Driven			8.854***				
			(2.400)				
Autonomous Cultural Values x Factor Driven			-9.551***				
			(2.127)				
Country Stage of Development (Efficiency driven)				-0.383***	-0.678		
				(0.139)	(0.555)		
Entrepreneurship Education x Efficiency Driven					-0.142		
					(0.302)		
Autonomous Cultural Values x Efficiency Driven					0.205		
					(0.153)		
Country Stage of Development (Innovation driven)						0.463***	0.037
						(0.165)	(0.596)
Entrepreneurship Education x Innovation Driven							0.286
							(0.331)
Autonomous Cultural Values x Innovation Driven							-0.030
							(0.176)
Funding availability	0.046	0.053	0.070	0.050	0.050	0.043	0.054
	(0.073)	(0.075)	(0.080)	(0.074)	(0.074)	(0.072)	(0.076)
Indirect Entrepreneurship Experience	0.034**	0.034**	0.048***	0.038**	0.037**	0.041**	0.043**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
GDP per capita	0.000	0.000	0.000	-0.000	-0.000	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Labor force (15-64)	0.009	0.010	0.011	0.010	0.008	0.006	0.005
	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
Female Population	-0.082***	-0.070**	-0.094***	-0.063	-0.054	-0.084*	-0.071
	(0.030)	(0.033)	(0.034)	(0.044)	(0.043)	(0.043)	(0.043)
Failure Perception	0.012**	0.012**	0.016***	0.009*	0.009	0.010**	0.011**
	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Transition to Efficiency driven		-0.198	0.688				
		(0.425)	(0.572)				
Transition to Innovation driven				0.145	0.143	0.155	0.136
				(0.134)	(0.122)	(0.125)	(0.125)
Constant	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	293	293	293	293	293	293	293
Countries	90	90	90	90	90	90	90
R^2	0.744	0.744	0.556	0.745	0.747	0.749	0.749
P-value F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test AR(1), p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sargan test p-value	0.706	0.795	0.637	0.634	0.606	0.622	0.605
Hansen test p-value	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1 (two-tailed test). Robust standard errors in parentheses.

Table 3 Estimation results for seizing capabilities across countries

Dependent Variable:	Seizing						
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seizing (1 year lag)	0.669***	0.653***	0.664***	0.641***	0.638***	0.627***	0.622***
	(0.064)	(0.059)	(0.056)	(0.051)	(0.049)	(0.052)	(0.051)
Entrepreneurship Education	0.081	0.115	0.115	0.121	0.212	0.082	-0.158
	(0.147)	(0.139)	(0.142)	(0.140)	(0.149)	(0.144)	(0.307)
Autonomous Cultural Values	0.244***	0.232***	0.233***	0.243***	0.242***	0.227***	0.362**
	(0.079)	(0.079)	(0.080)	(0.077)	(0.084)	(0.076)	(0.164)
Country Stage of Development (Factor driven)		-0.579*	-6.628***				
		(0.325)	(2.162)				
Entrepreneurship Education x Factor Driven			-6.262***				
			(2.124)				
Autonomous Cultural Values x Factor Driven			6.048***				
			(1.955)				
Country Stage of Development (Efficiency driven)				0.091	0.490		
				(0.190)	(0.667)		
Entrepreneurship Education x Efficiency Driven					-0.257		
					(0.314)		
Autonomous Cultural Values x Efficiency Driven					0.026		
					(0.170)		
Country Stage of Development (Innovation driven)						-0.359*	-0.575
						(0.207)	(0.692)
Entrepreneurship Education x Innovation Driven							0.371
							(0.350)
Autonomous Cultural Values x Innovation Driven							-0.170
							(0.167)
Funding availability	0.128	0.109	0.108	0.136	0.145	0.138	0.154
	(0.094)	(0.092)	(0.097)	(0.091)	(0.091)	(0.094)	(0.096)
Indirect Entrepreneurship Experience	-0.021	-0.028	-0.036	-0.026	-0.024	-0.030	-0.030*
	(0.021)	(0.021)	(0.024)	(0.018)	(0.017)	(0.019)	(0.017)
GDP per capita	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Labor force (15-64)	0.011	0.020***	0.019***	0.014*	0.013*	0.017**	0.016**
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Female Population	0.042	0.026	0.041	-0.020	-0.011	-0.012	0.005
	(0.041)	(0.038)	(0.039)	(0.053)	(0.055)	(0.054)	(0.057)
Failure Perception	-0.016	-0.019*	-0.020**	-0.015	-0.013	-0.014	-0.013
	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Transition to Efficiency driven		1.470***	0.793				
		(0.347)	(0.540)				
Transition to Innovation driven				0.235	0.212	0.119	0.099
				(0.150)	(0.150)	(0.143)	(0.143)
Constant	-3.493	-3.115	-3.661*	-0.854	-1.484	-1.306	-2.134
	(2.193)	(2.033)	(2.116)	(2.713)	(2.857)	(2.778)	(2.893)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	293	293	293	293	293	293	293
Countries	90	90	90	90	90	90	90
R^2	0.675	0.683	0.791	0.687	0.688	0.695	0.697
P-value F test	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Arellano-Bond test AR(1), p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sargan test p-value	0.556	0.673	0.529	0.513	0.518	0.524	0.556
Hansen test p-value	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ (two-tailed test). Robust standard errors in parentheses.

Table 4 Estimation results for transforming capabilities across countries.

Dependent Variable:	Transforming						
Model:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Transforming (1 year lag)	0.630***	0.636***	0.628***	0.613***	0.602***	0.607***	0.589***
	(0.049)	(0.049)	(0.050)	(0.048)	(0.045)	(0.047)	(0.045)
Entrepreneurship Education	0.056	0.072	0.060	0.083	0.061	0.095	0.176
	(0.075)	(0.074)	(0.074)	(0.076)	(0.093)	(0.074)	(0.133)
Autonomous Cultural Values	-0.099	-0.100*	-0.104*	-0.098	-0.143**	-0.094	0.057
	(0.063)	(0.059)	(0.060)	(0.061)	(0.061)	(0.062)	(0.114)
Country Stage of Development (Factor driven)		-0.314	-4.567***				
		(0.230)	(0.801)				
Entrepreneurship Education x Factor Driven			-1.222				
			(0.824)				
Autonomous Cultural Values x Factor Driven			2.260***				
			(0.701)				
Country Stage of Development (Efficiency driven)				-0.145	-0.689*		
				(0.119)	(0.412)		
Entrepreneurship Education x Efficiency Driven					0.063		
					(0.181)		
Autonomous Cultural Values x Efficiency Driven					0.158		
					(0.117)		
Country Stage of Development (Innovation driven)						0.211**	1.027**
						(0.104)	(0.391)
Entrepreneurship Education x Innovation Driven							-0.137
							(0.165)
Autonomous Cultural Values x Innovation Driven							-0.214*
							(0.122)
Funding availability	0.179***	0.166***	0.139***	0.186***	0.185***	0.183***	0.173***
	(0.047)	(0.043)	(0.039)	(0.045)	(0.045)	(0.044)	(0.040)
Indirect Entrepreneurship Experience	-0.015	-0.017	-0.022**	-0.015	-0.018	-0.014	-0.019
	(0.011)	(0.011)	(0.010)	(0.011)	(0.012)	(0.012)	(0.012)
GDP per capita	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Labor force (15-64)	-0.001	0.000	-0.001	-0.001	-0.001	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)
Female Population	0.030	0.016	0.020	0.039	0.039	0.030	0.030
	(0.026)	(0.028)	(0.030)	(0.038)	(0.036)	(0.036)	(0.032)
Failure Perception	0.006*	0.006*	0.005	0.005	0.004	0.005	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Transition to Efficiency driven		0.495	0.455*				
		(0.353)	(0.256)				
Transition to Innovation driven				0.056	0.077	0.081	0.111
				(0.103)	(0.102)	(0.104)	(0.098)
Constant	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	293	293	293	293	293	293	293
Countries	90	90	90	90	90	90	90
R^2	0.859	0.852	0.849	0.864	0.863	0.863	0.865
P-value F test	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Arellano-Bond test AR(1), p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sargan test p-value	0.419	0.476	0.326	0.359	0.395	0.359	0.409
Hansen test p-value	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1 (two-tailed test). Robust standard errors in parentheses.