ABSTRACT: Many scholars have highlighted the importance of economic competitiveness for entrepreneurial activity, and hence economic growth. However, few studies quantitatively analyse the interrelationship between competitiveness and its role in increasing entrepreneurial activity at various stages of development. The aim of this study is to fill this gap in the entrepreneurship literature and to study the causal relationship between the ‘pillars’ of competitiveness and the different macroeconomic effects of entrepreneurship, mediated by entrepreneurial behaviour, in a panel of 81 factor-, efficiency-, and innovation-driven countries during 2012–2017. Using a MIMIC model, the results show that innovation, higher education, and technological readiness have a positive and significant impact on the level of entrepreneurial activity in the three groups of countries. In addition, development of the financial market and market size has a positive impact on entrepreneurship in factor-driven countries. Higher education and institutional strengthening have a positive and significant impact on the level of entrepreneurship in the efficiency- and innovation-driven countries, but are not significant in factor-driven countries. Moreover, the impact of infrastructure on the level of entrepreneurial activity in the factor-, efficiency-, and innovation-driven countries is positive. Good entrepreneurial behaviour generates a simultaneous and/or medium-term favourable effect on the growth of gross domestic product, exports, imports, and employment rate. Therefore, besides immediate growth, it also assures sustainable economic and social progress in the analysed countries. Our results confirm previous findings of empirical studies in the field. These findings are consistent with received economic theory on how national context affects entrepreneurial activity.

KEY WORDS: economic competitiveness conditions; entrepreneurial behaviour; macroeconomic effects of entrepreneurship, MIMIC
1. INTRODUCTION

Competitiveness is a multidimensional concept that includes various aspects of macroeconomic indicators (price and non-price factors associated with institutions, infrastructure, and the political, social, and legal framework) and the performance of firms. There is currently widespread debate among politicians and scholars about the meaning and components of the concept of competitiveness. Bolto (1996) defines competitiveness as the ability of the economy to provide a higher standard of living. Porter (1998) argues that the only meaningful concept of competitiveness is national productivity. The World Economic Forum (WEF) used Porter’s (1998) definition to derive the Global Competitiveness Index (GEI), which is recognized as the measure of international competitiveness. According to the GEI, the keys to competitiveness are institutions, infrastructure, macroeconomic environment, primary education and health, higher education and training, goods market efficiency, labour market efficiency, financial market development, technology readiness, market size, business complexity, and innovation. These twelve ‘pillars’ are, to a certain extent, important in all economies. However, the level of entrepreneurial activity depends on the level of economic development. The World Economic Forum therefore produced the three categories of factor-driven, efficiency-driven, and innovation-driven countries. Essential requirements are very important for factor-driven countries, performance enhancers are important for developing countries at the efficiency-driven stage, and the factors of innovation and complexity affect innovation-driven countries.

In an effort to adapt to the importance of entrepreneurship, governments around the world have adopted various policies to enhance competitiveness, focusing on factors such as appropriate tax regimes, subsidies, investment, innovation, and simple business rules for small and medium businesses (Acs and Stough 2008). The ability to compete directly and indirectly affects the well-being of nations and the proper functioning of economies, and a country’s level of entrepreneurial activity can be explained by its economic growth resulting from competitiveness. However, in the existing literature on entrepreneurship, little research has been done on the direct relationship between competitiveness and entrepreneurship. Unlike previous studies, this paper uses available data for the 12 competitiveness ‘pillars’ to comprehensively examine their potential impact on economic growth, exports, imports, and employment rate in WEF member countries. The
competitiveness characteristics of countries vary depending on their stage of economic development. Thus, the main purpose of this paper is to examine the relationship between competitiveness conditions, entrepreneurial activity, and economic performance. The main questions considered are:

1. How do competitiveness conditions affect the promotion of entrepreneurial activity at different stages of the development process?
2. How does entrepreneurship contribute to economic development through employment generation, GDP growth, and imports and exports?
3. How does entrepreneurial activity affect the performance of macroeconomic indicators at different stages of the development process?

This study examines which components of competitiveness effectively engage with entrepreneurship. The results of this study can be helpful in government policymaking to stimulate entrepreneurial activity and economic performance. In addition, by knowing countries’ competitive advantage, entrepreneurs can choose and develop their businesses more effectively.

The rest of the paper is organized as follows. The second part presents the theoretical foundations of the research and explains the concept of country competitiveness and the impact of the components of competitiveness on entrepreneurial activity. The third section presents the research methodology and data. Section three provides a detailed explanation of the method and data collection. The fourth section performs the empirical analysis, and section five presents the conclusions.

2. LITERATURE AND RESEARCH HYPOTHESES

2.1 Competitiveness in economic literature

A country's competitiveness index consists of 12 pillars, divided into three groups. The first group relates to the basic requirements of institutions, infrastructure, macroeconomic stability, health, and primary education. The second group represents the factors and resources of efficiency, including higher education, product market efficiency, labour market efficiency, financial market development, technological readiness, and market size. The third group comprises innovation and business sophistication factors (WEF 2014). All of the
competitiveness pillars apply to all economies. However, given that countries are at different stages of development, these pillars affect economic performance in diverse ways. Basic requirements are very important for countries that are still in the ‘factor-driven phase. Factors affecting the enhancement and development of efficiency are important for countries that are transitioning to the ‘efficiency-driven’ stage, while the factors of innovation and sophistication affect countries at the innovation-driven stage. The Global Competitiveness Index framework is shown in Figure 1.

**Figure 1:** Global Competitiveness Index framework: the 12 pillars (source: Schwab 2013)

The twelve competitiveness pillars are divided into three groups according to specific stages of economic development, as shown in Figure 1. Each pillar contains the indexes by which the pillars are measured and ranked. Based on established economic theory, the assumption of the global competitiveness index is that in the first stage of development, economies are factor-driven. Countries at this stage of development are mainly based on unskilled labour and the economy is largely dependent on natural resources and minerals. In the second stage of development, competition depends on the proper functioning of private and public institutions. Because the country is competitive its productivity increases, wages increase at a faster pace, and countries move towards a
development-driven stage where they begin to develop an efficient production process and increase the quality of their products. Finally, moving towards the innovation stage, wages rise to a level that only innovative countries can afford to pay, and as a result a high standard of living is maintained, reaching the highest level of development of the production process through innovation and new products.

2.2 Causal variables

Pillar 1: Institutions

The institutional environment is the framework where individuals, firms, and governments interact on legal and administrative issues to generate wealth. The importance of a sound and fair institutional environment should not be underestimated. For example, given the increasing role played by the state at the international level and in many countries’ economies, a fair institutional environment is crucial for solidifying fragile recovery after a financial crisis. Entrepreneurs’ ability to exploit opportunities depends on the fairness of the institutional environment because the quality of institutions has a strong bearing on competitiveness and growth (Easterly & Levine, 1997; Barro & Sala-i-Martin 2003). It influences investment decisions and the organization of production and plays a key role in the way societies distribute the benefits and bear the costs of development strategies and policies. For example, owners of intellectual property are unwilling to invest in improvements and updating property if their rights as owners are not protected (Soto 2000). The role of institutions goes beyond the legal framework. Government attitudes toward markets, the efficiency of government operations, excessive bureaucracy (Soto & Abbot 1990), overregulation, corruption, dishonesty in dealing with public contracts, lack of transparency and trustworthiness, inability to provide appropriate services for the business sector, and politically dependent judicial systems all impose significant economic costs on businesses and slow the process of economic development (Verheul et al. 2002). This harms entrepreneurial activity and imposes a burden on future activity. Therefore, we propose the following hypothesis:

Hypothesis 1: In a competitive country there is a positive association between entrepreneurship and institutional strength.
**Pillar 2: Infrastructure**

An extensive and efficient infrastructure is critical for ensuring the effective functioning of an economy. It is an important factor in determining the location of the economic activity that helps a country’s development. A well-developed infrastructure reduces the effect of distance between regions, integrating the national market and connecting it at low cost to markets in other countries and regions. Entrepreneurs gain from a strong infrastructure as they do not need to make large investments to create the infrastructure themselves. In addition, the quality and extent of infrastructure networks significantly affect economic growth and reduce income inequalities and poverty in a variety of ways (Aschauer 1989). A well-developed transport and communications infrastructure network is a prerequisite for the access of less-developed communities to core economic activities and services, and thus provides opportunities for entrepreneurs in areas where these activities and services do not yet exist (Canning et al. 1994).

Effective modes of transport — quality roads, railroads, ports, air transport — enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs. Economies also depend on electricity supplies that are free from interruptions and shortages so that businesses and factories can work unimpeded. Finally, a solid and extensive telecommunications network allows for the rapid and free flow of information, which increases overall economic efficiency. By ensuring that businesses can communicate freely, economic actors can make decisions considering all available relevant information (Barro and Sala-i-Martin 2003). This decreases potential asymmetric information bias and increases chances for economic growth and thus the competitiveness of an economy. Therefore, the following hypothesis applies:

*Hypothesis 2: The strength of infrastructure is positively correlated with entrepreneurial activity within a country.*

**Pillar 3: Macroeconomic environment**

The stability of the macroeconomic environment is important for businesses and is significant for the overall competitiveness of a country (Fischer 1993). Although macroeconomic stability alone cannot increase the productivity of a nation, it is recognized that macroeconomic disarray harms the economy, as seen
in recent years, conspicuously in the European context (WEF 2017). Running fiscal deficits limits a government’s future ability to react to business cycles. Firms cannot operate efficiently when inflation rates are out of hand. In sum, the economy cannot grow in a sustainable manner unless the macro environment is stable. Therefore, the following hypothesis will be tested:

**Hypothesis 3:** There is a positive association between a country’s economic competitiveness and its entrepreneurial activity.

**Pillar 4: Primary education and health**

A healthy workforce is vital to a country’s competitiveness and productivity. Workers who are ill cannot function to their full potential and will be less productive. Poor health leads to significant costs for businesses, as sick workers are often absent or operate at lower levels of efficiency (WEF 2017). Investment in the provision of health services is thus critical for economic and also entrepreneurial activity (Sachs 2001). In addition to health, this pillar includes the quantity and quality of the basic education, which is increasingly important in today’s economies. Basic education increases the efficiency of each individual worker. Moreover, workers who have received little formal education often can only carry out simple manual tasks and find it difficult to adapt to more advanced production processes and techniques, and therefore they contribute less to devising or executing innovations. In other words, lack of basic education can become a constraint on business development, with firms finding it difficult to move up the value chain by producing more sophisticated or value-intensive products. This vital importance of a healthy and educated country to being competitive and successful is expected to have a positive association with entrepreneurship, as has been shown in earlier studies (Van Praag 1999). When there are programmes to provide extensive primary education and health coverage, a higher level of entrepreneurial activity can be expected. Thus, we propose the following hypothesis:

**Hypothesis 4:** The more primary education and health programmes a country has, the higher the entrepreneurial activity.
Pillar 5: Higher education and training

As seen in the fourth pillar, an educated workforce is crucial for a country’s competitiveness and productivity. Higher education and training is crucial for economies that want to move up the value chain beyond simple production processes and products (Schultz 1961; Lucas 1988; Becker 1993; Kremer 1993). Today’s globalizing economy requires countries to keep pools of well-educated workers in place who can perform complex tasks and adapt rapidly to the changing environment and the evolving needs of the production system in order for the economy to stay competitive. This pillar measures secondary and tertiary enrolment rates as well as the quality of education as evaluated by business leaders. The extent of staff training is also taken into consideration because of the importance of vocational and continuous on-the-job training for ensuring that workers’ skills are constantly upgraded, which many economies neglect. Higher quality education and a higher level of training make an economy more competitive. A more competitive workforce will have a positive correlation with entrepreneurship: when businesses have a more highly educated workforce they can grow faster, work more efficiently, and have a better chance of transforming opportunity into economic success. Reynolds, Hay, & Camp (1999) conclude that the greater a country’s investment in tertiary education, the higher the rate of new firm formation. Education – in the broadest sense – is important for stimulating entrepreneurship, for several reasons (Reynolds, Hay, & Camp 1999). First, education provides individuals with a sense of autonomy, independence, and self-confidence. These qualities are important when starting a business. Second, education makes people aware of alternative career choices. Third, education broadens horizons, thereby making people better equipped to perceive opportunities; and, finally, education provides knowledge that can be used by individuals to develop new entrepreneurial opportunities.

Based on these studies and findings for the association between entrepreneurship and higher education, we expect to find a similar positive correlation between the higher education and training pillar and entrepreneurial activity. People that are more educated will be better skilled at recognizing opportunities and making them a success, resulting in economic growth. The hypothesis that will be tested is thus:
Hypothesis 5: Higher education and training have a positive association with entrepreneurial activity.

Pillar 6: Goods market efficiency
Countries with efficient goods markets are well positioned to produce the right mix of products and services given the supply and demand conditions, as well as to ensure that these goods can be most effectively traded in the economy (WEF 2014). Healthy market competition, both domestic and foreign, is important in driving market efficiency and thus business productivity. For cultural or historical reasons, customers may be more demanding in some countries than in others. This can create an important competitive advantage, as it forces companies to be more innovative and customer-oriented, and thus imposes the discipline necessary for efficiency to be achieved in the market. Moreover, once a country is wealthier, customers look for more advanced products and thus create new opportunities for entrepreneurs. There are different views in the literature regarding the relationship between goods market efficiency and entrepreneurial activity; however, the relevance is relative to other more important factors influencing entrepreneurship and competitiveness. On the one hand, it is argued that when markets are efficient and in equilibrium, entrepreneurship is stimulated to develop new technologies, driving inefficient firms out of the market and leading to economic growth (King & Levine 1993). On the other hand, entrepreneurship succeeds when there are market imperfections and there is disequilibrium (Fischer 1993). This provides significant opportunities for the creation of radical technologies and innovative business models. We therefore propose:

Hypothesis 6: The more effective the goods market in a country, the higher the entrepreneurial activity.

Pillar 7: Labour market efficiency
Labour market efficiency and flexibility is critical for ensuring that workers are put to their most effective use in the economy, and provides incentives for workers to give their best in their jobs (WEF 2017).

Labour markets must have the flexibility to shift workers from one economic activity to another rapidly and at low cost and to allow for wage fluctuations with
minimal social disruption (Almeida & Carneiro; Kaplan 2009). The importance of the latter has been dramatically highlighted by events in Arab countries, where rigid labour markets have been an important cause of high youth unemployment. Youth unemployment continues to be high in some European countries, where important barriers to entry to the labour market remain in place.

Entrepreneurship and labour market efficiency tend to have a negative relationship (Banerjee & Newman 1993). “Because of capital market imperfections, poor agents choose working for a wage over self-employment, and wealthy agents become entrepreneurs who monitor workers. Only with sufficient inequality, however, will there be employment contracts; otherwise, there is either subsistence or self-employment” (Banerjee & Newman 1993). As argued before, entrepreneurial businesses such as start-ups might work better when employees cannot shift between jobs easily. Employees will prefer a higher wage and employment security to working for a start-up or entrepreneur when society increases in wealth in the development stage (Kaplan 2009). The expectation is thus that entrepreneurship will have a negative link to labour market efficiency and competitiveness. When employees can move more easily they might prefer established firms, so that starting entrepreneurs lose a large pool of potential workers. The hypothesis is based on this is:

**Hypothesis 7:** Labour market efficiency and entrepreneurial activity have a negative correlation.

**Pillar 8: Financial market development**

The financial crisis has highlighted the central role in economic activity of a sound and well-functioning financial sector. An efficient financial sector allocates resources saved by a nation’s citizens and resources entering the economy from abroad to their most productive uses. It channels resources to those entrepreneurial or investment projects with the highest expected rates of return, rather than to the politically connected. A thorough and proper assessment of risk is therefore a key ingredient of a sound financial market.

According to King and Levine (1993), “financial systems affect the entrepreneurial activities that lead to productivity improvements in four ways”. First, financial systems always screen prospective entrepreneurs and choose the
most promising projects. The screening process is a very complicated task, since many projects’ future cash flow is uncertain; however, this is beyond the scope of this study. Second, financial systems mobilize resources to finance promising projects. These financial resources can come from bank loans, investments from venture capitalists or business angels, money from crowd funding, or cash from friends, family, and fools. Third, financial systems allow investors to diversify the risk associated with uncertain innovative activities. Fourth, financial systems reveal the potential reward from engaging in innovation rather than continuing to make existing products with existing techniques. For entrepreneurship, better financial systems stimulate economic growth by accelerating the rate of productivity enhancement and financing. Thus, a more-developed financial system fosters productivity improvement by choosing higher quality entrepreneurs and projects, more effectively mobilizing external financing for these entrepreneurs, providing superior vehicles for diversifying the risk of innovative activities, and revealing more accurately the potentially large profits associated with the uncertain business of innovation. With regard to the above, the following hypothesis is formulated:

Hypothesis 8: The more developed the financial market in a country, the greater the entrepreneurial activity.

Pillar 9: Technological Readiness

In today’s globalized world, technology is increasingly essential for firms to compete and prosper. The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICT) in daily activities and production processes to increase efficiency and enable innovation that will lead to increased competitiveness (Aghion & Howitt 1992; Barro & Sala-i-Martin 2003). Therefore, ICT access and usage are key enablers of a country’s overall technological readiness. For entrepreneurs, access to new technologies in production process is of vital important since sunk costs are reduced and entrepreneurs can focus on their core business model. The presence of industry clusters contributes to the access to technologies and a higher level of efficiency (Gilbert et al. 2008). Aghion et al. (2005) find that the spread of technology in combination with innovation and competition results in a U-shaped figure. No previous literature specifically
studies the link between entrepreneurship and technological readiness. Following the line of reasoning that entrepreneurs can focus more on their core business model when a country is more competitive, when they are more technologically prepared they can create more growth. Entrepreneurial activity will profit from the ecosystem in a country with a high level of technological readiness. The expectation is hence that there is a positive correlation between the degree of technological readiness and entrepreneurial activity. As a result, the hypothesis is:

Hypothesis 9: Technological readiness has a positive correlation with entrepreneurial activity.

**Pillar 10: Market size**

The size of the market affects productivity: large markets allow firms to exploit economies of scale, eventually leading to lower costs and higher profits, an increase in the firm’s value, and increased growth. Traditionally, the markets available to firms have been constrained by national borders. In the era of globalization, international markets have become a substitute for domestic markets, especially for small countries. Empirical evidence shows that trade openness is positively associated with growth. Even if some recent research casts doubt on the robustness of this relationship, there is a general sense that trade has a positive effect on growth, especially for countries with small domestic markets (Sachs & Warner 1995; Frenkel & Romer 1999; Rodriguez & Rodrik, 2000; Alesina et al. 2005; Feyrer 2009). An increase in the home market size can have both positive and negative effects on firms’ profits and the decision of (potential) entrepreneurs regarding whether or not to start a new business. Positive effects also arise from pecuniary externalities of market expansion due to the home market effect, as shown by Krugman (1980). Other positive effects of an increase in the market size are that entrepreneurs recognize opportunities to create more economies of scale. When markets increase in size, the general sense is that this has a positive effect on economic growth, as described earlier. On the other hand, a negative effect stems from the pecuniary externalities of competition between firms. When market size increases, competing firms will try to eat away at each other’s market share. In addition, technological externalities of congestion diseconomies and increases in land rents and wage rates are negative effects when market size increases. For example, since there is a higher level of competition,
firms need to pay their employees more to keep them satisfied and the chance of employees transferring to competitors increases. If the positive effects outweigh the negative effects, entrepreneurs will establish a new firm in a large market and the entrepreneurial activity indicator will increase (Sato et al. 2012). This argument leads to a positive effect of size on entrepreneurship. Entrepreneurship is one of the drivers of economic growth, and when market size increases, entrepreneurial activity is likely to increase. The hypothesis is thus:

**Hypothesis 10: Market size has a positive association with entrepreneurial activity.**

**Pillar 11: Business sophistication**

Business sophistication concerns two elements that are intricately linked: the quality of a country’s overall business network and the quality of an individual firm’s operations and strategy. These factors are especially important for countries at an advanced stage of development, when the more basic sources of productivity improvement have been largely exhausted. The quality of a country’s business networks and supporting industries, as measured by the quantity and quality of local suppliers and the extent of their interaction, is important for a variety of reasons. When companies and suppliers from a particular sector are interconnected in geographically proximate groups, called clusters, efficiency is heightened. Greater opportunities for innovation in processes and products are created and barriers to entry for new firms are reduced. Individual firms’ advanced operations and strategies (branding, marketing, distribution, advanced production processes, and the production of unique and sophisticated products) spill over into the economy and lead to sophisticated and modern business processes across the country’s business sectors (WEF 2017). In this pillar the entrepreneurs’ skills and abilities are important, as well as a country’s investment climate and the quantity and quality of local partners and their interactions. Many studies have investigated the individual skills of entrepreneurs and their ability to recognize entrepreneurial opportunities and take advantage of them (Schumpeter 1942; King & Levine 1993). However, this study does not use individual skills and abilities, but focuses on the competitive advantage of business sophistication in an economy so entrepreneurial activity is more likely to thrive. Business sophistication is likely to happen in more advanced economies where productivity improvements have already been exploited; undeveloped economies are not likely to have a high level of sophistication.
Hypothesis 11: The greater the sophistication of the business sector that serves entrepreneurial activity, the greater the entrepreneurial activity.

Pillar 12: Innovation

Innovation can emerge from new technological and non-technological knowledge (WEF 2014). Non-technological innovation is closely related to the knowledge, skills, and working conditions embedded in organizations and is therefore largely covered by the eleventh pillar, which is arguably inferior to the other fundamental pillars. The final pillar of competitiveness focuses on technological innovation. Although substantial gains can be obtained by improving institutions, building infrastructure, reducing macroeconomic instability, and improving human capital, all these factors eventually run into diminishing returns (Aghion & Howitt 1992). The same is true for the efficiency of the labour, financial, and goods markets. Standards of living can be largely enhanced by technological innovation (Grossman & Helpman 1991).

Although less-advanced countries can still improve their productivity by adopting existing technologies or making incremental improvements in other areas, for those that have reached the innovation stage of development this is no longer sufficient. Firms in these countries must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an environment that is conducive to innovative activity and is supported by both the public and private sectors. The presence of high-quality scientific research institutions can generate the basic knowledge needed to build new technologies, with extensive collaboration between universities and industry in research and technological developments. The protection of intellectual property is fundamental, in addition to high levels of competition and access to venture capital and financing, as analysed in other pillars of the GCI (WEF 2017). Entrepreneurship and innovation are two concepts that are often linked together. Some people see entrepreneurs as the most innovative businesspeople in our economies. However, many innovations are generated in R&D departments. Several studies and theories have been developed and tested regarding this relationship (Schumpeter 1942; Audretsch 2005). The consensus of these studies is that there is a positive link between entrepreneurship and innovation. When an economy is very innovative, entrepreneurial activity is expected to grow. On the other hand, as
described earlier in this framework, competition and innovation leads to a U-shaped curve (Aghion et al. 2005). This tells us that competition and innovation does not have a positive association in all economies; however, the consensus remains that entrepreneurial activity and the innovation pillar are positively linked. This positive link will be tested in the regressions according to the following hypothesis:

**Hypothesis 12**: Innovation has a positive association with entrepreneurial activity.

### 2.3 Indicator variables

After considering the different factors affecting entrepreneurial activity, the multiple indicators multiple causes (MIMIC) model requires the specification of different indicators that reflect the creation of entrepreneurial opportunities.

Entrepreneurship plays a major role in national economies and is considered one of the main engines of economic growth and an important contributor to job creation and innovation. Nyström (2008) reviews empirical evidence for the effect of entrepreneurship on employment, productivity, and economic growth. There is a large theoretical and empirical literature on the relationship between competitiveness and economic growth. Existing studies on this relationship have mainly focused on one aspect of competitiveness (Harrison 1996) or on a particular region (Gardiner et al. 2006). Other studies have examined one or two dimensions of competitiveness (Petrariu et al. 2013), competition competitiveness in a particular year (Commission of Europe 2014), or competitive assessment of selected countries (Niessner 2013). Most studies have discussed the relationship between entrepreneurship and employment from a regional perspective (Fritsch et al. 2005; Fölster 2000; Acs and Armington 2004; Li et al. 2012; Nitu-Antonie and Feder 2012; Baptista and Thurik 2007). Furthermore, in recent decades, entrepreneurship has been recognized as a profound factor affecting economic growth. Many scholars (Braunerhjelm, et al. 2010; Toma, et al. 2014; Kritikos 2014; Wennekers et al. 2005; Wong et al. 2005; Van Stel et al. 2007; Acs et al. 2008, Aparicio et al. 2016; Nitu-Antonie et al. 2017) have paid considerable attention to the relationship between entrepreneurship and economic growth in general, while others (Almeida Couto et al. 2006; Zahra et al. 2006; Hessels & van Stel 2011; González-Pernía et al. 2012; González-Pernía & Peña-Legazkue 2015) have described and examined the relationship between
export-oriented entrepreneurship and economic growth. They empirically confirm that entrepreneurship has a positive impact on economic growth, and is enhanced by being orientated towards exports. Consequently, we can formulate the following hypotheses:

Hypothesis 13: The higher the level of entrepreneurial behaviour in a country, the greater the level of economic development.

Hypothesis 14: A high level of entrepreneurial behaviour in a country generates increased imports.

Hypothesis 15: A high level of entrepreneurial behaviour in a country generates increased exports.

Hypothesis 16: A high level of entrepreneurial behaviour generates an increase in the employment rate.

3. METHODOLOGY

3.1 Advantages of the MIMIC model

The structural equation model (SEM) of multiple indicators multiple causes (MIMIC) has several advantages over other statistical methods. According to Giles and Tedds (2002), the MIMIC approach is broader than most other competing methods, since it allows taking multiple indicator and causal variables into consideration at the same time. Moreover, this approach is flexible, allowing varying the choice of causal and indicator variables according to the particular features of the study, the period in question, and the availability of data. In addition, the analysis of the MIMIC model is based on the regression of latent variables onto group variables (Willse and Goodman 2008). The MIMIC model has several other advantages. One of the most important features of the MIMIC model is that a latent variable can be predicted by at least one observed variable (Woods 2009). It can also be estimated using ordinal or continuous data and data with different numbers of groups and with multiple independent continuous or categorical variables (Woods 2009). Further, it supplies information for the structural and measurement models (Muthén 1989) and does not require large sample sizes. SEM/MIMIC models lead to formal estimation and testing.
procedures, such as those based on the method of maximum likelihood. These procedures are well known and are generally ‘optimal’ if the sample is sufficiently large (Giles and Tedds 2002). Cassar (2001) argues that when compared to other methods, SEM/MIMIC models do not need restrictive assumptions to operate.

3.2 Criticism of the MIMIC model

The MIMIC method has its limitations, which are identified in the literature. The three most important points of criticism focus on the model’s implementation, the sample used, and the reliability of the estimates.

(1) The most frequent objection regards the meaning of the latent variable (e.g., Helberger and Knepel 1988; Dell’Anno 2004). The confirmatory rather than exploratory nature of this approach means that one is more likely to determine whether a certain model is valid than to ‘find’ a suitable model. Therefore, it is possible that the specified model includes potential definitions or informal economic activities other than those studied. This criticism, which is probably the most common in the literature, remains difficult to overcome as it goes back to the theoretical assumptions behind the choice of variables and empirical limitations on data availability.

(2) Helberger and Knepel (1988) argue that SEM/MIMIC model estimations lead to unstable coefficients with respect to changes in the sample size and alternative model specifications. However, Dell’Anno (2004) shows that instability disappears asymptotically as the sample size increases. Another issue is the application of SEMs to time series data, because only simple analytical tools such as q- and stem leaf plots are available to analyse the properties of the residuals.

(3) Criticism is also made with respect to the latent variable, as its unit of measurement is not observed. SEMs only provide a set of estimated coefficients from which an index can be calculated that shows the dynamics of the unobservable variable. Application of the so-called calibration or benchmarking procedure, regardless of which one is used, requires experimentation, and comparison of calibrating the values is widely debated. Unfortunately, at this stage of research it is not clear which benchmarking method is the best or the most reliable.
3.3 MIMIC Model

The MIMIC model is a special type of structural equation modelling (SEM) that is widely applied in psychometrics and social science research. The MIMIC model is a theory-based approach to confirm the influence of a set of exogenous causal variables on the latent variable (entrepreneurial activity), and the effect of entrepreneurial activity on macroeconomic indicator variables. First, it is important to establish a theoretical model explaining the relationship between the exogenous variables and the latent variable. Therefore, the MIMIC model is considered a confirmatory rather than an explanatory method. The hypothesized path of the relationships between the observed variables (economic framework condition) and the latent variable (entrepreneurial behaviour) based on our theoretical considerations is shown in Figure 2.

**Figure 2:** Hypothesized MIMIC path of research

Formally, the MIMIC model has two parts: the structural model and the measurement model. The structural model shows that the latent variable $X$ is linearly determined by a set of exogenous causal variables, which can be illustrated as follows:
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\[ \eta = \gamma \chi + \zeta \]

where \( \chi \) is a vector of causal variables, \( \gamma \) is a vector of scalars, \( \eta \) is the latent variable (entrepreneurial activity), and \( \zeta \) is a structural disturbance term. The measurement model is specified by:

\[ y = \lambda \eta + \epsilon \]

where \( y \) is a vector of indicator variables, \( \lambda \) is a vector of loading factors to represent the magnitude of the expected change for a unit change in the latent variable \( \eta \), and \( \epsilon \) is the measurement error term.

4. ESTIMATION OF THE MIMIC MODEL

After establishing a theoretical model explaining the expected relationship between the latent variable and the observed variables, as shown in Figure 1, the MIMIC model tests these theoretical considerations to test the hypothesized relationship between the latent variable and observed variables. We chose to analyse only WEF member countries due to the availability of data for at least two years, considered for each indicator. The countries in transition from stage 1 to stage 2 (15 countries) and countries in transition from stage 2 to stage 3 (20 countries) are considered. Thus, the analysed panel encompasses resource-, efficiency-, and innovation-driven countries, selected depending on their development level according to the World Economic Forum (2017), as shown in Table 1.
**Table 1:** List of countries based on WEF categories

<table>
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<tr>
<th>Innovation-driven Countries</th>
<th>Efficiency-driven Countries</th>
<th>Resource-driven Countries</th>
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<tr>
<td>Australia, Austria, Bahrain, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Italy, Japan, South Korea, Netherlands, Norway, Portugal, Qatar, Singapore, Slovenia, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, United States</td>
<td>Albania, Bosnia, Brazil, Bulgaria, China, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Indonesia, Iran, Jamaica, Jordan, Mexico, Montenegro, Morocco, Namibia, Paraguay, Peru, Russia, Serbia, South Africa, Swaziland, Thailand, Tunisia</td>
<td>Bangladesh, Benin, Burundi, Cameroon, Chad, Ethiopia, Gambia, Ghana, India, Kenya, Madagascar, Malawi, Mali, Mauritania, Moldova, Mozambique, Pakistan, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, Zambia</td>
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</tbody>
</table>

The main objective of the statistical data analysis, using STATA 14, is to evaluate the research model hypotheses – the assumptions regarding the existence or non-existence of causal relations between the constructs at aggregated panel level. Simultaneous regressions were created to estimate the equation system reflecting the mathematical description of the research model, as follows:

\[
Y_{it} = \alpha + \beta_{it} * X_{it} + \gamma_{it} * Z_{it} + \varepsilon_{it}
\]

where \( Y \) = endogenous dependent variable (increase in gross domestic product, in imports, in exports, and in employment rate), \( X \) = exogenous independent variables (institutions, infrastructure, macroeconomic environment, primary education and health, higher education and training, goods market efficiency, labour market efficiency, financial market development, technology readiness, market size, business sophistication, and innovation), \( Z \) = endogenous latent variable (entrepreneurial behaviour), \( \alpha \) = constant, \( \beta \) and \( \gamma \) = coefficients (corresponding to path analysis), \( \varepsilon \) = the error term for observed and latent
variables, \( i = 1, \ldots, N \) (number of countries in the panel), and \( t = 1, \ldots, T \) (number of years analysed in the time series). For the construction and estimation of the empirical model, specifications were introduced in the SEM Builder, and due to the limitation imposed by unavailable data, the Maximum Probability with Missing Values (MLMV) econometric method was applied.

After establishing an economic theoretical model explaining the expected relationship between the latent variable and the observed variables, as shown in Figure 2, the MIMIC model tests these theoretical considerations to confirm the hypothesized relationship between the latent variable \( \gamma \) (entrepreneurial behaviour) and its causes and indicators. The Maximum Probability with Missing Values (MLMV) econometric method was applied to estimate the parameters of the MIMIC model. In our MIMIC estimations we used annual data from 2008 to 2017 for the 97 countries in our sample. Table 2 shows the MIMIC results for factor-driven, efficiency-driven, and innovation-driven countries. In addition, it shows the results of testing Hypotheses 1–12; that is, the independent effect of different competitiveness pillars on overall entrepreneurial activity, controlling for various contextual variables. Table 2 also shows the testing of Hypotheses 13–16, that is, the effect of entrepreneurial activity on the economic performance of GDP growth, employment rate, exports, and imports in the three groups of countries.

The results of the MIMIC estimations for causal variables in Table 2 show that for factor-driven countries, Hypotheses 2, 6, and 12 are supported. Furthermore, the indicators show that ‘employment rate’ has the expected sign and is statistically significant at the 5% confidence level, supporting Hypothesis 14; while due to the unfavourable business environment in these countries the effect of the ‘competitiveness’ and ‘ease of doing business’ factors on GDP growth, imports, and exports is found to be insignificant, and thus a weak indicator of entrepreneurial behaviour. In other words, in the case of the factor-driven countries, Hypotheses 13, 15, and 16 are not supported. ‘Imports’ is also found to be insignificant and thus a weak indicator of entrepreneurial behaviour in factor-driven countries.
### Table 2: MIMIC estimation results

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAUSES</th>
<th>CAUSES</th>
<th>CAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor-driven Countries</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td>1.430</td>
<td>0.59</td>
<td>6.781</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>3.478</td>
<td>3.32</td>
<td>2.372</td>
</tr>
<tr>
<td>Macroeconomic Environment</td>
<td>0.268</td>
<td>0.75</td>
<td>3.513</td>
</tr>
<tr>
<td>Health and primary education</td>
<td>0.805</td>
<td>1.97</td>
<td>1.512</td>
</tr>
<tr>
<td>Higher Education and Training</td>
<td>0.506</td>
<td>0.59</td>
<td>2.345</td>
</tr>
<tr>
<td>Goods Market Efficiency</td>
<td>3.430</td>
<td>2.52</td>
<td>2.233</td>
</tr>
<tr>
<td>Labour Market Efficiency</td>
<td>0.883</td>
<td>0.67</td>
<td>4.039</td>
</tr>
<tr>
<td>Financial Market Development</td>
<td>3.527</td>
<td>0.48</td>
<td>2.033</td>
</tr>
<tr>
<td>Technological Readiness</td>
<td>8.095</td>
<td>0.82</td>
<td>4.172</td>
</tr>
<tr>
<td>Market Size</td>
<td>0.804</td>
<td>1.52</td>
<td>9.381</td>
</tr>
<tr>
<td>Business Sophistication</td>
<td>1.347</td>
<td>0.48</td>
<td>2.794</td>
</tr>
<tr>
<td>Innovation</td>
<td>1.363</td>
<td>2.46</td>
<td>2.345</td>
</tr>
<tr>
<td><strong>Efficiency-driven Countries</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP growth (annual %)</td>
<td>0.0149</td>
<td>1.25</td>
<td>0.0075</td>
</tr>
<tr>
<td>Employment rate (% of total labour)</td>
<td>0.0170</td>
<td>1.78</td>
<td>0.0237</td>
</tr>
<tr>
<td>Exports (% of GDP)</td>
<td>-0.0012</td>
<td>-0.75</td>
<td>0.0035</td>
</tr>
<tr>
<td>Imports (% of GDP)</td>
<td>0.0014</td>
<td>0.79</td>
<td>-0.0013</td>
</tr>
<tr>
<td><strong>Innovation-driven Countries</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GOODNESS OF FIT INDICES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi^2 (p-value)</td>
<td>12.32</td>
<td>(0.279)</td>
<td>12.45</td>
</tr>
<tr>
<td>GFI</td>
<td>0.92</td>
<td>0.93</td>
<td>0.95</td>
</tr>
<tr>
<td>CFI</td>
<td>0.913</td>
<td>0.942</td>
<td>0.921</td>
</tr>
<tr>
<td>CD</td>
<td>0.411</td>
<td>0.421</td>
<td>0.474</td>
</tr>
<tr>
<td>RMSE</td>
<td>0.019</td>
<td>0.011</td>
<td>0.015</td>
</tr>
</tbody>
</table>
In the case of efficiency-driven countries, Hypotheses 3, 4, 6, and 11 are not supported. However, all of the other hypotheses are supported; that is, they have the theoretically expected sign, which is highly statistically significant at the 1% confidence level. Furthermore, the indicators ‘GDP growth’, ‘employment’, and ‘exports’ have the expected sign and are statistically significant at the 1% confidence level, supporting Hypotheses 13, 14, and 15. In other words, in the case of efficiency-driven countries, Hypothesis 16 is not supported.

For innovation-driven countries, Hypotheses 4, 7, and 8 are not supported. The indicators ‘GDP growth’, ‘employment rate’, ‘exports’, and ‘imports’ have the expected sign and are statistically significant at the 1% confidence level; thus Hypotheses 13–16 are supported.

Finally, goodness-of-fit indices were considered to evaluate the proposed research model, as compared to the saturated model in which all the variables are correlated and to the basic model which assumes a total lack of correlation between the variables. The chi2 is within normal limits, having \( p > 0.05 \) in the case of all four specified models depending on the effect variables. The values of the root mean squared error of approximation (RMSEA) also fall within the normal limits: values less than 0.08 indicate a good model fit. A perfect fit of the Coefficient of Determination (CD) corresponds to CD=1; similarly, the CFI in the three models in table 2, tends to reach the 0.95 limit. When the Comparative Fit Index (CFI) is close to 1, it indicates a good model fit.

4.1 Discussion

The estimation results for the three groups of countries reveal the following:

The impact of ‘institutions’ on entrepreneurial activity is positive and meaningful in efficiency- and innovation-driven countries. According to the theory, the quality of institutions is closely related to competitiveness and economic growth and can play a key role in boosting economic growth by influencing investment decisions and organizing production. Despite this, the coefficient of this variable was not significant in the factor-driven countries. Inefficient government policies, excessive bureaucracy, excessive administrative formalities, excessive laws, corruption, bribery, misuse of public contracts, and lack of transparency result in significant economic costs to economic actors in factor-driven countries.
The ‘infrastructure’ variable has a positive and significant impact on economic growth in all three groups of countries. Thus, it can be argued that extensive and effective infrastructure is an important factor in determining the development of economic activity in a specific economy. Strengthening infrastructure can help entrepreneurs invest in building the necessary infrastructure for their business development. In addition, the quality and breadth of the infrastructure network has a significant effect on economic growth and affects the reduction of income inequality and poverty (Aschauer 1989).

The ‘macroeconomic environment’ has a positive and significant impact on economic growth in factor- and innovation-driven countries. Stability in the macroeconomic environment is important for business as well as for the competitiveness of a country (Fisher 1993). Although macroeconomic stability alone cannot increase national productivity, overall it can be said that an economy cannot perform well unless the macroeconomic environment is stable.

The variable ‘health and primary education’ has a positive and significant effect on entrepreneurial activity in factor-driven countries. The quantity and quality of health and primary education increase workforce efficiency and contribute to the design and implementation of innovations, which ultimately lead to an increase in the value chain through the production of more complex and high-value-added products (WEF 2014). A healthy workforce is vital for the competitiveness and productivity of any country. A weak and inadequate health system is costly for economic actors (WEF 2017).

The ‘higher education and training’ variable has a positive effect on entrepreneurial activity in both efficiency- and innovation-driven countries. An educated population is important for economic competitiveness and productivity. Higher education and training of human resources are important in order to expand the value chain beyond simple production processes (Kremer 1993; Lucas 1988).

‘Goods market efficiency’ does not affect entrepreneurial activity in the factor-driven countries, while it has a significant and positive effect on entrepreneurial activity in innovation-driven countries. Innovative economies can produce products and services in the presence of efficient goods markets in accordance with the conditions of supply and demand. In addition, in rich countries,
customers may seek higher quality products and thus create new opportunities for entrepreneurs (WEF 2014).

‘Labour market efficiency’ has a positive and meaningful effect on entrepreneurship in efficiency- and innovation-driven countries. The efficiency and flexibility of the labour market makes labour force allocation efficient. Efficient markets ensure strong incentives for employees to improve their workplace skills (WEF 2017), resulting in improved efficiency and higher economic growth.

‘Financial market development’ has a positive and significant effect on efficient entrepreneurial activity in innovation-driven countries, while its impact on economic growth in factor-driven countries is insignificant. Given the lack of developed financial markets in factor-driven countries, this result is expected. However, in developed and advanced financial markets, projects with the highest returns are always selected and there are resources to finance these projects. This reduces risk, increases returns, and results in increased investment growth and economic development.

The ‘technological readiness’ variable has a positive and significant effect on entrepreneurship in factor- and efficiency-driven countries. In advanced economies, ICT increase innovation, competition, and national productivity through daily activities and production, so the higher a country’s technological readiness, the more competitive the country and the higher the economic growth.

The ‘market size’ variable has a positive and significant effect on entrepreneurial activity in efficiency-driven countries. Market size affects productivity by creating opportunities for achieving economical economies of scale. Increased market size creates opportunities for more people and increases investment growth and economic development.

‘Business sophistication’ has a positive and significant impact on the entrepreneurship of innovation-driven countries, but the impact of this variable on entrepreneurship in factor-driven countries is insignificant. Business complexity in an economy creates a competitive advantage and improves economic growth. It is likely to occur in advanced economies where improvements in productivity have already been exploited; developing
economies do not have a high level of complexity (King and Levin 1993, Schumpeter 1942).

‘Innovation’ has a positive and significant effect and is an important factor influencing entrepreneurial activity in all three groups of countries. Significant improvements can be achieved through improving institutions, creating infrastructure, reducing instability in the macroeconomic environment, and enhancing human capital (Aghion & Howitt 1992). This is also true for the labour, financial, and commodity markets. In the long run, living standards can only be improved through technological innovation (Grossman & Helpman 1991).

5. CONCLUSIONS AND SUGGESTIONS

There is limited research on the impact of the twelve national competitiveness pillars on entrepreneurial activity. This study responds to this issue by examining how various competitiveness factors affect entrepreneurial activity, using the MIMIC estimation method to examine the relationship between national competitiveness and entrepreneurial activity for 81 countries in the three groups of factor-driven, efficiency-driven, and innovation-driven countries from 2012 to 2017. The empirical analysis applies SEM to build entrepreneurial behaviour as a latent construct based on the dimensions provided in the reference model, to assess the impact of specific components of the economic efficiency framework on stimulating entrepreneurial behaviour, and to analyse the simultaneous effects of entrepreneurial behaviour on the growth of gross domestic product, imports, exports, and employment rate.

The results of the model estimation show that the effect of the competitiveness pillars on the countries’ entrepreneurial activity is highly correlated with the countries’ degree of development. The results of this paper show that the impact on entrepreneurship of institutions and the development of financial markets was positive in the efficiency- and innovation-driven countries, while in the factor-driven countries the impact was insignificant. In addition, in the factor-driven countries the effect of financial market development and business complexity on entrepreneurship was insignificant. The impact of macroeconomic stability, infrastructure, higher education, labour market efficiency, and technological readiness on the entrepreneurial activities of efficiency- and innovation-driven
countries was positive. The effect of primary education and health on the entrepreneurial activity of the factor-driven countries was positive; the effect of market size varies depending on the growth of the economies of the affected countries; and, finally, the innovation variable has a positive effect on the entrepreneurial activity of all three groups of countries.

According to the findings of this research, the suggestions are as follows:

1. Given the importance of institutions in encouraging entrepreneurial activity, strengthening institutions in factor-driven countries may contribute to achieving higher economic growth.
2. Development of the financial market and the creation of an advanced financial system can strengthen the level of investment in factor-driven countries and lead to higher entrepreneurial activity.
3. Increasing the size of the market and its impact on prosperity and entrepreneurship requires an environment in which conditions for innovative activity are provided and supported by private and public sectors. In other words, this implies sufficient investment, especially by private research and development (R&D) departments, the existence of high-quality research institutions, and the protection of intellectual property.
4. Efficient labour and goods markets are vital for achieving higher, stable economic growth. When the labour force is highly skilled and educated, its productivity and effectiveness increases. Hence, investing in training skilled workers and in higher education is advisable.
5. The relationship between entrepreneurial activity and technological readiness is positive. In today's world, technology is increasingly necessary to improve firms’ competitiveness and success. Economies should adapt existing technologies to increase productivity in domestic industries and use ICT in daily activities and production processes to increase productivity and innovation to remain competitive.
6. Investing in health and health services is a requirement for a healthy economy. Training the workforce can lead to the development of business activity and the production of higher-value-added products and complexity, thus increasing the level of innovation and entrepreneurship.
7. One of the ultimate goals of economic policy is to achieve sustainable growth. Appropriate policy-making by government can directly influence the
business environment and physical and educational infrastructure, ultimately affecting competitiveness and thus business performance, productivity, prices, costs, and labour supply.

REFERENCES


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