

Do Countries Diverge on Factors for Business Angel's Development?

ABSTRACT

Business angels are significant players in Europe's early-stage private investment market. They are contributing funds in bulk to meet the needs of innovative ideas and struggling new businesses. For this reason, BA development remains an important aspect of policy makers. Numerous factors, such as BA's personal characteristics, institutional factors, and macro-economic factors, are crucial for BA's development. Using institutional and innovation theories, we propose that country's institutional development along innovation level are crucial for BA investment activity development. In addition, we believe that countries show divergence in their reliance on these factors to develop their BA markets. Our results of PCA analysis show that European countries reliance patterns are dissimilar on the factors of institutions (formal and informal) and innovation for BA development. However, PLS-SEM reveals that the institutional development and innovation level of a country both significantly contribute to develop BA markets. These results have important practical and policy implications.

Introduction

Innovative ideas and new businesses often struggle to secure funding, especially during their early stages (Mason & Harrison, 1995). While institutional venture capitalists used to fill this gap, but now they mainly focus on later-stage financing (Aram, 1989). To address this gap, angel investments have emerged as a crucial source of funding for innovative start-ups and entrepreneurial ecosystems (Mason & Botelho, 2021; ScaleUp Institute, 2021). Mitra (2008) states, "The bulk of the responsibility of early stage investment is shouldered by angels." Specialist literature further affirm this statement (Croteau & Grant, 2021; Liu, 2000; Mason, 2008). Meanwhile, business angels are significant players in Europe's early-stage private investment market, accounting for 58% of total investment, with an estimated annual investment of 7.67 billion euros (EBAN, 2020), followed by 4.6 billion euros of investment by early-stage VC industry¹. Overall, the visible angel market has been steadily growing since 2011, with an estimated 80% increase in European angel investment activity in 2020.

¹ Investing in Europe Private Equity Activity Report and Data 2020," Invest Europe, May 6, 2021, <https://www.investeurope.eu/research/activity-data>

Regarding investment trends and BA population, the UK leads the European angel market, followed by Germany and France (EBAN, 2020).

Apparently, estimated figures and other research findings show the development of BAs and their investments in spurring entrepreneurship and growth in countries (OECD, 2016, Mason, 2009). However, according to European Investment Bank (EIB), comparatively Europe lack behind other nations such as United States and China in building start-ups and innovative young firms, due to its under-developed early stage funding markets including, business angel market (Martin et al., 2002; Duruflé et al., 2018; EIB, 2019 p. 279). Therefore, keeping in view the importance of matter, many studies have devoted to figure out the reasons which are responsible for affecting these funding streams. However, previous studies mostly focused on factors affecting VCs (Li & Zahra, 2012; Gantenbein, Kind & Volonté, 2019; Grilli, Mrkajic & Latifi, 2018), while the knowledge about determinants of business angel activity is still limited. For instance, in this regard it is seen which factors influence BAs and their investment decisions (Szerb et al., 2007; Li, Ling, Wu & Li, 2014; White & Dumay, 2020; Ding, Sun & Au, 2014). While at country level, literature emphasize the importance of overall economic growth, microeconomic conditions, and the macroeconomic environment as key determinants of BA investment (Burke et al., 2014; Zinecker et al., 2021). Precisely, research finds formal and informal institutions, such as regulatory frameworks and cultural values as significant factors in shaping the emergence of business angels and their markets (Szerb et al., 2007; Cumming & Zhang, 2019). These findings are true to emerging economies also (Scheela et al., 2015; Harrison, 2017).

Collectively, to some extent, these studies provide foundation information on the determinants that facilitate or impede business angel activity. However, literature still does not exhaust on the factors which determine the development of BA activity across countries, particularly, in Europe (Diaconu, 2012). The reason might be the limited consideration of

indicators such as institutional indicators; minority shareholder protection, individualism, uncertainty avoidance, corruption, and political risk in BA domain(Cumming & Zhang, 2019; Scheela et al., 2015), while overlooking other crucial factors, such as innovation which is intertwined with institutions. This inadequate knowledge of factors further poses a limit to understand whether the drivers of business angel investment are consistent across countries or not.

To solve this puzzle, current study aims to count innovation and institution factors to answer following questions: Whether innovation inputs and institutions are equally significant for developing BA investments across countries? Whether countries' reliance patterns on institutional and innovation factors for BA development are similar?

Innovation is an appealing element and act as a catalyst for economic growth. For this reason, encouraging innovation through the establishment of small and medium-sized enterprises remained a key policy initiative (Jones & Tilley, 2003). However, these innovative SMEs are dependent on the various sources of funding, including the BAs. For instance, according to BAF report (2017)², 93% of the recent investments by business angels are made in firms engaging in process, product or business model innovation. In this way, innovation has direct bearing on investors decisions. In past, it is seen that innovation impacted the development of financial markets such as VCs (Gomper & Lerner, 1999; Lerner & Tag, 2013). Keeping in view the relevance of innovation, it can be postulated that innovation impacts BA market development by influencing the availability of investment avenues for BAs, as finding good opportunities remains a major challenge for BAs (Masson & Harrison, 2002). However, innovation doesn't occur in vacuum, and depends upon some other elements, such as institutions (Schumpeter, 1985; Weber & Hemmelskamp, 2005). Supporting institutions

² Understanding the Nature and Impact of the business angels in Funding Research and Innovation: Results of the Business Angels survey. Directorate European Commission/DG CNECT – F1 Innovation Unit

promote innovation, because institutions are constellation of procedures, regulations and customs that shape economic behaviors and interaction. Particularly, institutions set the ‘rules of the game’ (North, 1990), and these rules shape the conduct of individuals and constrain their choices (Tolbert & Zucker, 2006; Foxon, 2003). Thus, along with variations in formal structures, cultures, and economic environments (Kaufmann et al., 2010; Hofstede, 2011; Zinecker et al., 2021), innovation levels differ across countries (Choi, 2019; Moreno, Paci & Usai, 2005). Therefore, keeping in view the dependency of these two factors and building on the old and new approaches of innovation, this study consider institutions and innovation as important elements to answer the research question proposed for current study.

Our analysis exploits the EBAN report’s data on visible markets of BA investments in 26 European countries during the period 2021 to study the relevance of innovation and institutions to BA development and to explain the similarities and differences in countries reliance patterns on these two factors. Empirical results extend the BA literature on the set of factors responsible for BA development and explain the differences in reliance patterns of countries on dissimilar factors. Our novel finding reveals that drivers of BA activity vary across countries and identified four groups of countries based on their reliance on institutional and innovation factors. Furthermore, empirical results highlight that institutional and innovation dimensions are significantly related to BA development, while innovation having a greater impact. Theoretically, results of the current study confirms the significance of simple as well as extended approaches of innovation model and institutional theory in BA domain. Further contribution of this study lies in the methodological choice which incorporates factor analysis to identify the factors out of theoretically supported variables along with partial least squares structural equation model that validate the identified factors relationship with BA development. To our knowledge, this is the first study which explores how countries divide based on institution and innovation factors and test their significance using a combination of factor

analysis and PLS-SEM path modelling. These findings also have important policy implications for promoting BA activity in different countries. Particular knowledge of a country's dependence on certain factors can help policymakers to design tailored policies to improve that underlying factor to promote BA development.

The paper is organized as follows: In section 2, we present the theoretical framework and hypothesis development based on previous studies. Section 3 describes our data and methodology, section 4 presents the empirical results. Section 5 conclude the study with a discussion of the significance of our major findings and suggest future research directions.

Theory & Hypotheses Development

According to early theoretical perspectives of innovation, it is relatively simple, one-directional activity which involves technology development and diffusion (Schumpeter, 1934). However, rate and direction of innovation is dependent on advances in scientific understandings which is tied with optimizing inputs such as R&D spendings (Nemet, 2007). Therefore, on the basis of linear model of innovation, it can be assumed that countries with high innovation inputs lead to more innovation and discoveries, offer appealing investment avenues to BAs and promote BA development. However, with passage of time, linear theoretical model of innovation developed into more complex, non-linear process called the systematic perspective of innovation. This perspective emphasises the role of different interacting actors in innovation process such as regulatory framework and institutional structures, that affect incentives and barriers (Greenacre, Gross & Speirs, 2012). In particular, role of institutions is a key theme in innovation process as institutions establish and maintain the 'rules of the game' (North, 1990), and are taken as carrier of innovative systems (Tolbert & Zucker, 2006). Institutions build individuals expectations about the conduct of others, facilitate knowledge sharing and collaboration (Saiegh & Tommasi, 1998; Ruttan, 2001), and have bearing on contract formation

and enforcement, property rights protection, procedures to start business and market behaviours. All these elements matter for the development of financial markets. Therefore, building on innovation systematic perspectives, it can be assumed that in some countries institutions are supportive and strengthening the BA development by providing proper incentives and removing the barriers for investments. Collectively, distinctions in the innovation inputs and institutional quality among countries may further divide them in their reliance on these two set of factors for BA development.

Regarding previous literature on business angel across countries, researchers identify various determinants that influence the emergence of business angels, their investment process, and their opportunity selection. For example, Szerb et al. (2007) find that personal factors such as gender, income, entrepreneurial experience, and wealth motivate individuals to become informal investors. Others researchers identify that individual drivers like personal experience, trust, the need to contribute, and realistic expectations influence BA's initial investment process (Li, Ling, Wu, & Li, 2014; White & Dumay, 2020). Additionally, there is impact of a country's formal, informal institutions and economic factors on BA development (Cumming & Zhang, 2019; Szerb et al., 2007; Burke et al., 2014; Zinecker et al., 2021). Some studies extend the search of relevant factors that facilitate development of business angel markets in emerging economies. Finding shows that formal institutions hinder BA activity in developing economies, while informal institutions mitigate their negative effects (Scheela et al., 2015). Contrary, some economies, such as China, managed to excel in BA activities despite institutional voids (Harrison, 2017). This finding gives an indication that in addition to institutions there must be some other influential factors that dictate BA development. Thus to expand on this, we include innovation along institutions in the current study to extend the set of determinants of BAs and to see differences in countries reliance patterns on these factors for BA development.

Institutional Setup (Formal institutions/culture)

According to Porter (1991), some national environments are more conducive to progress and development, due to better financial market development, which is dependent on institutional setups (Lerner & Tag, 2013). A sound institutional setup creates a climate that encourages investments in value-added activities, supported by strong legal setups that provide property rights protection, contract enforcement, and voluntary exchanges. Such institutions better support market development (Gwartney et al., 2006), attract private investments (Gwartney et al., 2006), extends time horizons, and deters opportunistic behaviour (Haggard et al., 2008). Additionally, quality institutions guide behaviours, such as investment decisions, by setting rules of the game, monitoring, and enforcement (North, 1990). As a result country's attractiveness for VC and private equity investments increases (Groh et al., 2008). On the contrary, poor institutions increase uncertainty, instability, and transaction costs, which discourage private investment (Zouhaier & Karim, 2012). Under institutions, prevailing law system also impact investment activity. For example, common law systems offer greater investor protection compared to civil law systems, with the French legal system being less welcoming to private economic activity (La Porta et al., 1997). The division between these legal systems is closely linked to a country's rule of law and regulatory quality (Kaufmaan et al., 2010), which are crucial for investors. These legal setups aim to support investments that rely on institutions (Haggard et al., 2008).

Institutions can be categorized as formal or informal. Formal institutions refer to political, legal, and regulatory structures that influence economic activity through legal aspects and policies (North, 1990). Informal institutions mainly include culture, which represents a society's values, attitudes, beliefs, and underlying assumptions (Huntington, 2000). Formal institutions particularly the legal framework (Haggard, MacIntyre & Tiede, 2008), creates a secure and well-defined environment that reduces uncertainty, transaction costs, and opportunistic behaviours (Haggard et al., 2008; North, 1990; Balcerzak, 2020; Efendic,

Mickiewicz, & Rebmann, 2015). Such elements help to attract high-growth companies and extend the time horizon of operations (Haggard et al., 2008). On the other hand, informal institutions, especially culture (Holmes et al. 2013), also significantly impact economic outcomes by shaping individual behaviors and attitudes towards important factors such as innovation, entrepreneurship, risk-taking, and long-term investment decisions (Shane, 1993; Hayton et al., 2002; Desai, 2011; Li et al., 2013; Taylor & Wilson, 2012).

However, institutional setups vary across countries (Balcerzak, 2020), with differences in legal systems (Miller, 2011; La Porta et al., 1997) and cultural norms (Hofstede, 2011; Rodgers & Peng, 2017). Therefore, on the basis of institutional differences it is assumed that some countries may have an advantage over others in developing their BA markets based on the strength of their institutions, which provide proper incentives and remove barriers for innovation and investments. This led us to argue that,

H1: Institutional setups (formal/culture) significantly influences BA development.

Innovation Inputs:

Drucker (2014) describes innovation as the renewal and improvement of products, services, processes, business models, and organizational structures to meet new market needs. Innovation is also a significant driver of performance differences between regions and countries (Fagerberg & Verspagen, 2003). Differences in innovation can be attributed to differences in various elements such as innovation inputs like R&D spending and society orientation towards future. As it is seen that R&D spending is one of the early indicators of innovation (Choi, 2019; Kims, 2021; Nemet, 2007), and long-term orientation is believed to further facilitate the innovation process (Rossberger, 2014).

Innovation, especially when it comes to technology, requires long-term planning and investment, which are the characteristics of long-term oriented societies (Rujirawanich et al.,

2011). High-long-term oriented societies tend to focus more on the future than the present (Hofstede et al., 2010), more desirable to plan (Venaik et al., 2013), and have longer-term planning horizons (Das, 1987), which can make them more conducive to innovation. The relationship between long-term orientation (LTO) and R&D spending is important to consider since R&D is a long-term investment that is linked to a society's future orientation (Kims, 2021). In past, studies show that LTO influences various long-term financial decisions, including R&D spending, acquisition, cash holding, and long-term investments (Kim, 2021; Alipur, 2021; Orlova, 2020). However, some studies find a positive relationship between LTO and R&D spending, others suggest that LTO may be responsible for cyclical variations in R&D spending across countries (Choi, 2020; Kim, 2021). The difference in R&D spending between LTO and short-term-focused societies is due to their different predictors, such as future planning and long horizons (House et al., 2004; Alipour, 2021; Kim, 2021; Rujirawanich et al., 2011), which affect their willingness to invest in long-term gains.

Furthermore, R&D spending and innovation are directly linked and widely investigated (Raghupathi & Raghupathi, 2017; Dimos & Pugh, 2016). R&D spending is critical for innovation, economic growth, and financial market development such as VCs (Lerner & Tag, 2013; Gompers & Lerner, 1999). It reflects the intensity of investment in potentially useful innovation activities (Islam, 2015; Marcelino-Jesus et al. 2017, Freimane & Băliņa 2016). Furthermore, innovation is a blend of researchers, who provide ideas, and entrepreneurs, who commercialize them. For this reason, Michelacci (2003) argue that it is necessary to support both researchers and entrepreneurs. Increased R&D spending can stimulate innovation by providing entrepreneurs with the necessary finances to take risks (Callahan & Muegge, 2003). R&D transfer related to national research and development leads to new commercial opportunities (Amorós and Bosma, 2014; Lerner & Tag, 2013), making them an appealing avenue for investment and development. Some states have already used R&D spending to

advance basic research and develop financial markets. Studies show a significant relationship between public spending on R&D and its role in the development of VC markets in different countries (Gompers & Lerner, 1999; Lerner & Tag, 2013).

The relationship between long-term orientation, R&D spending, and innovation has been extensively researched, and has been found to influence the development of financial markets, such as VC activities. However, countries differ in their approach towards the future (Hofstede, 2010), and R&D spending (Kim, 2021), which can impact their innovation capacity and availability of investment opportunities. Countries with higher LTO and R&D spending tend to be more innovative, leading to the development of investment avenues for BAs. This has already been observed in the case of VC markets (Gompers & Lerner, 1999). Thus, we can assume,

Hypothesis 2: Innovation inputs (LTO/R&D spending) significantly influence BA development.

Methodology

Data

The study utilizes annual data from the EBAN Statistics Compendium for the year 2021 to analyse the significance of institutional and innovational factors for BA development and to study the similarities and differences in the reliance patterns of countries on these two factors. Further, for robustness, comparison of BA investment for year 2015 and 2021 is also made. The EBAN Statistics Compendium is considered the most comprehensive annual research on the activities of business angels and business angel networks in Europe, and is based on data from multiple sources, including EBANs, the Federation of BANs, individual business angels, and 35 other sources such as Deal room, CrunchBase, pitchbook, and national and regional

angel investment research studies (EBAN, 2020). This data provides valuable insights into the latest developments in BA investment activity across 26 countries for the current study.

Dependent Variable

Estimated BA investment amounts are taken as dependent variable of the study. This measure gives good insight into BA development in the visible markets of different countries.

Independent Variables

We use data from the World Governance Index to measure formal institutions, focusing specifically on regulatory quality and the rule of law indicators of WGI due to their high relevance to investments given in literature (La Porta et al., 1997; Cumming & Zhang, 2019). To measure culture, we use Hofstede's cultural dimensions of power distance, uncertainty avoidance, and individualism. Researchers have used different measures of national cultural dimensions (e.g., House et al., 2004; Schwartz, 1990), but Hofstede measures are widely used in studies on international business, innovation, entrepreneurship and BA domain (Shane, 1993; Tihanyi et al., 2005; Li & Zahra, 2012; Szerb et al., 2007; Cumming & Zhang, 2019). The Hofstede LTO dimension and R&D spending are used as indicators of innovation, as they are crucial to promote innovation (Rossberger, 2014; Choi, 2020). Appendix 1 provides detail information on each measure and its source.

Table 1 provides descriptive statistics for all the indicators used to extract the factors in the following section, including mean and standard deviation values, as well as measures such as maximum, and minimum values. This table offers valuable insights into the dataset indicators.

Table. 1 Descriptive Statistics

(Table 1 Here)

Methods

The study employs two data analysis techniques, namely factor analysis and PLS-SEM model. Factor analysis method is used to extract the factors from the set of selected independent variables. Extracted factors help to see the reliance patterns of countries around these factors and to identify the most important factor of each country for BA development. PLS-SEM is used to check the proposed hypothesis and enhance the validity of results. The following section provides brief explanations of both methods.

i. Factor analysis

Factor analysis is a statistical technique that helps to identify common underlying dimensions, known as factors, among a set of interrelated variables. In this study, factor analysis is used to extract important factors from seven indicators, including IDV, PDI, UAI, ROL, RQ, LTO, and R&D spending, to understand how countries differ in their reliance on these factors for BA development. Principal component analysis is used to extract the factors, and regression analysis is used to obtain factor scores to explain countries' reliance on the extracted components.

ii. PLS-SEM method

PLS-SEM is a structural equation modelling technique that combines principal component analysis and path analysis to evaluate both theory and data simultaneously (Pedhazur, 1982). PLS-SEM is particularly useful when working with small sample sizes (Haier et al., 2014). It is relevant for the current study because we have small sample due to limited data on BA activity.

Furthermore, confirmatory factor analysis is used in this study to validate the two factors extracted through explanatory factor analysis and to demonstrate their explanatory power in BA development across different countries. This approach ensures that the factors are

measurable and confirms their relevance to the study's research questions. The latent variable model is as follows:

$$\varnothing_{i0} = \lambda_0 + \lambda_1 \text{INT}_{i0} + \lambda_2 \text{INO}_{i0} + u_{i0}$$

Where $\varnothing_{i0}$ represents BA development measured by amount invested by BAs in year 2021, INT_{i0} represents institutional factor and INO_{i0} shows innovation factor. Partial least squares (PLS) estimates this equation using the SmartPLS4.0 software.

Analysis and Results

Factor Analysis Method

Before proceeding with factor analysis, it is important to assess the suitability of the data. According to sampling adequacy test (Kaiser, 1970), the KMO value (0.819) is greater than the typical cut-off of 0.5, indicating that the data is suitable for factor analysis. Additionally, the significant p-values (less than 0.05) from Bartlett's test demonstrate the presence of patterned relationships among the variables. These results suggest that the variables in this study are appropriate for factor analysis.

Table.2 KMO and Bartlett's Test

(Table 2 Here)

Table 3 presents the results of the principal component analysis, which includes the eigenvalues, percentage of variance, and cumulative total variance explained by the components. The first two components, with eigen values greater than 1, are retained, accounting for a total of 71.37% of the variance.

Table 3. SPSS output for the total variance explained for extracted factors

(Table 3 Here)

Furthermore, the scree plot graph in Figure 1 also supports the selection of the first two components. Component 1 and component 2 are situated at the steepest locations of the graph, while the remaining values are maintained at the flat position of the scree plot graph. So, we selected the first two components for further analysis.

Figure 1. Scree Plot

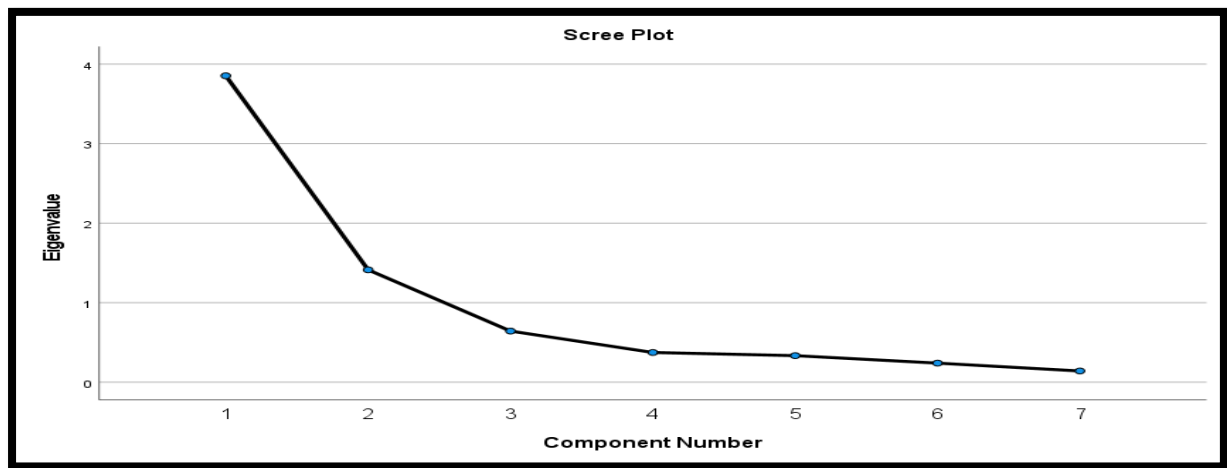


Table 4 displays the rotated component matrix obtained through Varimax rotation, which helps eliminate unclear factors. The numbers under component 1 and 2 indicate the loading strength of each indicator against the respective component, with the sign indicating the direction of correlation (Kline, 1998). For example, Regulatory quality, power distance, uncertainty avoidance, rule of law, and individualism are highly loaded on component 1, which we define as the institutional factor. R&D spending and long-term orientation are heavily weighted in component 2, which we define as the innovation factor.

Table. 4 Rotated Component Matrix
(Table 4 Here)

After extracting factors 1 and 2, score values of these factors are calculated using the regression method. These score values indicate how much an individual country score on each factor. We

then utilized these factor scores to plot the countries in the dataset, which provided a visual representation of the grouping of countries based on their scores on the institutional quality and innovation factors.

Figure 2: Country's position on institutional/innovation factors and amount invested by BAs (year 2021)

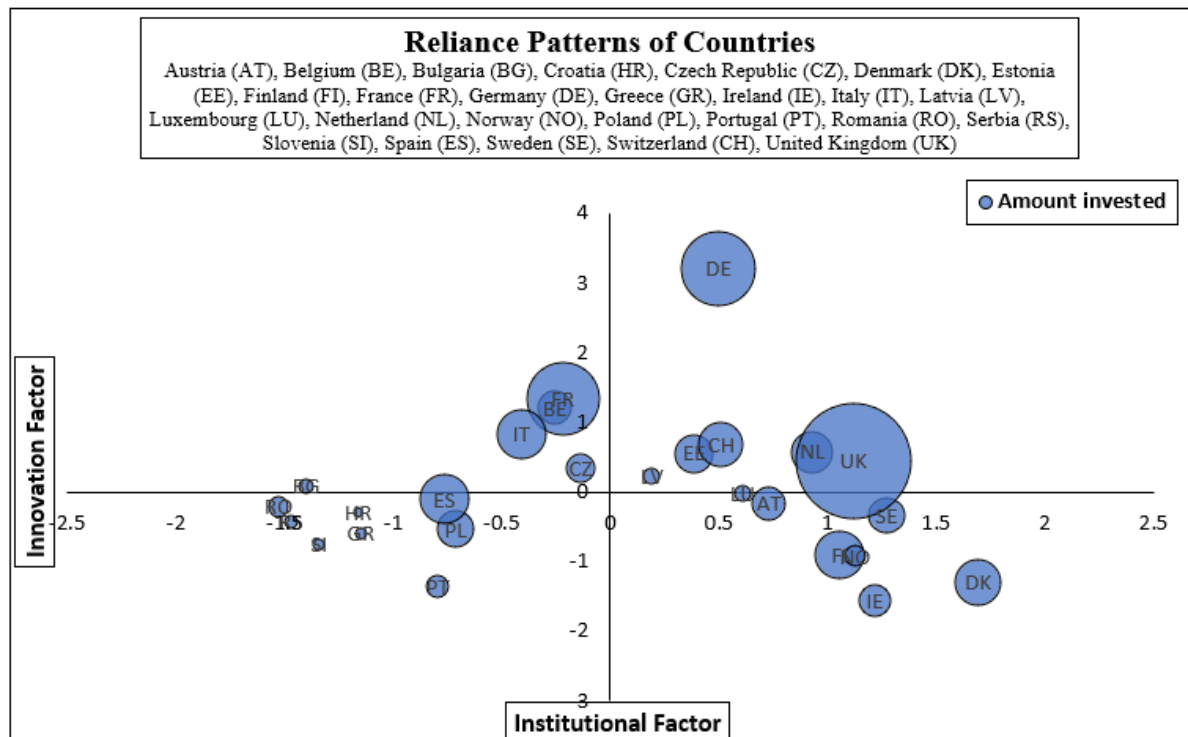


Figure 2 displays the relationship between the institutional and innovation factors and BA investments. The x-axis shows the countries' position based on their score on the institutional factor, where positive scores represent a supportive institutional setup, and negative scores represent weaker institutions. Similarly, the y-axis shows the countries' position based on their score on the innovation factor, where positive scores indicate a supportive innovation factor, and negative scores suggest a weaker innovation dimension. The graph is divided into four quadrants, each representing a group of countries based on their scores on the two factors.

Quadrant 1 comprises countries such as Germany, the UK, Estonia, Switzerland, Latvia, and the Netherlands, which have a supportive institutional setup as well as a supportive innovation factor. Quadrant 2 includes countries such as France, Italy, Belgium, Bulgaria and Czech Republic which have weaker institutional dimensions but have somehow a supportive innovation factor. Quadrant 3 represents countries that lack both supporting institutional and innovation factors, such as Croatia, Greece, Poland, Portugal, Romania, Serbia, Spain, and Slovenia. Quadrant 4 contains countries Austria, Luxembourg, Sweden, Finland, Norway, Denmark and Ireland with a supportive institutional setup but a weaker innovation dimension. The size of each bubble in the graph represents the amount of BA investment in a particular country.

The patterns of countries in the BA market suggest that both institutions and innovation play crucial roles in promoting BA development. However, countries dependence on these factors varies across countries and within group of countries. For instance, countries in the first quadrant rely on innovation inputs and institutions, however variation in their investment size lies in the variation in the strength of development of each factor. For example, UK and the Netherlands both have innovation inputs and supportive institutional setup but investment varies, this might be due to the more developed institutions of UK as compared to Netherlands. Similarly, supporting the previous trend, Latvia having innovation-institutions factors show low BA investment because both of its factors are least developed as compared to the rest of countries in this group. Second group of countries lack supportive institutions and seem dependent on innovation inputs for BA development. For example, France, Belgium and Italy show good innovation input capacity, which might contribute to their success in BA activity. On the other hand, Denmark, Finland, Sweden, and Austria demonstrate a reliance on supportive institutional quality, with significant investment size. The distribution of these countries supports the previous findings that stronger institutions promote private investment

(Gwartney et al., 2006) by setting fair rules of game, which facilitate individual interactions and build trust, provide protection (North, 1990; La Porta et al., 1997), which increases the incentive for innovation and investment (Zouhaier & Karim, 2012). Similarly, innovation is an equally relevant factor and supports the previous finding that a country's attractiveness for investment depends on the availability of investment opportunities that are related to innovation resultant from its inputs (Groh, Liechtenstein & Lieser, 2008).

A group of countries including Bulgaria, Poland, Portugal, Serbia, Romania, Croatia and Slovenia show low levels of BA investment due to their under-developed institutions and innovation. This pattern of countries align with previous research indicating that poor institutions discourage private investment due to increased uncertainty and transaction costs (Zouhaier & Karim, 2012), constraining innovation. Additionally, low innovation in these countries means that there are fewer innovation inputs in these countries, resultant fewer opportunities for BAs, which hinders BA development (Mason & Harrison, 1999). Many of these countries, such as Bulgaria, Poland, and Slovenia, are undergoing significant institutional and economic reforms as transition economies (Svejnar, 2002). Therefore, they need development of supportive institutions and innovation inputs for fostering BA activity.

Apart from general patterns observed, Spain has a high level of BA activity with poor institutions and weak innovation. This anomaly suggests that in addition to country level factors, there must be some role of individual level factors such as BA personality traits which drive their decision making.

A mere graphical representation does not indicate the strength of the relationship between these factors and BA development. To confirm their relevance and influence empirically, PLS SEM has been used.

PLS-SEM Analysis and Results

To verify the research model and hypothesis, the PLS equation is utilized, which consists of two steps: 1) evaluating the measurement model, and 2) assessing the structural model. The measurement step includes assessing the indicators' reliability and validity, while the structural step analyzes the relationship between the latent variables and includes R-square and path coefficients. This approach ensures the accuracy and consistency of the constructs' measurements before drawing conclusions about their relationships (Barclay et al., 1995).

Evaluation of measurement model

Reliability and Validity

Before analyzing the structural model, it is crucial to ensure the reliability and validity of the measurement model (Nitzl, 2016). Composite reliability is a widely used test to measure internal consistency reliability in SEM (Hair et al., 2014) and value of 0.6 or higher is considered acceptable (Hair et al., 2014). However, the initial composite reliability value for the institutional dimension was low at 0.34, whereas the innovation dimension had an acceptable value of over 0.6. To improve the composite reliability, one indicator (PD) was removed from the original five indicators of the institutional construct. The decision to hold individualism and uncertainty avoidance instead of power distance was based on their reliability, as they have been empirically tested and found relevant to BA investments (Cumming & Zhang, 2019). Furthermore, this decision does not affect the further analysis, as mentioned, reflective indicators can be omitted or changed due to collinearity, without changing the meaning of the construct (Haier et al., 2014). The resulting composite reliability for the modified institutional construct is 0.739, indicating improved internal consistency. The validity of the construct is assessed by convergent validity and discriminant validity. For convergent validity, average variance extracted (AVE) is showing values ranging between 0.6 and 0.7, higher than the recommended value of 0.5 (Hair et al., 2014).

To ensure the discriminant validity of the model, cross-loading analysis is conducted which is widely used criterion for establishing discriminant validity (Tailab, 2020). The purpose is to ensure that each construct in the model is more strongly associated with its own indicators than with the indicators of other constructs (Wasko & Faraj, 2005). Results in Table 5 indicate that individualism (IDV), uncertainty avoidance (UAI), rule of law (ROL), and regulatory quality (RQ) have higher weights in their respective institutional dimensions. Similarly, long-term orientation (LTO) and research and development spending (R&D) are more strongly associated with their respective innovation dimensions. Thus, based on the cross-loading analysis, the model demonstrates adequate discriminant validity.

Table 5. Evaluation of measurement model

(Table 5 Here)

Evaluation of Structural Model

After establishing reliability and validity, it is necessary to evaluate the inner model. The assessment of the model's quality is based on its ability to predict the endogenous constructs (Haier et al., 2014). The evaluation criteria include the coefficient of determination (R²), and path coefficients (Haier et al., 2014). R² is a measure of the model's predictive accuracy and is used to evaluate the explained variance. In this study, the R² value of 0.44 indicates a moderate level of predictive power for the endogenous construct, as presented in Table 6.

Path coefficients Results

To estimate the hypothesized relationships between constructs, this study employ a bootstrapping technique with 5,000 samples as recommended by Hair et al. (2014). The results of the PLS-SEM model show that the innovation factor has a high positive path coefficient

value of 51.1%, while the institutional dimension has a lower but positive path coefficient of 31% in relation to BA development. These path coefficients indicate the relative importance of each factor in contributing to BA development. The total effect of each factor on BA development is summarized in Table 6, which presents the results of the structural model.

Table 6. Results of hypothesis testing using Path coefficient

(Table 6 Here)

The structural model reveals the direct effects between variables through path coefficients. The results show positive and significant relationship ($p=0.006$) between institutional dimension and BA development, supports H1. Result indicates that countries with strong institutions rely on institutional factor for BA developments, as 1 unit improvement in their institution factor can result in a 31.1% increase in their BA development. Similarly, H2 proposes significant positive relationship between innovation inputs and BA development. Results show that with a 1 unit increase in innovation factor leads to a 51.1% improvement in BA development. These findings confirm previous studies that highlight the influential role of institutions, either formal (La Porta et al., 1997; Gwartney et al., 2006; Balcerzak, 2020; Zouhaier & Karim, 2012) or cultural (Shane, 1993; Hayton et al., 2002; Li et al., 2013; Taylor & Wilson, 2012), and innovation (Lerner & Tag, 2013; Gomper & Lerner, 1999; Da Rin et al., 2006).

The Path diagram (Figure 3) summarizes the inner and outer model findings obtained by running the PLS model.

Figure 3. Structural Equation Model

Figure 3 Here

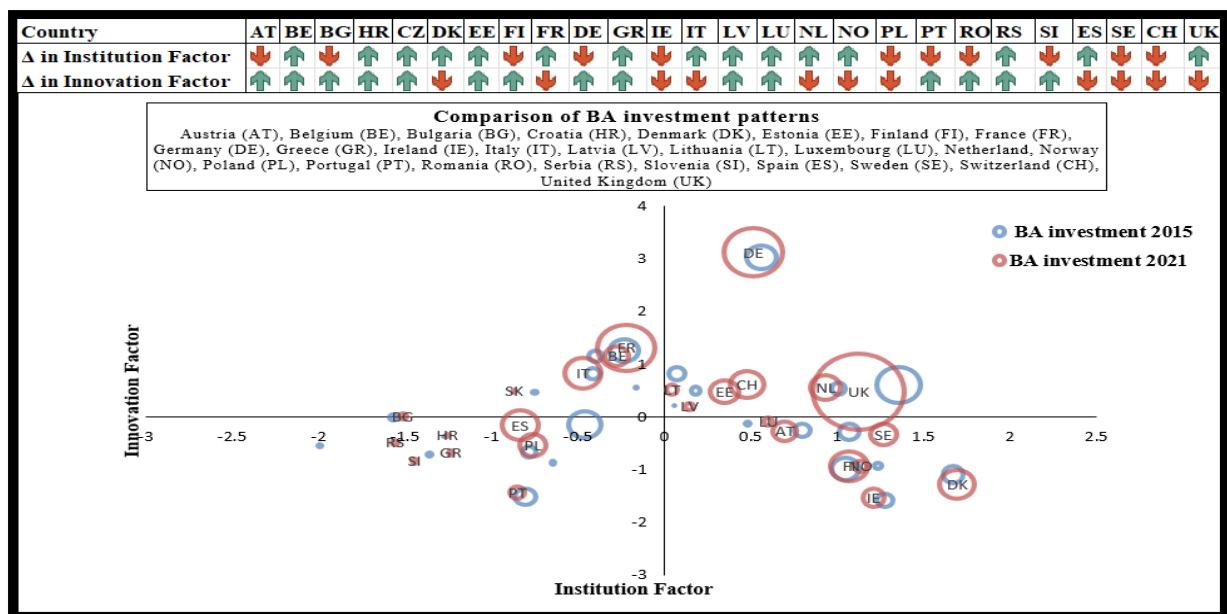
Robustness Check

- i. Comparison Analysis

Figure 4 shows comparison of BA investments across countries during year 2015 and 2021 in relation with changes in their institutional and innovation scores. According to bubble sizes, BA investments increase substantially from year 2015 to year 2021 for most of the countries due to improvement in either institutional factor or innovation factors or both. This behaviour supports our study findings that innovation inputs and institutions support the BA development. While it is also clear from the graph that countries show variations in dependence over institutional and innovation factors. Corresponding strength of institutional and innovation factors of a country form their reliance patterns, affecting the BA investment.

Apart from general patterns, it is seen that few countries (Ireland, Poland, Sweden, and Switzerland) are showing increase in BA investment despite of decrease in both factors. This anomaly is might be due to two reasons. Firstly there might be no major shift happened in institutions and innovation indicators in these countries, so that minor changes could not affect BA investments adversely. Secondly factors related to individual BAs such as personality traits, their choices and decision making styles might mitigated the negative consequences of decline in country level factors.

Figure 4 Changes in BA investments across countries during 2015 & 2021 with respect to variation in institutional and innovation factors



ii. Country Effect

It is given that the presence of outliers might influence results substantially (Sarstedt & Mooi, 2019). Keeping it in view, we confirm the results by excluding the outlier (UK), using PLS-SEM path coefficients,

Table 7 Path coefficient results (excluding outlier)

(Table 7 Here)

The results of the path coefficient confirm that institutional and innovative dimensions play a role in fostering BA development across countries. The findings remain significant and positive for the institutional dimension ($p = 0.06$) as well as for the innovation dimension ($p = 0.00$) after removing UK from the dataset. Moreover, consistency still held in results, with innovation being more influential over institutions.

Discussion

The development of BA markets is critical for the economic growth of a country, as they provide funding for entrepreneurial ecosystems. Previous studies show the relationship

between institutions, BA emergence, and investment activity development (Cumming & Zhang, 2019; Szerb et al., 2007; Scheela et al., 2015), surprisingly ignoring innovation factor. However, mostly studies have considered innovation factor and institution factor for studying VC development (Lerner & Tag, 2013; Gompers & Lerner, 1999; Li & Zahra). This lack of knowledge further poses the limit to understand the reliance patterns of countries on similar or dissimilar factors for BA development. This study address this gap, using factor analysis and the PLS-SEM model to explore inter-related indicators of institutions and innovation in 26 countries to determine the significant of proposed factors as well as to study the division of countries on these set of factors.

The graphical results show that countries rely on different factors for BA development, with some emphasizing institutions and others emphasizing innovation as a competitive edge. The reliance of countries on institutional and innovation factor confirm previous research on the importance of strong institutions, (Gwartney et al., 2006; La Porta et al., 1997; Cumming & Zhang, 2019); supportive culture (Cumming & Zhang, 2019; Szerb et al., 2007) and innovation for various kind of private investments (Groh, Liechtenstein & Lieser, 2008; Mason, Botelho & Zygmunt, 2017). With few exceptions, countries having improvement in institutions and innovation inputs have more visible BA investment in year 2021 as compared to year 2015.

The study utilized the PLS-SEM model to provide empirical evidence of the significance of institutions and innovation factors for the development of BA activities. The study's structural models confirms that the institutional dimension has a significant and positive impact on BA development. Supportive institutions can provide better minority shareholder protection, contract enforcement, and resource allocation, among others (La Porta et al., 1997; Gwartney et al., 2006; North, 1990; Balcerzak, 2020; Zouhaier, 2012; Li & Zahra, 2012). Additionally, cultural elements in the institutional dimension have a direct bearing on individual behaviours towards entrepreneurship, risk-taking, and long-term investments, (Hayton et al., 2002; Li et

al., 2013; Taylor & Wilson, 2012), leading to better BA activity development. These findings are consistent with previous studies that found institutions relevant for VCs as well as for BAs (Li & Zahra, 2012; Cumming & Zhang, 2019). However, the study also finds that innovation factor is more influential and relevant than institutional factor in BA development. Therefore, some countries in dataset (such as France, Italy) have leading position in BA markets despite of weak institutions. The innovation dimension of the study focuses on a country's long-term orientation and R&D spending patterns. Long-term orientation in societies is linked to individual motivation and the willingness to invest wealth for future gains (Des Jardine & Shi, 2021), which bring technological advancements and investment opportunities for BA. This finding is consistent with previous research that has shown that innovation increases a country's attractiveness for private investments and results in financial development such as VCs (Groh, Liechtenstein & Lieser, 2008; Gompers & Lerner, 1999; Lerner & Tag, 2013). Thus, current study confirms the importance of innovation for BA development.

Overall, the study provides evidence that both institutions and innovation play a role in fostering BA development, but in a different content. The findings suggest that innovation has a greater influence on BA development than institutions, possibly because it creates desirable investment opportunities for BA investments. However, institutions can still be a barrier to BA development, but some investors in particular country like Spain may see this as an opportunity, as they reduced transaction costs, which make investments more appealing (Scheela et al., 2012). The study highlights the need for further research, especially in light of the unusual patterns observed in some countries such as Switzerland, Norway, and Spain.

This study makes many contributions. It extends the literature on the sets of BA determinants. Additionally, it sheds light on the differences in reliance patterns of countries on institutional-innovation factors. This knowledge is crucial to identify country competitive edge and design promoting policies. On policy end, study findings may help policymakers tailor their

approaches to strengthen the most relevant factors for BA development in a given country. Lastly, in response to the call for new quantitative methodologies in BA domain (Tenca & Croce, 2018), this study is a worthy contribution of factor analysis and PLS models.

Limitations and future direction:

Our paper contributes to the BA literature by focusing on institutional and innovation composite factors and to see similarities and differences in countries' reliance patterns on these factors for BA development. Although the results successfully explain the relevance of institutions and innovation for BA development and explained the countries' divergence pattern on these two factors. However, several limitations exist. Firstly, the data on BA activity is limited to the developed territories of Europe, and only a fraction of visible BA activity is covered by EBAN reports. Future studies should strive to obtain more comprehensive data on BA activity from both developed and developing countries. Secondly, the limited focus on country level institutions and innovation factors may not provide full picture of BA development, additional research can include individual BA level factors in it. Further investigation can be made to find factors that are influencing Western Europe and Eastern Europe BA development. Finally, while this study focus on innovation inputs, future research can examine the relationship between innovation outputs and BA activity.

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Appendix 1 Data description and sources

Variables	Description	Source
BA development	Estimated amount invested by business angels in each country during year 2020	EBAN Statistics Compendium(2020)
Explanatory indicators iii) Regulatory Quality iv) Rule of Law	“It reflects perceptions of the ability of the government to formulate & implement the sound policies and regulation that permit and promote private sector development.” “It reflects perceptions of the extent to which agents have confidence and abide by the rules of society, particular the quality of contract enforcement, property rights, the police and the courts.” World Governance Indicator (WGI)	given by Kaufmann et.al, 2009 World Bank ³ WGI
i) Individualism (IDV)	Individualism focuses on the relation between the individuals. Individualistic societies involve loosely knit social relationships, emphasize self-reliance and independent action, and embrace personal challenge and individual freedom.	Hofstede (2011)
ii) Uncertainty Avoidance (UAI)	The Uncertainty Avoidance Index (UAI) reflects a society’s level of anxiety regarding the unknown and the unfamiliar.	Hofstede (2011)
iii) Power Distance (PDI)	The Power Distance Index (PDI) focuses on each society’s solution to problems resulting from social inequality and reflects the extent to which the less powerful members of a society accept the legitimacy of an unequal distribution of authority.	Hofstede (2011)

³ <https://info.worldbank.org/governance/wgi/>

Long-term orientation (LTO)	The long-term – short-term dimension reflects the connection of past, current and future actions and challenges within a society.	Hofstede (2011)
Government R&D spending (in euros)	Public budget allocation for research & development activities	Eurostat