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GEM research: achievements and challenges

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Abstract This article analyzes the content and evolution of research based on the Global Entrepreneurship Monitor (GEM) project. We conducted a rigorous search of articles published in journals within the Thomson Reuters' Social Sciences Citation Index® through an exploratory analysis focused on articles using GEM data. The main findings of this study reveal that the institutional approach is the most commonly used conceptual framework. Also, although there are still few academic publications using GEM data, the number of articles is increasing, as are opportunities for future research.

Keywords Global entrepreneurship monitor · GEM · Literature review · Institutional approach · Social Sciences Citation Index

JEL classification L26 · B25 · M13 · O57

1 Introduction

Given the need for endogenous development strategies for countries and regions, entrepreneurship has emerged as one of the main mechanisms for social and economic growth (Acs and Armington, 2006; van Stel et al. 2005; Wennekers and Thurik 1999; Wennekers et al. 2005). As a result, there is growing interest in several public and private initiatives for promoting entrepreneurial activity as well as in the academic community for analyzing this phenomenon further.

Seeking to provide internationally comparable data on entrepreneurial activity (Reynolds et al. 1999, 2005), researchers at Babson College (USA) and London Business School (UK) created the Global Entrepreneurship Monitor (GEM) in 1999. The purpose of the GEM project is to use empirical data to assess the level of entrepreneurial activity across countries, to understand how entrepreneurial activity varies over time, and to understand why some countries are more entrepreneurial than others. In addition, GEM researchers seek to explore the relationship between entrepreneurial activity and economic growth and identify which public policies boost entrepreneurship.

Between 1999 and 2011, approximately 1 million people were surveyed and 11,000 experts were

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interviewed in association with the GEM project.¹ In addition, the number of academic papers that use the GEM database is growing. Despite the increasing number of people using and collaborating with the GEM project, according to the Social Sciences Citation Index (SSCI),² few systematic reviews of GEM-based research can be found. However, considering the increasing scientific research using the GEM data set, it is important to provide an overview of research using GEM data and to systematize the findings in search of future research needs.

Thus, this article aims to explore the content and evolution of research based on the GEM project and to identify the topics, units of analysis, and statistical techniques used throughout these studies as well as the authors and articles with the most impact. To accomplish this objective, we conducted a search for SSCI articles that use GEM data. This study is aligned with the research of Álvarez and Urbano (2011a), Amorós et al. (2013a), Urbano et al. (2010), and Bosma (2013), which analyzes the scientific articles that use GEM databases to produce knowledge.

The structure of this article is as follows. First, we present a conceptual framework for the analysis of published research using GEM data. Second, we describe the methodology used to analyze the research and present the results of this study. Finally, we highlight the achievements of and challenges for GEM research.

2 Conceptual framework: institutional approach and new venture creation

From a general perspective, the research in the field of entrepreneurship³ has been categorized using four

broad approaches: (1) the economic approach, in which researchers emphasize aspects of economic rationality and broadly argue that new venture creation is due mainly to economic issues (Audretsch and Thurik 2001; Parker 2004; Wennekers et al. 2005; among others); (2) the psychological approach, which posits that individual factors or psychological traits determine entrepreneurial activity (Carsrud and Johnson 1989; Collins et al. 1964; McClelland 1961; among others); (3) the organizational or resource-based approach, in which scholars focus on the characteristics of the organization or specifically on the resources and capabilities of the new firm (e.g., human, physical, financial, technological, etc.) as the main determinant of the entrepreneurial process (Cooper et al. 1994; Greene and Brown 1997; Alvarez and Busenitz 2001; Ucbasaran et al. 2008; among others); and (4) the sociological or institutional approach, which argues that the socio-cultural environment determines an individual's decision to start a business (Aldrich and Zimmer 1986; Berger 1991; Busenitz et al. 2000; Manolova et al. 2008; Shapero and Sokol 1982; Steyaert and Katz 2004; among others).

This article focuses on the institutional approach. Specifically, we consider institutional economics (North 1990, 2005) because of the suitability of this approach for the analysis of environmental factors that condition new business creation (Urbano 2006; Aidis et al. 2008; Veciana and Urbano 2008; Thornton et al. 2011; Welter and Smallbone, 2011). In this context, institutional factors are the driving conditions for entrepreneurship, distinguishing between formal factors (e.g., public agencies and policies that support business startups, procedures, and costs to start a business, etc.) and informal factors (e.g., entrepreneurs' networks, entrepreneurship role models, attitudes toward entrepreneurship, etc.). To compare the results with the institutional approach, we will also consider the economic approach.

Specifically regarding entrepreneurship and environmental factors, Gnyawali and Fogel (1994) consider five dimensions that influence entrepreneurial activity: (1) government policies and procedures, (2) social and economic conditions,⁴ (3) entrepreneurial

¹ The GEM project collects three types of data: adult population surveys, national expert surveys, and standardized cross-national data.

² The SSCI is part of Thomson Reuters' Web of KnowledgeSM (formerly ISI Web of Knowledge), which is a unified research platform for finding, analyzing, and sharing information in the sciences, social sciences, arts, and humanities. More information can be found at <http://wokinfo.com/>.

³ While entrepreneurship as a discipline is relatively new, several authors have made significant theoretical and empirical contributions in recent decades: Brockhaus (1987), Busenitz et al. (2003), Bygrave and Hofer (1991), Davidsson (2003), Gartner (1985), Gnyawali and Fogel (1994), Johannisson (1988), Shane and Venkataraman (2000), Steyaert and Hjorth (2006), Verheul et al. (2002), and others.

⁴ Although Gnyawali and Fogel (1994) discuss the social and economic conditions together, we consider these conditions separately in this work in order to adapt them to the conceptual framework.

and business skills, (4) financial assistance for new ventures, and (5) non-financial assistance.

Governmental policies and procedures include governmental actions that can influence market mechanisms. These policies and procedures can help the market work more efficiently by removing market imperfections and rigid administrative regulations. Social conditions can be defined as social attitudes that are conducive to entrepreneurial activity, such as the presence of experienced entrepreneurs and successful role models. Economic conditions are related to the proportion of small businesses in a country and their dynamism, economic growth, and economic activity diversity. Entrepreneurial and business skills are the skills an individual needs to start a new company. These skills are acquired through training and education and may focus on skill improvement for business-plan development or for business management in general. Entrepreneurs also require both financial assistance (e.g., funding to launch their businesses and diversify the risk for startup, growth, and expansion) and non-financial assistance (e.g., support for market research, preparing business plans, establishing contacts, networking with other entrepreneurs, etc.).

If North's (1990, 2005) propositions and Gnyawali and Fogel's (1994) theory are intertwined, we can see that government policies and procedures, entrepreneurial and business skills, and financial and non-financial assistance are related to formal factors, while social conditions are related to informal factors (Álvarez and Urbano 2011a, b, c). Similarly, economic conditions can be addressed within the economic approach to business creation.

3 Methodology

We selected the articles considered in the literature review based on their inclusion in the SSCI Web of Knowledge. We conducted a search according to the following keywords in the title, abstract, and text of the articles: "GEM," "Global Entrepreneurship Monitor," "GEM and Entrepreneurship," and "GEM data." The search covered articles from 2000 to 2012 (we ended the search on 31 January 2012). In the first search round, we put special emphasis on the highest impact index journals

according to the Journal Citations Report⁵ (JCR) in the business and economics categories. From this search we found only two articles in the *Journal of International Business Studies*, and one article was published in the 11–20th ranked highest 5-year impact index journals in the *Journal of Management Studies*.

We also specifically searched the entrepreneurship and small business management journals included in the JCR (i.e., *Entrepreneurship & Regional Development*, *Entrepreneurship: Theory & Practice*, *International Small Business Journal*, *Journal of Business Venturing*, *Journal of Small Business Management*, *Small Business Economics*, and *Strategic Entrepreneurship Journal*⁶). These journals included 58 articles related to entrepreneurship.

Finally, we extensively searched the SSCI while restricting the search to economics, business, and other topics related to business management, which yielded another 68 articles that met the selection criteria described above. From the results, we selected articles using GEM data in their empirical sections either by drawing on the GEM database directly or by drawing on reports published by national or regional GEM teams. We included articles that presented the GEM methodology as well as introductions to special issues related to scientific research using GEM data. Likewise, we dismissed some works that only used GEM data to compare results with other investigations or to contextualize certain frameworks but did not use the data to construct empirical variables. After this selection process, 106 articles remained: 95 were strictly empirical, 5 were introductions to special

⁵ The 5-year impact factors according to JCR (up to 2011) are the following: *Academy of Management Review* (11.442), *Academy of Management Journal* (10.565), *Journal of Economic Literature* (9.243), *Quarterly Journal of Economics* (8.184), *Journal of Marketing* (7.039), *Journal of Management* (6.810), *Administrative Science Quarterly* (6.545), *Journal Finance* (6.333), *Strategic Management Journal* (6.288), and *Journal of International Business Studies* (5.245).

⁶ By rule, the Web of Knowledge only includes publications that have the journal's volume number, issue number, and page number even though some articles are "in press" on journals' web-based systems and have Digital Object Identifiers (DOI®) (for more information see <http://www.doi.org/>). For this research, we made an exception. For example, we included Springer Link's "Online First" system articles, which include several articles that use GEM data mainly from *Small Business Economics* (for more information see <http://www.springerlink.com>). Now many of them have volume and issue.

issues dedicated to the GEM project, and 6 were related to methodological issues and descriptions of the GEM project. Then, we proceeded with an exploratory study of the research topic (theoretical or empirical) and the different methodologies used (e.g., level of analysis, statistical techniques, data source). In addition, we identified the impact of these articles based on the number of citations in the SSCI, the number of authors per article, the most cited authors, and the most active author in publishing. Finally, we conducted a correspondence analysis to describe the relationship between two nominal variables (i.e., economic approach/institutional approach vs. journal, level of analysis, and statistical technique).

4 Results: research based on GEM data

4.1 Qualitative analysis

As stated above, we used the institutional approach as the conceptual framework in this article. Specifically, we classified the articles according to the environmental factors proposed by Gnyawali and Fogel (1994) in light of North's (1990, 2005) propositions. Table 1 shows the approach and topics of the analyzed articles, excluding the theoretical studies and the papers dedicated to the GEM project's methodological aspects.

This table shows that most of the empirical works are related to social conditions (45 %) followed by economic conditions (20 %), formal and informal institutional factors (14 %), entrepreneurship financial and non-financial assistance (9 %), government policies and procedures (8 %), and entrepreneurial and business skills (3 %).⁷

With regard to social conditions, 46 % are works directly related to the role of institutions. For instance, Aidis et al. (2008) explore how institutions and networks have influenced the (under-)development of entrepreneurship in Russia. Anokhin and Schulze (2009) argue that corruption undermines confidence in

institutions required to develop new businesses, and Kwon and Arenius (2010) examine the effects of social capital on the perception of entrepreneurial opportunities. Furthermore, Pinillos and Reyes (2011) analyze the relationship between cultural dimensions (i.e., individualist/collectivist orientation) and entrepreneurial activity. Tominc and Rebernik (2007) explain the factors that influence entrepreneurial activities in post-socialist countries, and Pete et al. (2011) identify the influencing factors of early stage entrepreneurial aspirations in efficiency-driven economies. Vaillant and Lafuente (2007) evaluate the impact of different institutional environments on rural versus urban entrepreneurship, and De Clercq et al. (2010) discuss the propensity of new international businesses and their relationship with the institutional environment. Other researchers, like Aidis et al. (2012) and Bjørnskov and Foss (2008), relate general institutional indicators, such as economic freedom, to entrepreneurial activity at the country level. Álvarez et al. (2010) consider both individual and societal motivations to analyze the factors that determine business consolidation in a sample of Latin American countries. In addition, Stephan and Uhlaner (2010) link cultural descriptive norms to entrepreneurship in a sample of 40 countries and identify two cultural dimensions: socially supportive culture, which relates to the supply-side variable of the entrepreneurship rate, and performance-based culture, which predicts demand-side variables, such as opportunity existence and the quality of formal institutions to support entrepreneurship. Finally, Serida and Morales (2011) apply the theory of planned behavior to understand and predict nascent entrepreneurship.

Other scholars, such as Arenius and Minniti (2005), investigate variables related to the individual decision to become an entrepreneur using sociodemographic characteristics (e.g., age, gender, education, etc.), economics (e.g., household income, employment status, etc.), and perceptual variables (e.g., opportunity recognition, fear of failure, entrepreneurial skills and abilities, etc.). Using perceptual variables, Arenius and De Clercq (2005) argue that entrepreneurship is conditioned by the perception of opportunities, which also depends on entrepreneurs' social networks. Also, Sepúlveda and Bonilla (2011) study the factors that may influence attitudes toward the risk of entrepreneurial activity and their impact on individuals' propensity to become an entrepreneur. Ramos-

⁷ Considering the strict definition of entrepreneurial and business skills Gnyawali and Fogel (1994) provide, few items can be classified in this dimension because although many studies consider the perceptions of entrepreneurial and business skills, these authors include only the formal aspects of education and training in this definition, while the perceptual aspects are included as social conditions.

Table 1 Approach and topics of the analyzed articles

Approach and topic		Articles		Author and year of publication
		No.	%	
INSTITUTIONAL APPROACH	Social conditions	43	45	Aidis et al. (2008), Álvarez et al. (2010), Álvarez-Herranz and Valencia de Lara (2011), Anokhin and Schulze (2009), Arenius and De Clercq (2005), Arenius and Ehrstedt (2008), Arenius and Kovalainen (2006), Arenius and Minniti (2005), Baughn et al. (2006), Bjørnskov and Foss (2008), Bosma and Schutjens (2011), Brixy et al. (2012), De Clercq et al. (2010), Driga et al. (2009), Fernández et al. (2009), González-Álvarez and Solís-Rodríguez (2011), Jones-Evans et al. (2011), Koellinger (2008), Koellinger and Minniti (2006), Koellinger et al. (2007, 2013), Kwon and Arenius (2010), Lafuente et al. (2007), Langowitz and Minniti (2007), Lerner and Malach-Pines (2011), Levie (2007), Martiarena (2013), Merino and Vargas (2011), Minniti and Nardone (2007), Pete et al. (2011), Pinillos and Reyes (2011), Ramos-Rodríguez et al. (2010), Ramos-Rodríguez et al. (2012), Sepúlveda and Bonilla (2011), Serida and Morales (2011), Stephan and Uhlaner (2010), Terjesen and Szerb (2008), Thompson et al. (2009), Tominc and Rebernik (2004), Tominc and Rebernik (2007), Uhlaner and Thurik (2007), Vaillant and Lafuente (2007), Wagner (2007)
	Informal factors			
INSTITUTIONAL APPROACH	Government policies and procedures	8	8	Aidis et al. (2012), Autio and Acs (2010), Du and Vertinsky (2011), Ho and Wong (2007), Levie and Autio (2011), McMullen et al. (2008), Stephen et al. (2009), van Stel et al. (2007)
	Financial and non-financial assistance	9	9	
	Entrepreneurial and business skills	3	3	
INSTITUTIONAL APPROACH	Formal and informal factors	13	14	Álvarez and Urbano (2011b, c), Amorós et al. 2013b, Bowen and De Clercq (2008), Chepurensko (2010), Danis et al. (2011), De Clercq et al. (2013), Elam and Terjesen (2010), Estrin and Mickiewicz (2011), Nissán et al. (2012), Schøtt and Jensen (2008), Terjesen and Hessels (2009), Verheul et al. (2006)
ECONOMIC APPROACH	Economic conditions	19	20	Acs and Amorós (2008b), Acs and Varga (2005), Acs et al. (2007), Bergmann and Sternberg (2007), Bosma and Schutjens (2007), De Clercq et al. (2008), Frederick and Monsen (2011), Hessels and van Stel (2011), Hessels et al. (2008), Koellinger and Minniti (2009), Larroulet and Couyoumdjian (2009), Peterson and Valliere (2008), Rocha and Sternberg (2005), Sternberg and Litzemberger (2004), Terjesen and Amorós (2010), Valliere and Peterson (2009), van Stel et al. (2005), Wennekers et al. (2005), Wong et al. (2005)
Total		95	100	

Rodríguez et al. (2012) assess the impact of certain factors (i.e., age, gender, income, perception of opportunities, fear of failure, entrepreneurial ability, role models, and business angels) on the likelihood of being entrepreneur. Koellinger (2008) uses perceptual variables to explain entrepreneurs' degree of innovation. Autio and Acs (2010) use real options logic to analyze the effect of a country's intellectual property protection regime on human and financial capital.

Then, they measure the relationship of these capitals on entrepreneurs' growth aspirations. They conclude that context is fundamental to understanding strategic entrepreneurial behaviors.

Previous articles' results have also been used in other research examining the variables related to the decision to become an entrepreneur in specific groups, such as female entrepreneurs and ethnic entrepreneurs. In terms of female entrepreneurs, Tominc and

Rebernik (2004) analyze the differences between female and male entrepreneurs in Croatia and Slovenia. Arenius and Kovalainen (2006) explore women's preferences for self-employment in Nordic countries, and Baughn et al. (2006) evaluate the impact of specific norms supporting female entrepreneurs. In addition, Verheul et al. (2006) find that entrepreneurial activity rates for men and women are influenced by the same factors and in the same direction, but that some of these factors have a differential impact on women. Also, Minniti and Nardone (2007) suggest that perceptual variables explain gender differences regarding the decision to start a business and that these differences are universal and are not conditioned by socioeconomic circumstances or context. Lango-witz and Minniti (2007) also show that perception variables are determinants of entrepreneurial activity based on gender but that women have less favorable perceptions about themselves and the environment than men. Wagner (2007) investigates which variables are related to gender differences in entrepreneurship, emphasizing fear of failure (which is higher in women) as the main reason for not starting a new business. Furthermore, Koellinger et al. (2013) find that the lower rate of female business ownership is primarily due to women's lower propensity to start businesses rather than to differences in survival rates across genders. Also, they emphasize that women are less confident in their entrepreneurial skills, have different social networks, and exhibit higher fear of failure than men. Similarly, Thompson et al. (2009) explore the characteristics of self-employed women who manage home-based businesses. González-Álvarez and Solís-Rodríguez (2011) analyze the existence of gender differences in both the discovery of opportunities and the stock of human and social capital possessed by men and women.

In terms of ethnic entrepreneurs, Koellinger and Minniti (2006) study variables related to entrepreneurship rates in black and white Americans, and Levie (2007) assesses the effect of ethnic origin on the propensity to become an entrepreneur in the UK. Finally, Jones-Evans et al. (2011) explore the entrepreneurial characteristics of Welsh speakers who live both inside and outside Welsh language clusters. They find that while fluent Welsh speakers are more likely than non-Welsh speakers to perceive opportunities for business starts and be involved in business starts in non-Welsh-speaking areas, this can be largely

explained by differences in environmental and personal characteristics.

In the dimension related to economic conditions (20 %), we found several authors who analyze the relationship between entrepreneurship and economic growth, one of the main objectives of the GEM project. For example, van Stel et al. (2005) and Wong et al. (2005) show the influence of entrepreneurship on economic growth, finding that this relationship depends more on countries' total per-capita income than on national levels of innovation. Using an econometric model, Wennekers et al. (2005) determine a U-curve relationship between economic development and the rate of entrepreneurial activity. Valliere and Peterson (2009) present an extension of the economic growth model developed by Wong et al. (2005), which reflects differences in the economic effects of entrepreneurship by opportunity and necessity in both emerging and developed countries. In addition, Acs and Amorós (2008a, b) and Larroulet and Couyoumdjian (2009) study the relationship among entrepreneurship, competitiveness, and economic growth with an emphasis on Latin America. Frederick and Monsen (2011) explain why New Zealand only exhibits a moderate level of economic development despite its high level of entrepreneurial activity, and Acs and Varga (2005) identify the relationship between variations in countries' entrepreneurial activity and agglomeration effects on the spillover of new knowledge. Furthermore, Bosma and Schutjens (2007) analyze entrepreneurship in different regions of Europe, and Rocha and Sternberg (2005) explore the impact of clusters and agglomerations on new business creation in German regions. Similarly, Acs et al. (2007) conduct a study comparing Ireland and Hungary and find significant differences in terms of entrepreneurial activity and level of development, while Hessels et al. (2008) analyze whether socioeconomic variables can explain the impact of entrepreneurial motivations. Hessels and van Stel (2011) also analyze the relationship between the prevalence of new ventures in a country and its rate of economic growth considering new ventures' export orientation. Other economic conditions studied within this line of research have been the dimension of the economy on the regional level (Naudé et al. 2008) and foreign direct investment (De Clercq et al. 2008).

With regard to formal and informal institutional factors (14 %), researchers, such as Álvarez and

Urbano (2011b), Bowen and De Clercq (2008), and De Clercq et al. (2013), analyze the relationship between institutions and entrepreneurial activity. Others, e.g., Verheul et al. (2006), focus their studies on the environmental factors that influence female entrepreneurship. Other scholars assess the environmental factors that condition entrepreneurship in specific contexts—for example, Schøtt and Jensen (2008) and Danis et al. (2011) in developed and developing countries, Terjesen and Hessels (2009) in Asia, Álvarez and Urbano (2011c) in Latin America, Amorós et al. (2013b) in Chile, Chepurensko (2010) in transition economies, and Nissan et al. (2012) in non-profit activities.

Issues related to financial assistance (9 %) have been studied by authors such as Maula et al. (2005) and Szerb et al. (2007), who focus on the determinants of informal investments and demographic and perceptual variables (e.g., age, gender, education, household income, employment status, perception of opportunities, fear of failure, and networks). Szerb et al. (2007) focus on specific countries, including Croatia, Hungary, and Slovenia. Roper and Scott (2009) analyze the impact of gender on individuals' perceptions of the difficulties of accessing funding and the decision to start a new business, showing that women perceive more financial barriers than men, which negatively affects their intentions to become entrepreneurs. Amorós et al. (2008) analyze formal and informal equity sources currently available for financing entrepreneurial activity in Chile. In addition, Levie and Lerner (2009) compare family and non-family businesses in the UK in regard to their financial and human resources. Nofsinger and Wang (2011) examine the determinants of initial startup financing for entrepreneurial firms in 27 countries, showing that institutional investors rely on entrepreneurs' experience in managing startups and the quality of investor protection to reduce moral hazard. They also highlight that informal investors are common in initial startup funding. Finally, Korosteleva and Mickiewicz (2011) investigate the determinants of startup financing, finding that financial liberalization increases the total financial size of individual startup entrepreneurial projects via the increased use of both external and personal funds.

The authors who analyze government policies and procedures (8 %) focus on the relationship between regulations and entrepreneurial activity, studying

various aspects, such as entry regulation and labor regulation (van Stel et al. 2007), enforcement practices and the regulation of working time (Stephen et al. 2009), costs to start a business (Ho and Wong 2007), and the degree of economic freedom (McMullen et al. 2008). Some of the results from this type of research indicate that regulations affect opportunity- and necessity-based entrepreneurship differently (Ho and Wong 2007; van Stel et al. 2007). In addition, Du and Vertinsky (2011) focus on the relationship between ownership structure and countries' legal systems, and Aidis et al. (2012) analyze the influence of government size, freedom from corruption, and "market freedom" (defined as a cluster of variables related to the protection of property rights and regulation) on the decision to become an entrepreneur.

With regard to entrepreneurial and business skills (3 %), De Clercq and Arenius (2006) relate the effects of individuals' possession of and exposure to knowledge on their likelihood to engage in business startup activity. Levie and Autio (2008) show the impact of formal education and entrepreneurship training on entrepreneurial activity. Finally, also using individual-level data (i.e., sociodemographic variables and perceptual variables), Hessels et al. (2011) investigate whether and how recent entrepreneurial exits relate to subsequent engagements. Their findings suggest that a recent exit decreases the probability of foregoing entrepreneurial activity, whereas it substantially increases the probability of being involved in all other engagement levels.

If we relate Gnyawali and Fogel's (1994) work to North's (1990, 2005) approach, our analysis shows that informal factors (i.e., social conditions) and formal factors (i.e., government policies and procedures, financial and non-financial assistance, and entrepreneurial and business skills) are the environmental dimensions considered in 80 % of papers, while only 20 % of the studies are based on a strictly economic approach. Thus, at least based on these preliminary results, the majority of the research in this context considers environmental factors, a fact that confirms the recent trend in the entrepreneurship literature.

With regard to the non-empirical publications, we found two theoretical articles (Álvarez and Urbano 2011a, Sautet 2013), four methodological articles (Acs et al. 2008b; Lepoutre et al. 2013, Reynolds 2008; Reynolds et al. 2005), and five introductions to special

issues (Amorós 2011; Acs and Amorós 2008a, Acs and Szerb 2007, Acs et al. 2008a, Sternberg and Wennekers 2005).

Concerning the theoretical articles, on the one hand Álvarez and Urbano (2011a) analyze the content and evolution of research based on the GEM project. On the other hand, using recent research on the mechanisms of social cooperation as well as network and firm theories, Sautet (2013) explains why entrepreneurship has a limited impact on growth in developing countries.

In the methodological articles, Reynolds et al. (2005) present and describe the GEM's conceptual model, features, and implementation from 1998 to 2003, and Acs et al. (2008b) compare GEM data with information about entrepreneurship from the World Bank (World Bank Group Entrepreneurship Survey). In addition, Reynolds (2008) analyzes the impact of variations in wording in the initial screening items (either across time in the same language or in different languages) on the final prevalence rates of entrepreneurial activity in the US. The results show that there was no statistically significant change in the prevalence of active nascent entrepreneurs over the 1998–2006 period. Based on these works, we can see that although GEM's methodology has been not undergone radical changes since the onset of the project, has included several improvements over the years, and has been reported in various Global Reports (see Bosma and Levie 2010), there are few academic papers on the methodological aspects of the GEM model and methodology. Finally, Lepoutre et al. (2013) develop a methodology to measure population-based social entrepreneurship activity (SEA) and provide insights into institutional and individual drivers of SEA.

In terms of the introductions to special issues, we found three special issues dedicated to GEM in *Small Business Economics*. The first focuses on the variation in entrepreneurial activity in developed countries (Sternberg and Wennekers 2005). The second describes advances regarding the relationship among entrepreneurial activities, economic growth, and public policies and includes both developed and transitioning countries (Acs and Szerb 2007). Finally, the third examines the relationship between economic development levels and entrepreneurship activity and includes developed, transitioning, and developing countries (Acs et al. 2008a). We found another special

issue introduction in the Chilean journal *Estudios de Economía*, in which Acs and Amorós (2008a) discuss the importance of the three stages of economic development (i.e., the factor-driven stage, the efficiency-driven stage, and the innovation-driven stage) and examine empirical evidence on the relationship between stages of economic development and entrepreneurship. Both Acs and Amorós (2008a) and Acs et al. (2008a) emphasize that there has not been much progress in theoretical studies related to GEM probably because the GEM project is in the initial phase of its “lifecycle” (relative to the production of other academic outputs). These arguments suggest that as GEM matures, there will be more publications related to it in high-impact journals, including literature reviews and articles related to extending the GEM model.⁸ Finally, the most recent special issue was published in *Academia, Revista Latinoamericana de Administración*. In the introduction of this special issue, Amorós (2011) describes the GEM project, summarizes some key indicators for the region, and analyzes specific articles' contributions, stressing the importance of systematically studying entrepreneurship in Latin America. This special issue highlights the fact that three of the five papers are in Spanish.

4.2 Quantitative analysis

As mentioned earlier in the methodology section, there are a few articles using GEM data in the SSCI top journals under the business and economics categories—for example, Bowen and De Clerc (2008) and Stephan and Uhlaner (2010) in the *Journal of International Business Studies* and Levie and Autio (2011) in the *Journal of Management Studies*. Additionally, as we will analyze in this section, there is also a relatively small number of articles in what are considered the top entrepreneurship journals, such as the *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, and the *Strategic Entrepreneurship Journal*.⁹ This might be considered an important

⁸ For more information about the evolution of the GEM model, see the GEM Global Report 2008 (Bosma et al. 2009).

⁹ The 5-year impact factors according to JCR (up to 2011) are the following: *Journal of Business Venturing* (3.849), *Entrepreneurship Theory and Practice* (3.610), *Strategic Entrepreneurship Journal* (2.803), *Entrepreneurship and Regional Development* (2.438), and *Small Business Economics* (2.287). We highlight the case of the *Strategic Entrepreneurship*

Table 2 Journals and published articles per year

Journal	2004–2006	2007–2009	2010–2012	Total	
				No	%
Academia	0	0	6	6	6
African Journal of Business Management	0	0	2	2	2
Entrepreneurship & Regional Development	1	3	0	4	4
Entrepreneurship: Theory & Practice	1	2	2	5	5
Estudios de Economía	0	5	0	5	5
European Journal of Development Research	0	0	2	2	2
European Planning Studies	1	1	0	2	2
International Business Review	0	0	2	2	2
International Small Business Journal	2	2	1	5	5
Journal of Business Venturing	0	2	1	3	3
Journal of Evolutionary Economics	0	1	1	2	2
Journal of International Business Studies	0	1	1	2	2
Regional Studies	0	1	1	2	2
Strategic Entrepreneurship Journal	0	0	1	1	1
Small Business Economics	11	19	10	40	38
Others	1	10	12	24	21
Total					
No	17	47	42	106	100
%	16	44	40	100	

opportunity for future research on GEM-based research consolidation.

There is no doubt that particular entrepreneurship journals will play key roles in driving GEM-based research, including *Small Business Economics* (38 % of the articles) followed by *Academia* (6 %), *Entrepreneurship Theory & Practice* (5 %), *Estudios de Economía* (5 %), *International Small Business Journal* (5 %), *Entrepreneurship & Regional Development* (4 %), and the *Journal of Business Venturing* (3 %). It is interesting to note that only one of the articles using the GEM data set was found in the *Journal of Small Business Management (JSBM)* even though it had an impact factor of 1.189 in 2010. In addition, the *JSBM* focuses on small business management and

entrepreneurship, so it initially seemed likely that it would include more articles using GEM data.

The results indicate that the number of articles per year is basically determined by special issues, especially those published by *Small Business Economics*. However, considering that the largest number of articles (47) was published in 2007–2009 and another 42 articles were published in 2010–2012, this indicates a growing trend in using GEM data even when special issues are not published. Importantly, although the GEM project began in 1999, the first article using GEM data was published in 2004 in *European Planning Studies*, and the first special issue using GEM data was published in *Small Business Economics* in 2005 (see Table 2).

Based on Sternberg and Wennekers' (2005) criteria and depending on the level of analysis, we classified the articles as micro if the empirical work made use of individual data from the GEM database, meso if the data referred to regions, and macro if the data related to whole countries. The results indicate that the majority of GEM-based work has focused on analyzing entrepreneurial activity from a micro (47.4 %) and

Footnote 9 continued

Journal, which was created in 2007 and has been published four times a year by the Strategic Management Society. It quickly increased its impact factor and according to JCR rankings was 29/113 (Business) and 41/166 (Management) in 2011. Also, another specific entrepreneurship journal that has recently been accepted as part of the SSCI is the *International Entrepreneurship and Management Journal* (without JCR impact yet).

Table 3 Level of analysis

Level of analysis	Article		Author and year of publication
	No.	%	
Micro (individuals)	45	47.4	Acs et al. (2007), Aidis et al. (2008), Álvarez-Herranz and Valencia de Lara (2011), Arenius and De Clercq (2005), Arenius and Kovalainen (2006), Arenius and Minniti (2005), Bergmann and Sternberg (2007), Bowen and De Clercq (2008), Brixy et al. (2012), Danis et al. (2011), De Clercq and Arenius (2006), De Clercq et al. (2010, 2013), Driga et al. (2009), Du and Vertinsky (2011), Elam and Terjesen (2010), Estrin and Mickiewicz (2011), Fernández et al. (2009), González-Álvarez and Solís-Rodríguez (2011), Hessels et al. (2011), Jones-Evans et al. (2011), Koellinger (2008), Koellinger and Minniti (2006), Koellinger et al. (2007, 2011), Kwon and Arenius (2010), Lafuente et al. (2007), Langowitz and Minniti (2007), Levie (2007), Levie and Lerner (2009), Martiarena (2013), Maula et al. (2005), Minniti and Nardone (2007), Pete et al. (2011), Ramos-Rodríguez et al. (2010, 2012), Roper and Scott (2009), Sepúlveda and Bonilla (2011), Serida and Morales (2011), Szerb et al. (2007), Terjesen and Szerb (2008), Thompson et al. (2009), Tominc and Rebernik (2007), Vaillant and Lafuente (2007), Wagner (2007)
Meso (region)	7	7.4	Amorós et al. (2013b), Bosma and Schutjens (2007), Bosma and Schutjens (2011), Jones-Evans and Thompson (2009), Naudé et al. (2008), Rocha and Sternberg (2005), Sternberg and Litzenberger (2004)
Macro (country)	43	45.3	Acs and Amorós (2008b), Acs and Varga (2005), Aidis et al. (2012), Álvarez and Urbano (2011b, c), Álvarez et al. (2010), Amorós et al. (2008), Anokhin and Schulze (2009), Arenius and Ehrstedt (2008), Autio and Acs (2010), Baughn et al. (2006), Bjørnskov and Foss (2008), Chepurensko (2010), De Clercq et al. (2008), Frederick and Monsen (2011), Hessels and van Stel (2011), Hessels et al. (2008), Ho and Wong (2007), Koellinger and Minniti (2009), Korosteleva and Mickiewicz (2011), Larroulet and Couyoumdjian (2009), Lerner and Malach-Pines (2011), Levie and Autio (2008, 2011), McMullen et al. (2008), Merino and Vargas (2011), Nissan et al. (2012), Nofsinger and Wang (2011), Peterson and Valliere (2008), Pinillos and Reyes (2011), Schött and Jensen (2008), Stephan and Uhlaner (2010), Stephen et al. (2009), Terjesen and Amorós (2010), Terjesen and Hessels (2009), Tominc and Rebernik (2004), Uhlaner and Thurik (2007), Valliere and Peterson (2009), van Stel et al. (2005, 2007), Verheul et al. (2006), Wennekers et al. (2005), Wong et al. (2005)
Total	95	100	

macro (45.3 %) perspective, while only 7.4 % has focused on the regional level (see Table 3).

As expected from the level of analysis (micro) and the nature of the GEM data (binary responses, 1/0), the statistical techniques used in the empirical studies are logit, probit, and tobit models (42 %) followed by multiple linear regression analysis associated with the macro level (29 %), panel data (13 %), and other techniques (16 %) (see Table 4). This finding highlights a recent trend of articles using the multilevel regression model. None of the articles make use of qualitative methods, a detail pointing to emerging future research.

Related to the unit of analysis, we were able to identify several types of dependent variables. The use of dependent variables in most of the articles relates to entrepreneurial activity in general (59 %) followed by papers that use indicators of entrepreneurial aspirations (14 %), (for example grow aspirations, innovation, job growth, export) and female entrepreneurship

(10 %) as dependent variables. These articles were followed by studies that use dependent variables related to economic issues, especially growth and economic development (5 %), and articles that attempt to explain perceptions of opportunities and motivations to become an entrepreneur (5 %). Finally, the remaining 7 % use a financial aspect as the dependent variable.

As already mentioned, the GEM project has two main sources of primary data: the adult population survey (APS) and the national expert survey (NES). It is interesting to note that 87 % of the articles use APS data, 3 % use the NES information, and 10 % use both information sources. Thus, it is clear that the information experts provide is an untapped resource for future publications.

Related to the number of authors and co-authors, most of the articles, 55 %, have two authors, 27 % have three authors, 10 % have four or more authors, and 9 % have a single author. Likewise, the average

Table 4 Main statistical technique used in the analyzed articles

Technique	Articles		Author and year of publication
	No	%	
Multiple regression model	28	29	Aidis et al. 2012, Anokhin and Schulze 2009, Baughn et al. 2006, Bjørnskov and Foss 2008, Chepurensko 2010, De Clercq et al. 2008, Frederick and Monsen 2011, Hessels and van Stel 2011, Hessels et al. 2008, Ho and Wong 2007, Korosteleva and Mickiewicz 2011, Levie and Autio 2008, McMullen et al. 2008, Merino and Vargas 2011, Peterson and Valliere 2008, Pinillos and Reyes 2011, Schøtt and Jensen 2008, Stephan and Uhlaner 2010, Sternberg and Litzenger 2004, Terjesen and Hessels 2009, Terjesen and Szerb 2008, Uhlaner and Thurik 2007, Valliere and Peterson 2009, van Stel et al. 2005, van Stel et al. 2007, Verheul et al. 2006, Wennekers et al. 2005, Wong et al. 2005
Logit, probit, tobit model	40	42	Aidis et al. (2008), Álvarez-Herranz and Valencia de Lara (2011), Arenius and De Clercq (2005), Arenius and Kovalainen (2006), Arenius and Minniti (2005), Bergmann and Sternberg (2007), Bowen and De Clercq (2008), Brixy, Sternberg and Stüber (2012), Danis et al. (2011), De Clercq and Arenius (2006), De Clercq et al. (2010), Driga et al. (2009), Elam and Terjesen (2010), Fernández et al. (2009), González-Álvarez and Solís-Rodríguez (2011), Hessels et al. (2011), Jones-Evans et al. (2011), Koellinger (2008), Koellinger and Minniti (2006), Koellinger et al. (2007, 2013), Kwon and Arenius (2010), Lafuente et al. (2007), Langowitz and Minniti (2007), Levie (2007), Levie and Lerner (2009), Martiarena (2013), Maula et al. (2005), Naudé et al. (2008), Nofsinger and Wang (2011), Pete et al. (2011), Ramos-Rodríguez et al. (2010, 2012), Roper and Scott (2009), Sepúlveda and Bonilla (2011), Serida and Morales (2011), Szerb et al. (2007), Thompson et al. (2009), Vaillant and Lafuente (2007), Wagner (2007)
Panel data	12	13	Acs and Amorós (2008b), Acs and Varga (2005), Álvarez and Urbano (2011c), Álvarez et al. (2010), Autio and Acs (2010), Du and Vertinsky (2011), Estrin and Mickiewicz (2011), Koellinger and Minniti (2009), Levie and Autio (2011), Rocha and Sternberg (2005), Stephen et al. (2009), Terjesen and Amorós (2010)
Others	14	16	Acs et al. (2007), Álvarez and Urbano (2011b), Amorós et al. (2008), Amorós et al. (2013b), Arenius and Ehrstedt (2008), Bosma and Schutjens (2007), Bosma and Schutjens (2011), De Clercq et al. (2013), Jones-Evans and Thompson (2009), Larroulet and Couyoumdjian (2009), Lerner and Malach-Pines (2011), Minniti and Nardone (2007), Nissan et al. (2012), Tominc and Rebernik (2004), Tominc and Rebernik (2007)
Total	95	100	

number of authors per article is 2.4. These results highlight the importance of research teams in this area of study.

To approximate the activity of national teams, we classified items according to the country from which the various authors came.¹⁰ The countries with higher number of articles are the USA (16.4 %) followed by Spain (14.1 %), The Netherlands (13.7 %), and the UK (12.5 %). Also, considering that between 2001 and 2010 a total of 82 countries participated in the GEM project, we can say that the number of countries with scientific publications is still very low. Note also that despite the high level of participation of Latin American countries in the GEM project (16 countries),

there are few publications from this region. This fact can be regarded as niche research for the Latin American scientific community (Table 5).

To analyze the impact of the articles, we use the number of total citations according to the SSCI. The results indicate that the most cited article (114 citations) is Reynolds et al. (2005), which describes GEM's methodology and project development. This work is followed by Wennekers et al. (2005) (73 citations), Arenius and Minniti (2005) (65 citations), van Stel et al. (2005) (63 citations), and Wong et al. (2005) (53 citations). Table 6 presents the most cited papers.¹¹

¹⁰ The author's country refers to the country associated with the first affiliation institution in which he/she was developing his/her scientific activity at the time of publication and not the country of origin or residence.

¹¹ After having been published for several years, the articles have a higher chance of being cited compared with more recently published articles. Therefore, an index of citations is often weighted by the number of years in which a work has been published. In this sense, this work does not consider this index because the results do not vary with respect to those presented in

Furthermore, the authors who published the most articles are Acs (eight), Arenius (seven), De Clercq (seven), Minniti (seven), Terjesen (seven), Thurik (seven), Autio (six), Hessels (six), van Stel (six), Amorós (five), Koellinger (five), and Sternberg (five) (see Table 7).

We performed a cross-cited analysis, which is useful for determining how many scholars use GEM-based research and how many of them are “outside” the group of authors who are directly involved in GEM-based paper writing. Using the information reported in Table 6, we calculated the absolute percentage of papers included in the current analysis and the percentage of papers that are non-GEM related. It is not surprising that 66 % of Reynolds et al.’s (2005) references are GEM-based articles because as we described before, this paper analyzes the foundations of GEM’s methodology and project development. Nevertheless, of the top 15 most cited articles, only 38 % of the cross-references (on average) are part of GEM-based articles. This average percentage is interesting because it illustrates that GEM research is not very “endogamic,” which highlights the fact that GEM-based research is cited by an increasing number of scholars and academics “outside” the GEM project. As a consequence, we can infer that the concepts, results, and conclusions of GEM research have been useful for an extended academic entrepreneurship community.

In addition, it is not surprising that the most cited journal in the cross-cited analysis is again *Small Business Economics* with 25 % of the references in the top 15 most cited articles. The next are *Entrepreneurship and Regional Development* (7 %), *Entrepreneurship Theory and Practice* (6 %), and the *Journal of Business Venturing* (4 %). It is interesting that two non-entrepreneurship journals—the *Journal of International Business Studies* and the *Journal of Evolutionary Economics*—have 4 % of the references, again showing that GEM-based research is increasing outside strictly entrepreneurship journals. Table 8 shows the 15 most cited journals in the cross-cited analysis.

In order to complement the graphical representations of the above results, we developed a correspondence analysis. These correspondences allow associations and similarities (Hoffman and Franke

Table 5 Countries and published articles

Country	Articles		Country	Articles	
	No	%		No	%
Argentina	2	0.8	Kuwait	1	0.4
Australia	3	1.2	Mexico	2	0.8
Belgium	3	1.2	New Zealand	1	0.4
Canada	13	5.1	Peru	2	0.8
Chile	13	5.1	Romania	6	2.3
China	2	0.8	Russia	2	0.8
Colombia	1	0.4	Singapore	4	1.6
Denmark	4	1.6	Slovenia	4	1.6
Finland	7	2.7	South Africa	2	0.8
France	1	0.4	Spain	36	14.1
Germany	16	6.3	Switzerland	8	3.1
Hong Kong	1	0.4	The Netherlands	35	13.7
Hungary	7	2.7	UK	32	12.5
Ireland	1	0.4	USA	42	16.4
Israel	4	1.6	Total	256	100
Italy	1	0.4			

The total number of articles does not match the above tables because an article can have multiple authors

1986) to become evident in publications making use of the GEM database.

As presented in the section related to the conceptual framework, this work is regarded as following an institutional approach. Nevertheless, we also consider the economic approach to new business creation for purposes of comparison. In this sense, we initially examined whether it was possible to establish a statistically significant association between the different journals and approaches (i.e., institutional/economic). However, the significance level of χ^2 indicates that the relationship is not significant. Nevertheless, it is important to note that the economic approach is mainly used by *Small Business Economics* in 12 of the 95 empirical studies. The remaining articles focus on the analysis of environmental factors.

Subsequently, we explored the relationship between the level of analysis and the approaches (i.e., institutional/economic) used. The results indicated that the χ^2 is 25.48 with six degrees of freedom and is significant at 0.00. Therefore, we concluded that there is a statistical association between the level of analysis and the focus. A graphical representation helps to visualize this relationship. Figure 1 presents the scatter diagram between the level of analysis and

Footnote 11 continued

Table 6 (since the horizon period between 2005 and 2011 is small).

Table 6 Most cited articles

No.	Author(s)	Total citations in SSCI	
		No.	%
1	Reynolds et al. (2005)	114	10
2	Wennekers et al. (2005)	73	7
3	Arenius and Minniti (2005)	65	6
4	van Stel et al. (2005)	63	6
5	Wong et al. (2005)	53	5
6	Arenius and De Clercq (2005)	44	4
7	Sternberg and Wennekers (2005)	36	3
8	Acs and Varga (2005)	36	3
9	Sternberg and Litzenberger (2004)	32	3
10	Koellinger et al. (2007)	32	3
11	van Stel et al. (2007)	31	3
12	Rocha and Sternberg (2005)	28	3
13	Roper and Scott (2009)	27	2
14	Bowen and De Clercq (2008)	24	2
15	Verheul et al. (2006)	23	2
16	Acs and Szerb (2007)	22	2
17	Langowitz and Minniti (2007)	21	2
18	Levie and Autio (2008)	19	2
19	Others	371	33
Total		1,114	100

SSCI Social Sciences Citation Index

the approaches. For each variable on the graph, the distances between the category points reflect the relationship between the categories with similar categories being closer to each other. Figure 1 shows that informal institutional factors are associated with a micro level of analysis, while formal institutional factors and economic approaches are associated with a macro level of analysis.

We also found a statistically significant association of 0.000 (χ^2 is 29.82 with nine degrees of freedom) between the statistical techniques used in the articles and the approaches (i.e., institutional/economic) used with a clear relationship between formal and informal institutional factors and logistical techniques and between the economic approach and the use of regression analysis (see Fig. 2).

Finally, Fig. 3 characterizes a tridimensional representation of the research using the highest frequency journals. If this “close-neighbor” notion confirms a clear relationship between statistical techniques, type of approaches, and level of analysis, possible future

Table 7 Authors sorted by number of publications

No.	Authors	Articles	No.	Authors	Articles
1	Acs, Zoltan	8	13	Bosma, Niels	4
2	De Clercq, Dirk	8	14	Levie, Jonathan	4
3	Arenius, Pia	7	15	Mickiewicz, Tomasz	4
4	Minniti, Maria	7	16	Szerb, Laszlo	4
5	Terjesen, Siri	7	17	Urbano, David	4
6	Thurik, Roy	7	18	Álvarez, Claudia	3
7	Autio, Erkkko	6	19	Estrin, Saul	3
8	Hessels, Jolanda	6	20	Jones-Evans, Dylan	3
9	van Stel, André	6	21	Lafuente, Esteban	3
10	Amorós, José Ernesto	5	22	Reynolds, Paul	3
11	Koellinger, Philipp	5	23	Vaillant, Yancy	3
12	Sternberg, Rolf	5			

lines of research could analyze the macro vision of the institutional approach and use GEM data to close the research gap by supplying a more detailed micro view of the economic approach.

5 Conclusions and implications

The GEM project is currently the largest study of entrepreneurial activity in the world. It started in 1999 with 10 countries and has grown to include more than 80 economies (Bosma and Levie 2010; Kelley et al. 2011). It has also managed to consolidate a team of more than 200 academics and researchers to produce annual national and regional reports, explore specific themes (e.g., female entrepreneurs, high-growth new ventures, financing new ventures, entrepreneurship education and training, social entrepreneurship, etc.), and provide access to harmonized information on entrepreneurial phenomena, thereby facilitating international comparisons. In addition, the national reports provide an important basis for the design of government policies related to enhancing entrepreneurial activity in their respective countries. Furthermore, the

Table 8 Most related journals from cross-references analysis

No.	Journal	Total citations in SSCI		
		No.	%	Accum. (%)
1	Small Business Economics	788	71	71
2	International Small Business Journal	53	5	75
3	Entrepreneurship & Regional Development	50	4	80
4	Entrepreneurship: Theory and Practice	39	4	83
5	European Planning Studies	33	3	86
6	Journal of Economic Psychology	32	3	89
7	Journal of International Business Studies	25	2	92
8	Journal of Business Venturing	25	2	94
9	Journal of Evolutionary Economics	18	2	95
10	Public Choice	7	1	96
11	Asia Pacific Journal of Management	7	1	97
12	International Business Review	6	1	97
13	Others	31	3	100
Total		1,114	100	

increased number of publications based on GEM data highlights the academic and scientific spirit of the project. As we mentioned earlier, this research is growing stronger and gradually achieving greater global legitimacy in the field of entrepreneurship.

In this article, we analyzed articles that use GEM data and were published in journals indexed by the SSCI. We noted that there were no GEM-based articles in major journals in the business and management categories, not only in journals with high SSCI impact factors, but also in journals the scholarly community considers top notch, showing a possible challenge regarding consolidating GEM research. This issue is very relevant for the academic community involved in the GEM project as there are apparent barriers in journals related to general entrepreneurship topics, specifically those using GEM data. One of the main reasons explaining this lack of articles in top journals concerns the nature and evolution of the GEM project. The GEM project includes a consortium of international teams, many of them concentrating on exploiting the data at divulged levels (e.g., national

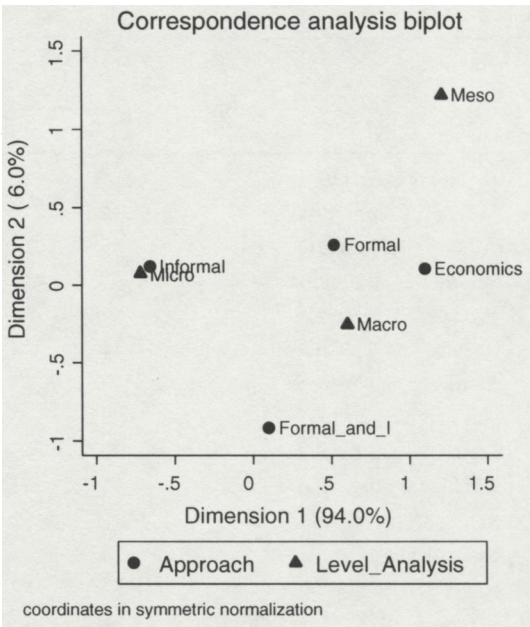


Fig. 1 Approach versus level of analysis

reports). However, only a few teams and their networks (mainly in Europe and North America) have scholarly experience publishing in top journals. If we do observe an important evolution of the project, there could be a gap in the number of GEM-related papers published in top journals. This issue can be addressed, however, by enhancing the academic prestige of GEM. The GEM project is now in its 13th year, and the richness of its data and, more importantly, its knowledge capital are truly relevant. One idea to improve the GEM project’s publication track record is creating constituted sub-consortiums of scholars with a mix of emergent young academics and senior scholars who work in cooperative ways. The GEM project is moving in this direction with some activities (e.g., doctoral workshops; higher presence at well-reputed academic conferences¹²). Additionally, the current availability of individual- and country-level data¹³ enables academics “outside” national teams to use GEM data in their research. Such researchers could use GEM data not to only increase the quantity of GEM-related publications, but also to add to the aim

¹² For example the Academy of Management in general management topics or Babson College Entrepreneurship Research Conference in particular on entrepreneurship.

¹³ GEM data are available at www.gemconsortium.org.

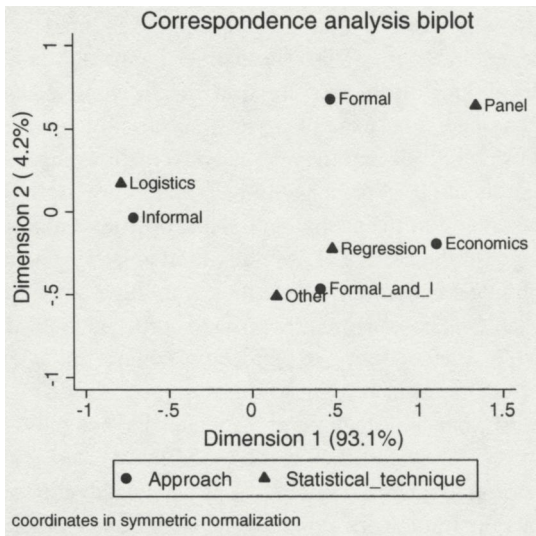
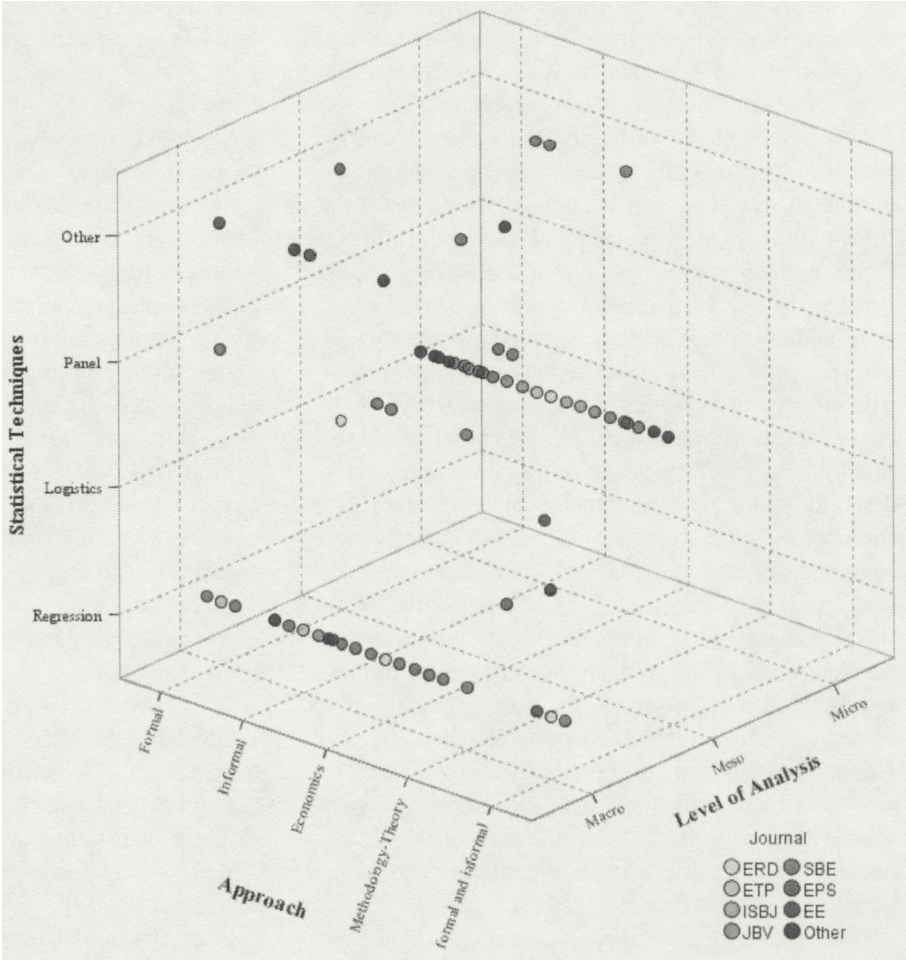


Fig. 2 Approach versus statistical technique

Fig. 3 Tridimensional representation of approach, statistical technique and level of analysis



and scope of GEM data use to create new high-quality research.

We expect that the relative lack of GEM data publications in top journals will be resolved in the coming years because of the strength and positioning developing in the academic entrepreneurship field along with the availability of data provided by the project, which is a necessary condition for developing high-quality empirical work. On the other hand, the total number of articles arising from GEM research published in SSCI journals is still small, especially considering the fact that the first data appeared in 1999. While the first publication based on these data dates from 2004, our analyses indicate that the number of articles per year is increasing.

We would also like to give special mention to the journal that stimulates the most GEM research—*Small*

Business Economics—which is characterized by a strong economic focus, as is consistent with the objective of the GEM project. However, in light of the conceptual framework used, the most investigated issue in the articles analyzed herein is related to factors regarding the institutional approach—informal factors (45 %), formal factors (20 %), and both approaches (14 %)—compared with 20 % using strictly an economic approach. Apart from the social conditions of the entrepreneurship environment, several authors also discuss governmental policies and procedures, financial assistance, and entrepreneurial and business skills. Surely, this interest is due to the impact of governments' increasing tendency to design policies to promote entrepreneurship, which requires rigorous empirical evidence for proper planning and implementation.

Holcomb et al. (2010) suggest those multilevel and cross-level models are fundamental to entrepreneurship theory development; however, little empirical evidence makes an effort to conceptualize and test theory involving relationships that cross levels and time. GEM data are clustered horizontally and across countries as well as vertically and within countries over time. Thus, this data set is appropriate for multilevel modeling and lends itself uniquely to the study of individual, organizational, and environmental factors, which combine to provide a more comprehensive analysis than any one aspect in isolation.

In addition, there are some methodological works that present the GEM model and compare their results with other measures of entrepreneurial activity. These theoretical studies are scarce, are generally represented as introductions to special issues, and are limited to a description of the project. One example of how GEM data can be used to construct both new theory and empirical evidence is the Global Entrepreneurship and Development Index (GEDI) (Acs and Szerb 2011). GEDI also uses GEM's variable classification to create three sub-indices that measure the attitudes, activities, and aspirations reflecting the dynamic interaction that drives productive entrepreneurship in a given country. This example opens up the possibility for researchers to explore further lines of research using GEM data, such as analyzing national systems of entrepreneurship—a research line that offers ample opportunity and value for policy outreach (Acs et al. 2012).

Considering the level of analysis and methodologies, 47.4 % of the analyzed papers point to a micro perspective using logistic regression techniques

compared with a macro perspective (45.3 %) from linear regressions. This macro–micro approach is also relevant for further exploration of different analysis techniques. For example, we want to highlight the applicability of multilevel analysis methods for the analysis of GEM data. Multilevel models are useful for analyzing the effects of variables that operate at multiple levels (in the case of GEM data, individual vs. country aggregates) and their interactions with other contextual variables. These techniques provide useful methods that enable researchers to explore how context influences entrepreneurship activities. These improvements in the use of statistical techniques are relevant not only for empirical evidence, but as the GEM model states, it is also important because context is part of the entrepreneurship framework conditions that ultimately define entrepreneurship dynamics (Levie and Autio, 2008). Good examples of multilevel analysis using GEM data are Autio and Acs (2010) and De Clercq et al. (2013). In this line, GEM can provide unique insights for policy makers that “design” specific entrepreneurship contexts, and the use of more sophisticated statistical techniques could provide real evidence for how context shapes individuals' propensity to be entrepreneurs.

Another line of future research is the regional analysis of entrepreneurial activity using a meso approach (only 7.4 % of the GEM-based research) to analyze entrepreneurship dynamics inside countries or macro regions in order to have a more universal understanding of the links between entrepreneurial action, attitudes, and aspirations and economic development (Bosma, 2013). Additionally, our results show a limited use of information from national experts (Amorós et al. 2013b), making this, together with the absence of qualitative work (e.g., case studies), another opportunity for research using the GEM data.

Referring to the analysis of authors and articles, as might be expected, the most cited article is the one that introduces and describes the GEM model (Reynolds et al. 2005), which is followed by the article by Wennekers et al. (2005). We believe that both articles have had a strong influence on the development of the entrepreneurship discipline, one acting as a milestone in the project and the other as a starting point for discussions related to the use of GEM data. Further, we found that the authors with the most related publications are Acs, Arenius, De Clercq, Minniti, Terjesen, Thurik, Autio, Hessels, van Stel, Amorós, Koellinger, and Sternberg.

The average number of authors per article is 2.4, indicating the prevalence of research teams over individual efforts. This aspect confirms the new research dynamic encouraging teamwork and the complementarity of members over the individualism of the past. However, the results indicate that out of the 82 countries that have participated in at least 1 year of the GEM project, only 30 have an author with at least one article, while only five (i.e., the US, Spain, The Netherlands, the UK, and Germany) account for more than 60 % of the publications. In this sense, this issue requires different national and regional teams to go beyond the implementation phase of the project and increase the scientific exploitation of the results, which could then lead to publications in high-impact journals (Urbano et al. 2010). This is a natural evolution of the GEM project that could produce not only high-quality reports, but also high-quality academic publications.

In addition, another consideration for future research, especially by the scientific community in emerging countries, could be analyzing entrepreneurship dynamics in their own cultural contexts and applying the institutional approach. For example, there is a high level of participation among Latin American countries in the GEM project but little involvement in publications (Álvarez and Urbano 2011a).

As a final conclusion, we want to underline the significant progress that has been made in the GEM research, positioning the database as one of the most significant references sources in leading high-impact entrepreneurship journals according to the JCR. Nevertheless, we acknowledge that academic progress needs to be made in the social sciences that extends beyond the field of entrepreneurship by strengthening and promoting the GEM database, especially in the high-impact JCR journals within the business and management areas.

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