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GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE

The role of entrepreneurship in stimulating economic growth in developed and developing countries

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Abstract: This paper analyses whether different measure of entrepreneurship can explain economic growth. It utilises 14 difference indicators of entrepreneurship to analyse the contribution of entrepreneurial activity, aspirations, and attitudes to Gross Domestic Product (GDP) per capita. It also examines whether the importance of entrepreneurship varies across high-income and middle/low-income countries. An unbalanced panel of 55 countries over the time period 2004–2011 is used. Fourteen different indicators of entrepreneurship are utilised and are condensed into three components using principle components analysis. Regression analysis is then used to assess whether these three different components of entrepreneurship drive economic growth. The results indicate that entrepreneurial attitudes are found to stimulate GDP per capita in high-income countries while entrepreneurial activity is found to have a negative effect in middle/low-income economies.

Subjects: Economics; Macroeconomics; Entrepreneurship

Keywords: Entrepreneurship; economic growth; developing countries

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This research is part of the group's on-going work is the area of regional economics.

PUBLIC INTEREST STATEMENT

This paper analyses whether different measure of entrepreneurship can explain economic growth. It utilises 14 difference indicators of entrepreneurship to analyse the contribution of entrepreneurial activity, aspirations and attitudes to GDP per capita. It also examines whether the importance of entrepreneurship varies across high-income and middle/low-income countries. An unbalanced panel of 55 countries over the time period 2004–2011 is used. Fourteen different indicators of entrepreneurship are utilised and are condensed into three components using principle components analysis. Regression analysis is then used to assess whether these three different components of entrepreneurship drive economic growth. The results indicate that entrepreneurial attitudes are found to stimulate GDP per capita in high-income countries, while entrepreneurial activity is found to have a negative effect in middle/low-income economies.

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1. Introduction

There is a large body of literature on entrepreneurial research at the country level that has explored issues such as the relationship between entrepreneurial activity and technological change (Ács & Varga, 2005) as well as impact of corruption on entrepreneurship (Dreher & Gassebner, 2013; Dutta & Sobel, 2016). In addition, the role of entrepreneurship in stimulating economic growth is a topic of much discussion in existing literature (Ács, 2006; Van Stel, Carree, & Thurik, 2005). The broad consensus among economists is that entrepreneurship matters for economic development and growth (Ács, Autio, & Szerb, 2014) but there is little research considering the impact of entrepreneurship on performance where the country is the unit of observation (Carree & Thurik, 2010; Van Stel et al., 2005). This persists despite the best efforts of the Global Entrepreneurship Monitor (GEM) programme. GEM is the world's leading research consortium exploring the relationship between entrepreneurship and economic growth and development (Bosma & Levie, 2010). However, as noted by Ács et al. (2014) "entrepreneurship has never received adequate treatment as a country-level phenomenon" (p. 477). The lack of empirical evidence is due in part to the problems associated with formally defining and measuring entrepreneurship (Wong, Ho, & Autio, 2005). The aim of this paper is to add to the small body of existing literature [see for example (Valliere & Peterson, 2009; Van Stel et al., 2005)] by analysing the impact of entrepreneurship on the economic growth of a selection of national economies through the use of principle component analysis and random effects regression estimations. It further investigates whether the impact of entrepreneurship is the same for developing and developed countries. Existing research finds that the stage of economic development of the nation matters when examining the impact of entrepreneurship on economic growth with distinctions drawn between developed and developing economies (Avnimelech, Zelekha, & Sharabi, 2014; Hashi & Krasniqi, 2011; Marcotte, 2014; Van Stel et al., 2005; Wong et al., 2005).

The data used in this paper covers 55 different countries over an eight-year time period, from 2004 to 2011. One of the key advantages of using GEM data is that it provides a broader measure of entrepreneurship than simply new firm creation or the number of individuals who are self-employed (two of the most commonly used proxies for entrepreneurial activity). This is important because there is a low degree of comparability across countries in terms of how self-employment is defined as well as what constitutes entry and exit of an enterprise (Ács, 2006). The data from GEM are consistently and uniformly defined across the various countries covered in the monitor. This facilitates a comparison of developed and developing countries, while at the same time allowing for a nuanced consideration of entrepreneurship.

At this point the novel elements of this analysis are highlighted. The use of GEM data allows for this paper to make two specific contributions to existing literature. Firstly, 14 different indicators of entrepreneurship from the GEM are utilised which allows the diverse elements of entrepreneurship such as entrepreneurial activity, attitudes and aspirations, to be captured. This builds on the work of other studies (Marcotte, 2013), who emphasise the need to analyse national entrepreneurship utilising measures other than new firm formations or a single index of entrepreneurial activity. The approach here allows for more nuanced measures of entrepreneurship to be used. Secondly, a distinction is made between developed and developing countries in order to analyse whether the impact of entrepreneurship differs according to a country's development status. This is made possible through the use of panel data across time on 55 different countries (reflecting different development status). Naudé (2010) notes that the area of entrepreneurship and economic growth in developing countries is an under researched topic in the field of entrepreneurial research. Our paper aims to contribute to existing knowledge through the use of a novel data-set which enables a multifaceted definition of entrepreneurship, while also allowing for a comparison of developed versus developing countries.

The results indicate that entrepreneurship is important in driving economic growth, with some forms of entrepreneurial activity being more important than others. Specifically, entrepreneurial activity (as defined by GEM) is negatively related to economic growth in middle/low-income countries,

but entrepreneurial attitudes have a significantly positive effect on GDP per capita in high-income countries.

The remainder of the paper is structured as follows. Section 2 provides an overview of the existing literature in the area. The data and methodology are described in Sections 3 and 4, respectively. Section 5 presents the results. Section 6 concludes.

2. Literature review

There are a large number of definitions of entrepreneurship which lend themselves to a variety of different means of measuring entrepreneurship (Pittaway, 2005; Wennekers, van Wennekers, Thurik, & Reynolds, 2005). Entrepreneurship was, for a long time, measured quantitatively typically through the rate of self-employment or the number of new firms created (Ács & Szerb, 2010). Indeed, it appears that the latter is an extensively used proxy for entrepreneurial activity within the existing literature (Ács & Armington, 2004; Audretsch & Fritsch, 2002; Hessels & Van Stel, 2011; Mariet Ocasio & Mariet Ocasio, 2016). While this approach may be justified because an entrepreneur will often have to establish a new firm to exploit the opportunity identified, it is not a comprehensive measure for several reasons (Baliamoune-Lutz, 2015). First, entrepreneurship can occur within existing organisations; it is not confined to new start-ups. Second, there are a myriad of reasons for starting a new business, not all of them resulting from a need to exploit a new idea. Third, the use of firm births may be an overly simplistic interpretation of entrepreneurship. Wong et al. (2005) suggest that the use of new firm start-ups as a measure of entrepreneurship has been driven by the problems associated with obtaining a measure of entrepreneurship at the national level suitable for econometric analysis, which can be used in conjunction with a measure of economic growth at a national level. Such measures include GDP, wealth or productivity for example.

Doran, McCarthy, and O'Connor (2016) note that a more nuanced measure of entrepreneurship, rather than just new firm formation, could be utilised to provide a more detailed analysis of the impact of entrepreneurship on economic growth. To overcome these limitations, the GEM's Total Early-stage Entrepreneurial Activity (TEA) ratio has become a widely used measure of entrepreneurship in recent years (Ács & Szerb, 2010). While it is useful, it is still limited to measuring the quantity of existing or nascent businesses (Ács & Szerb, 2010). Indeed, entrepreneurship is complex and multi-dimensional and the widely used existing measures of entrepreneurship, such as new venture creation or TEA, are not sufficient in capturing the full impact of entrepreneurship (Ács & Szerb, 2010).

This limitation was recognised in the most recent revision of the GEM model (Bosma, 2013). A review of the definitions of entrepreneurship highlights three major components: entrepreneurial attitudes, activity and aspirations (Bosma, Ács, Autio, Coduras, & Levie, 2009) which were subsequently included in the revision of the GEM model of entrepreneurship. Entrepreneurial attitudes reflect the general attitudes towards entrepreneurship in a country (Bosma et al., 2009). Entrepreneurial aspirations are important because they may affect the economic impact of entrepreneurial activities, if realised; they include aspirations related to innovation and business growth (Bosma et al., 2009). Finally, entrepreneurial activity typically refers to new venture creation (Bosma et al., 2009). These three dimensions of entrepreneurship are captured through the GEM. Wong et al. (2005) suggest that the GEM data have essentially filled the gap that existed in terms of defining entrepreneurship and providing a measure appropriate for analysis. This revision implies that a wider view of entrepreneurship should be used. Indeed, this is the approach adopted by (Ács & Szerb, 2010) who define entrepreneurship as a dynamic interaction of attitudes, activities and aspirations. A multi-faceted approach to studying the impact of entrepreneurship on economic growth, while accounting for a country's level of development, is adopted here. The focus moves beyond entrepreneurial activity only; it incorporates attitudes and aspirations also.

There is a wide consensus in the literature that entrepreneurship is important for economic growth (Ács, 2006; Ács & Naudé, 2011; Amorós, Fernández, & Tapia, 2012; Audretsch, 2007; Baumol & Strom, 2007; Carlsson, Acs, Audretsch, & Braunerhjelm, 2009; Hessels & Van Stel, 2011; Kourilsky,

Walstad, & Thomas, 2007; Minniti & Lévesque, 2010; Olaison & Meier Sørensen, 2014; Stam & Van Stel, 2011; Van Praag & Versloot, 2007; Van Stel et al., 2005; Wennekers & Thurik, 1999). According to Anokhin, Grichnik, and Hisrich (2008), "Entrepreneurship is the main vehicle of economic development" (p. 117), while Holcombe (1998) refers to it as "the engine of economic growth" (p. 60). Entrepreneurship can affect economic growth in a number of ways. These can include knowledge spillovers, increased competition and increased diversity in terms of the product and service offering available (Audretsch & Keilbach, 2004). Further mechanisms include the creation of jobs, the introduction of new innovations and productivity enhancements (Ács, 2006; Van Praag & Versloot, 2007; Van Stel et al., 2005; Wong et al., 2005). They further suggest that entrepreneurs have a role to play in improving knowledge regarding the viability of new innovations as well as assisting in identifying consumer preferences by bring new varieties of exisiting products and services to the market. Fritsch (2008) identifies several further mechanisms through which entrepreneurship can positively affect economic growth. Entrepreneurs can (i) force efficiency upon existing businesses through contesting existing market positions, (ii) accelerate the pace of creative destruction, whereby new firms drive industrial change by replacing existing businesses, (iii) stimulate the rate of innovation in industries resulting in the opening of new markets and (iv) provide a greater variety of new products, services and processes than would be available from existing firms (Fritsch, 2008).

The impact of entrepreneurship on an economy's growth varies according to its stage of economic development (Bosma et al., 2009; Ferreira, Fayolle, Fernandes, & Raposo, 2017; Gries & Naudé, 2010; Sternberg & Wennekers, 2005; Wennekers et al., 2005). Existing research indicates that the effect of entrepreneurship on economic growth may not be consistent in developing and developed countries (Sternberg & Wennekers, 2005; Valliere & Peterson, 2009). Ferreira et al. (2017) find that the importance of entrepreneurship depends on a country's stage of economic development.

However, the empirical evidence does not present conclusive evidence. While some studies find that the effect of entrepreneurial activity on economic growth is positive or greater in highly developed countries compared to developing economies (Sternberg & Wennekers, 2005; Van Stel et al., 2005), others find that entrepreneurship does not directly affect economic growth in high-income countries but does in poor countries (Stam, Hartog, Van Stel, & Thurik, 2011).

3. Data

The data for GDP, capital stock, population and human capital are derived from the Penn World Tables (Heston, Summers, & Aten, 2011), while the entrepreneurial indicators are derived from the Global Entrepreneurship Monitor (GEM, 2015). Real GDP is at constant national prices (in mil. 2011US$), Capital stock is at constant national prices (in mil. 2011US$), human capital is the standard Penn World Tables measure which is an index of human capital per person, based on years of schooling and returns to education.

The GEM programme aims to gather data on entrepreneurship at a national level, covering both developed and developing countries, providing a comparable measure of entrepreneurship. This is important because there is a low degree of comparability across counties in terms of how self-employment is defined as well as what constitutes entry and exit of an enterprise (Ács, 2006). Thus, a key advantage of the GEM data is the consistent and uniform definitions applied across countries, which aids comparability. Wong et al. (2005) suggest that the GEM data have essentially filled the gap that existed in terms of defining entrepreneurship and providing a measure appropriate for analysis. The Total Early-Stage Entrepreneurial Activity (TEA) indicator has been the most frequently used by researchers, with other GEM indicators being used less frequently (Marcotte, 2014). The TEA indicator captures the proportion of individuals involved in establishing a business (nascent entrepreneurs) or owner/manager of a new business. However, GEM provides data on a multitude of entrepreneurial variables allowing for a more in-depth study of entrepreneurship, discussed in the next section.

Table 1. Summary and definitions of variables

Variable	Short definition
Entrepreneurial activity	
Established business ownership rate	Percentage of 18–64 population who are currently owner-manager of an established business for more than 2.5 years
Informal investors rate	Percentage of 18–64 population who have personally provided funds for a new business started by someone else in the past 3 years
Nascent entrepreneurship rate	Percentage 18–64 population who are currently a nascent entrepreneur
New Business Ownership Rate	Percentage of 18–64 population who are currently owner-manager of a new business for less than 2.5 years
Total early stage entrepreneurial activity	Percentage of 18–64 population who are either a nascent entrepreneur or owner-manager of a new business
Necessity driven entrepreneurial activity	Percentage of those involved in TEA who are involved in entrepreneurship because they had no other option for work
Entrepreneurial aspiration	
Growth expectations early stage entrepreneurial activity	Percentage of total early stage entrepreneurs who expect to employ at least five employees in five years time
New product early stage entrepreneurial activity	Percentage of total early stage entrepreneurs who indicate that their product or service is new to at least some customers
International orientation early stage entrepreneurial activity	Percentage of total early stage entrepreneurs who indicate that at least 25% of the customers come from other countries
Entrepreneurial attitudes	
Entrepreneurial intention	Percentage of 18–64 population who intend to start a business within three years
Fear of failure rate	Percentage of 18–64 population with positive perceived opportunities who indicate that fear of failure would prevent them from setting up a business
Know start-up entrepreneur rate	Percentage of 18–64 population who know someone who started a business in the past two years
Perceived capabilities	Percentage of 18–64 population who believe to have the required skills and knowledge to start a business
Perceived opportunities	Percentage of 18–64 population who see good opportunities to start a firm in the area where they live

Note: Full definitions available from http://www.gemconsortium.org/data/key-indicators.

3.1. Entrepreneurship data and PCA

Table 1 presents a list of the 14 entrepreneurship variables considered as well as their definitions. A very high degree of correlation among the 14 entrepreneurship variables is noted. Therefore, to avoid possible multicollinearity issues of entering all of these variables into the model, principle components analysis (PCA) is used to combine the variables into a reduced number of principle components for inclusion in the analysis. Furthermore, the exclusion of any variables is not desirable as they all may contain pertinent information which could explain economic growth. Using PCA, as much of the original explanatory power of the data as possible is retained, while avoiding the problem of multicollinearity. The PCA approach is described in the following paragraphs and generates three components which are termed (i) entrepreneurial activity, (ii) entrepreneurial aspirations and (iii) entrepreneurial attitudes.

Table 2. Principle components analysis of variables

Component and composite variables	Scoring coefficients
Entrepreneurial activity	
Established business ownership rate	0.3882
Informal investors rate	0.364
Nascent entrepreneurship rate	0.4247
Necessity driven entrepreneurial activity	0.2396
New business ownership rate	0.4782
Total early stage entrepreneurial activity	0.5003
Entrepreneurial aspiration	
Growth expectations early stage entrepreneurial activity	0.6722
New product early stage entrepreneurial activity	0.5909
International orientation early stage entrepreneurial activity	0.446
Entrepreneurial attitudes	
Entrepreneurial intention	0.4655
Fear of failure rate	−0.2815
Know start-up entrepreneur rate	0.438
Perceived capabilities	0.5206
Perceived opportunities	0.4911

Notes: In total one PC is retained for each of the three entrepreneurship categories. The decision to retain only one for each category is made as the Eigenvalue exceeds one only for the first principle component in each category.

The starting point of the PCA is a pre-grouping of variables based on theory and on the GEM's definitions of the variables. This yields three groupings of variables: *Entrepreneurial Activity*, *Entrepreneurial Aspirations* and *Entrepreneurial Attitude*. Each captures different aspects of entrepreneurship and, using the GEM data, is measured by a combination of between three and six separate variables. PCA is applied to the variables within each of these three categories.

The results of the PCA are displayed in Table 2. When generating the principle components, components with Eigenvalues in excess of 1 are retained (excluding the remainder with Eigenvalues less than (1), as is standard in the literature (Srholec, 2010). The component retained in the *Entrepreneurial Activity* category suggests that countries reporting higher levels of Established Business Ownership Rates, Informal Investors Rates, Nascent Entrepreneurship Rates, Necessity Driven Entrepreneurial Activity, New Business Ownership Rates and Total Early Stage Entrepreneurial Activity have a higher *Entrepreneurial Activity* value, as each of these variables contribute positively to this component. Likewise, higher values for the Growth Expectations Early Stage Entrepreneurial Activity, New Product Early Stage Entrepreneurial Activity and International Orientation Early Stage Entrepreneurial Activity increase a country's *Entrepreneurial Aspiration* score. Finally, countries receive higher scores for *Entrepreneurial Attitudes* when scores for Entrepreneurial Intention, Know Start-up Entrepreneur Rate, Perceived Capabilities and Perceived Opportunities are high but the score for the Fear of Failure Rate is low.

These three components, which are to be included in the model, make intrinsic sense and appear to capture three very different facets of entrepreneurship. The first, *Entrepreneurial Activity*, relates to the actual level of entrepreneurial activity prevalent in an economy. The second, *Entrepreneurial Aspirations*, includes perceived growth opportunities, innovation and internationalisation among existing entrepreneurs. The final indicator, *Entrepreneurial Attitudes*, refers to how individuals view entrepreneurship and whether it is a desirable path.

3.2. Other data sources

Data on the income status of each country are obtained from the World Bank (2015). Using income per capita the World Bank divides countries into four categories: low-income economies ($1,045 or less), lower middle-income economies ($1,046 to $4,125), upper middle-income economies ($4,126 to $12,735) and high-income economies ($12,736 or more). Given the available data, a distinction is made between high-income economies and the remaining categories which are grouped as middle to low-income economies. The rationale for this is that the GEM does not include an adequate number of countries in the lower income bands to provide sufficient degrees of freedom to be satisfied that the results of splitting the sample by four categories is statistically robust.

4. Methodology

The model specified relates entrepreneurship to economic growth, while controlling for country-specific factors, which may impact growth. We adopt a growth accounting framework for our analysis. This is presented in Equation (1).

$$ln\left(\frac{Y_{it}}{N_{it}}\right) = ln(A_{it}) + \alpha_1 ln\left(\frac{K_{it}}{N_{it}}\right) + \alpha_2 ln(H_{it}) + \alpha_3 ln\left(\frac{L_{it}}{N_{it}}\right) \quad (1)$$

$$ln(A_{it}) = \alpha_0 + \varphi E_{it} + \varepsilon_{it} \quad (2)$$

where i represents country i ... N and t represents time period 1 ... T. $ln\left(\frac{Y_{it}}{N_{it}}\right)$ represents the natural logarithm of real GDP per capita. E_{it} is a 3*(N*T) matrix of entrepreneurial indicators (described in Section 3) with φ as the associated vector of coefficients. $ln\left(\frac{K_{it}}{N_{it}}\right)$ is the natural logarithm of capital stock per capita, $ln\left(\frac{L_{it}}{N_{it}}\right)$ is the natural logarithm of employment per capita (i.e. the employment rate), $ln(H_{it})$ is the natural logarithm of human capital (note that this variable from Penn World Tables is already in per capita terms and therefore, in our case is not divided by N_{it} in Equation (1)), ε_{it} is the error term, and the α values are coefficients.

Equation (1) enables an analysis of the impact of entrepreneurship on economic growth. As noted, there are three alternative measures of entrepreneurship: entrepreneurial activity, entrepreneurial aspirations and entrepreneurial attitudes. These indicators of entrepreneurship are expected to have a positive impact on the economic growth of the panel of countries. However, the impact of each measure may not be uniform. Previous research indicates that different measures of entrepreneurial activity impact economic growth differently (Marcotte, 2013).

Furthermore, as emphasised by Van Stel et al. (2005), the development status of a country may impact the relationship between entrepreneurship and economic growth. We define two groups for development status high-income countries and middle/low-income countries as defined by the World Bank (2015). We re-estimate our Equations (1) and (2) dividing our data into these two categories giving two additional sets of results which allow us to identify whether the effect of entrepreneurial activity differs for high-income countries and developing countries.

As this is an unbalanced panel, the model is estimated using panel econometric techniques, utilising random effects over fixed effects. In order to ensure the robustness of the use of random effects, our models are estimated using fixed effects and random effects and the coefficients are compared using a Hausman test. The null hypothesis of the Hausman test is that the difference in coefficients is not systematic and in all cases this cannot be rejected. This suggests that the use of random effects is appropriate.

We note that ideally in Equation (2) the entrepreneurial indicators would be lagged one time period. This would act as a countermeasure for possible endogeneity between GDP and our entrepreneurial indicators. However, due to the unbalanced nature of our data (see Appendix 1 for more details) it is not possible to include a lag in our analysis. As a result when discussing our results we note the presence of associations between our indicators, and are cautious in discussing causal relationships.

5. Results

Table 3 presents the results of the random effects estimations of our models. The first results column shows the results for the full sample. The second column shows the results of the estimation for high-income countries and the third column shows the results of the estimation for the middle/low-income sample.

Starting with the results of the full sample, when considering entrepreneurship, it should be noted that two of the three indicators are significant (one positive and one negative). Higher levels of entrepreneurial attitudes have a significant positive effect on GDP per capita. However, entrepreneurial activity has a negative effect on GDP per capita. When progressing to the analysis of the

Table 3. Results

	Full sample	High-income	Middle/low-income
$ln\left(\frac{K_{it}}{N_{it}}\right)$	0.6677**	0.3368**	0.6258**
	(0.0303)	(0.0697)	(0.0434)
$ln(H_{it})$	0.7878**	0.2435	0.9554**
	(0.1787)	(0.2491)	(0.2419)
$ln\left(\frac{L_{it}}{N_{it}}\right)$	0.4992**	0.6960**	0.2397**
	(0.0778)	(0.0996)	(0.1071)
Entrepreneurial activity	−0.0219**	−0.0128	−0.0169**
	(0.0047)	(0.0092)	(0.0055)
Entrepreneurial aspirations	−0.0075	−0.0025	−0.0078
	(0.0047)	(0.0053)	(0.0065)
Entrepreneurial attitudes	0.0136**	0.0221**	−0.0041
	(0.0056)	(0.0066)	(0.0082)
Constant	2.1177**	6.7155**	2.0443**
	(0.2637)	(0.8159)	(0.3620)
Year dummies			
2004	0.0173	0.0193**	0.0415*
	(0.0132)	(0.0113)	(0.0246)
2005	0.0182	0.0067	0.0921**
	(0.0131)	(0.0125)	(0.0233)
2006	0.0262**	0.0215	0.1117**
	(0.0131)	(0.0137)	(0.0230)
2007	0.0425**	0.0518**	0.1256**
	(0.0138)	(0.0149)	(0.0249)
2008	0.0434**	0.0529**	0.1360**
	(0.0138)	(0.0166)	(0.0243)
2009	0.0078	0.0178	0.0959**
	(0.0133)	(0.0164)	(0.0230)
2010	0.0128	0.0380	0.1135**
	(0.0139)	(0.0172)	(0.0252)
2011	0.0414**	0.0614**	0.1392**
	(0.0139)	(0.0183)	(0.0245)
Obs	271	180	191
R^2	0.9320	0.5333	0.8979

Notes: The coefficients for the three entrepreneurship variables show the impact of a one standard deviation change in the variable on the log of GDP per capita.

*Indicate significance at the 10% level.

**Indicate significance at the 1% level.

high-income countries and the middle/low-income countries, it becomes apparent that this result is being driven by a positive effect of entrepreneurial attitudes in high-income countries and a negative effect of entrepreneurial activity in middle/low-income countries. This suggests that the role of entrepreneurship in determining GDP per capita differs depending on the development stage of an economy.

To gain an insight into the meaning of these results we must return to the composition of these two variables. Beginning with entrepreneurial attitudes, these relate to the perceptions and possibilities for future entrepreneurial activity. These variables in our case relate to individuals' perceived entrepreneurial intention, capabilities to start their own business, perspectives on the opportunities of starting their own business and their knowledge of other entrepreneurs. This finding is not unique. In a large-scale study of individuals in 28 countries Arenius and Minniti (2005) find that perceptual variables are important in explaining an individual's decision to become an entrepreneur. They find that an individual's alertness to opportunities, fear of failure, self-efficacy and knowing other entrepreneurs (role models) are important for entrepreneurship, which ultimately leads to higher levels of GDP. The results here support their findings; the more intangible elements of entrepreneurship matter. Cultivating attitudes that promote opportunity identification and belief in one's capabilities are crucial as is exposure to positive entrepreneurial role models and reducing the consequences of entrepreneurial failure. This suggests that culture and institutions matter. Thus, our estimates point towards attitudes as important determinants of economic growth. The fact that this positive effect is only observed in high-income countries in our sample (and is not observed in the middle/low-income sample) may be due to the positive attitudes towards entrepreneurship in these more developed countries and the emphasis placed on them as a means of driving economic growth and the support granted to them by government agencies.

The negative impact of actual entrepreneurship in middle/low-income countries again may be due to the composition of this variable. An important component of this indicator is necessity driven entrepreneurship. This type of entrepreneurial activity is dominated by individuals who are forced into starting their own business due to a lack of employment and is typically not highly productive. Therefore, the negative finding of this indicator on GDP per capita may be unsurprising.

These findings support previous research which suggests that entrepreneurship matters for economic growth (Ács, 2006; Ács & Naudé, 2011; Amorós et al., 2012; Baumol & Strom, 2007; Hessels & Van Stel, 2011; Minniti & Lévesque, 2010; Olaison & Meier Sørensen, 2014; Stam & Van Stel, 2011; Van Praag & Versloot, 2007; Van Stel et al., 2005). However, it moves beyond this to focus on the impact of different entrepreneurship indicators on economic growth. The impact of these indicators on economic growth is not homogenous. It is not entrepreneurial activity, per say, that drives growth in our high-income sample; it is the aspirations of the entrepreneurs which in fact drive GDP per capita. This suggests that the simple creation of a new business is not sufficient for economic growth. The results suggest that the goals of entrepreneurs matter (Van Stel et al., 2005).

6. Conclusions

This paper analyses the role of entrepreneurship in stimulating economic growth at a national level for a sample of 55 countries using data from the GEM. The paper adopts a multi-dimensional approach to studying entrepreneurship; 14 different indicators of entrepreneurship, derived from GEM, are used and subsequently condensed utilising principle components analysis into three indicators of entrepreneurship. The results of the analysis suggest that, while entrepreneurship is important for economic growth, the impact of different types of entrepreneurship indicators on GDP is not uniform. For instance entrepreneurial activity (comprised of indicators of business formations and necessity-based entrepreneurship) has a negative effect on growth in middle/low-income countries. However, entrepreneurial attitudes (perceptions, intentions and role models) have positive effects on GDP in high-income countries.

This distinction between developed and developing economies adds to the small body of existing literature in this area. The results provide evidence of differences in the importance of entrepreneurship for developed and developing countries. In both cases, entrepreneurial aspirations are insignificant. Entrepreneurial attitudes are significant and positive for high-income economies but insignificant in explaining economic growth in middle/low-income economies. Entrepreneurs in high-income economies may be more innovative, internationalised and growth focused than entrepreneurs in middle/low-income economies. Indeed, existing literature in this area highlights the increased incidence of necessity entrepreneurship in developing economies compared to developed economies (Ács, Desai, & Hessels, 2008). Necessity entrepreneurship, typically borne from a lack of alternative employment options, is prevalent in middle /low-income countries (Ács et al., 2008) which may be coming through in the results here. If this is, indeed, the case (as existing literature suggests) then there is a need to formulate policy in developing countries to attempt to encourage entrepreneurship to be more than simply necessity or subsistence entrepreneurship. In most high-income countries significant support is provided to entrepreneurs in the form of business development courses through universities and other training systems, government grants and policies which promote and support entrepreneurship and also through established intuitions which can provide funding such as banks and venture capital funds. These training facilities, grants and institutions are typically lacking in middle/low-income countries, which may negatively impact on entrepreneurial attitudes. Where in middle/low-income countries entrepreneurs may aspire to profit in developing countries entrepreneurs may simply aspire to support families through necessity of a lack of other job opportunities. Overcoming these differences in attitudes is not straightforward given the policy, financial and institutional constraints present in developing countries; however, the evidence here suggests that it is a necessary challenge to undertake.

Linked with the above discussion, the results also have broad policy implications regarding the importance of fostering entrepreneurship to promote economic growth. However, they also highlight an important issue. Entrepreneurial activity, in and of itself, is not sufficient to promote economic growth. Positive entrepreneurial attitudes and aspirations in a country are more important. Typical policies and programmes, aimed at promoting entrepreneurial activity focusing specifically on new firm formation, may not be sufficient to promote growth. The policy focus needs to move from increasing the quantity of entrepreneurs to focusing on the attitudes and quality (e.g. growth aspirations) of individuals and existing entrepreneurs. More nuanced policies, which educate individuals in general about the importance of entrepreneurship and cultivate a positive view of entrepreneurship, are needed. This could also include policies that aim to increase exposure to entrepreneurial role models (i.e. networking) and reduce the consequences of entrepreneurial failure (e.g. through bankruptcy law). Aligica and Florian (2008) suggest that international development organisations need to pay greater attention to the role of both entrepreneurship and education, including teaching entrepreneurial skills for example. These policies, however, may take more time to foster positive attitudes to entrepreneurship.

The results also highlight avenues for future research. As the different aspects of entrepreneurship are found to impact growth differently (or not at all) studies which focus on a simple measure of entrepreneurship (such as new firm formation) may wish to consider alternative measures of aspirations and attitudes in order to capture these important elements of entrepreneurship. However, data in this area are not readily available, with the national data provided by GEM being an exception. This research highlights the need for a further development of GEM type data, at a sub-national level, to facilitate regional analysis of entrepreneurship.

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Appendix 1. List of countries and years

Country	2004	2005	2006	2007	2008	2009	2010	2011
Argentina	x	x	x	x	x	x	x	x
Australia	x	x	x					x
Belgium	x	x	x	x	x	x	x	x
Brazil	x	x	x	x	x	x	x	x
Canada	x	x	x					
China			x	x			x	x
Colombia				x	x	x	x	x
Croatia	x	x	x	x	x	x	x	x
Denmark	x	x	x	x	x	x	x	x
Slovakian Republic					x	x		
Ecuador						x	x	
Finland	x	x	x	x	x	x	x	x
France	x	x	x	x	x	x	x	x
Germany	x	x	x			x	x	x
Greece	x	x	x	x	x	x	x	x
Guatemala							x	x
Hong Kong	x							
Hungary		x	x	x	x	x	x	x
Iceland	x	x	x	x	x	x	x	
India				x	x			
Iran						x	x	x
Ireland	x	x	x	x	x			x
Ireland								
Israel					x	x	x	
Italy	x	x	x	x	x	x	x	
Jamaica			x			x	x	x
Japan	x	x	x	x	x	x	x	x
Latvia			x	x	x	x	x	x
Malaysia							x	x
Mexico			x					x
Netherlands	x	x	x	x	x	x	x	x
Norway	x	x	x	x	x	x	x	x
Pakistan								x
Peru				x	x	x	x	x
Portugal								x
Romania					x	x	x	x
Russia				x	x	x	x	x
Saudi Arabia							x	
Serbia					x	x		
Singapore	x	x	x					
Slovenia	x	x	x	x	x	x	x	x
South Africa	x	x	x			x	x	x
Spain	x	x	x	x	x	x	x	x

(*Continued*)

Appendix 1. (*Continued*)

Country	2004	2005	2006	2007	2008	2009	2010	2011
Spain								
Sweden	x	x	x	x				x
Switzerland							x	x
Taiwan								x
Thailand			x	x				
Trinidad & Tobago								x
Tunisia							x	
Turkey				x	x			x
UK	x	x	x	x	x	x		
Uganda	x						x	
United States	x	x	x	x	x	x	x	x
Uruguay				x	x	x	x	x

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