Theoretical and Applied Economics
Volume XXVII (2020), No. 1(622), Spring, pp. 21-40

Intellectual property rights, human capital and types of entrepreneurship in emerging and developing countries

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Abstract. *This study examines the single and combined effects of intellectual property rights (IPR) and human capital on the types of entrepreneurship in emerging and developing countries. For this purpose, we use the Global Entrepreneurship Monitor data for the entrepreneurial activity, while IPR are assessed based on the IPR index of World Economic Forum and human capital is measured by the gross enrollment ratio for secondary school. Linear regressions are applied on data for 15 countries during the period 2009-2013. Findings show that improvement of intellectual property rights has no influence on opportunity driven entrepreneurship and affects negatively necessity driven entrepreneurship. Furthermore, the improvement of the education level allows to increase opportunity driven entrepreneurship in emerging and developing countries. However, it does not allow to increase necessity entrepreneurship. Moreover, countries with higher human capital level benefit from the enhancement of the IPR system more than countries with lower human capital. In summary, our study recognizes the complementary role of intellectual property rights and human capital in increasing high quality entrepreneurship. We conclude that both intellectual property rights and human capital are effective tools of industrial policy in emerging and developing countries.*

Keywords: Opportunity Driven Entrepreneurship, Necessity Driven Entrepreneurship, intellectual property rights, human capital, emerging and developing countries.

JEL Classification: L26, K11, O3, O25, I25, I28, J24.

I. Introduction

Entrepreneurship is increasingly seen as a key driver of economic development (Baumol 1990; Wennekers and Thurik 1999; Minniti and Lévesque 2008). That's why, scholarly contributions have set out to identify its national determinants. In this contribution we examine two determinants: human capital and institutions especially Intellectual Property Rights (IPR).

According to North (1991), institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights). Institutions can both enable behaviors and constrain them.

The OECD (2001, p. 18) defines human capital as "The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being". Human capital is seen as an important source of competitive advantage for individuals, organizations and societies (Coleman, 1988; Gimeno et al., 1997).

While the entrepreneurship literature emphasizes the role of IPR and human capital, two main shortcomings emerge from previous studies.

First, previous studies neglect a crucial question: How the effect of institutional framework on entrepreneurship differ according to the human capital level of different countries?

Second, findings do not suggest an unanimous conclusion concerning the impact of IPR system and human capital on entrepreneurial activity. On the one hand, the impact of IPR on entrepreneurial activity is positive according to some studies like Johnson et al. (2002) and Estrin et al. (2009). On the other hand, it is negative (Desai et al., 2003; Livramento and Foray, 2007) or not significant (Pissarides et al., 2003 and Estrin et al., 2011). Similarly, previous works show that the relation between human capital and the founding of new businesses is uncertain. Some studies find a positive relationship (Robinson and Sexton, 1994 and Davidsson and Honig, 2003). Some others find a negative relationship (Blanchflower, 2004; Van der Sluis et al., 2005 and Reynolds et al., 2007).

To overcome this problem, we think that it is necessary to make distinction between different types of entrepreneurship.

The present paper extends the work of Eesley (2016) who focuses on institutional barriers to growth and their effects on individuals' decision to enter entrepreneurship. Thus, the purpose of our study is to shed some light on how the human capital, the institutional framework especially, the intellectual property rights and the interaction between these two aspects affect the different types of entrepreneurship in emerging and developing countries.

To define entrepreneurship, we refer to the Global Entrepreneurship Monitor (GEM) studies. Entrepreneurship is defined as "Any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business". (Reynolds et al., 1999, p. 3). To distinguish different types of entrepreneurs, GEM studies

identify two types: opportunity driven entrepreneurs who start up a business to exploit an opportunity, and necessity driven entrepreneurs who start up a business to meet their needs.

Our study aims to answer the following questions: How do intellectual property rights affect both opportunity driven entrepreneurship and necessity driven entrepreneurship? How does human capital affect the two types of entrepreneurship? What is the combined effect of IPR and human capital on the two types of entrepreneurship?

The issue of IPR is becoming increasingly crucial in the context of developing countries because, following the Trade Related Intellectual Property Rights Agreement (TRIPS), all members of the World Trade Organization are required to achieve high standards of IPR.

While the question of what determines the level of entrepreneurship in developed countries is well studied, much less attention has been given to determinants of entrepreneurship in the context of emerging and developing countries, a context with specific characteristics. In fact, technological development in this group of countries aims to achieve the catching up, a process which includes two key forms of learning: imitation of foreign technologies and domestic Research and Development (R&D) effort (Song et al., 2003; Kim, 1980; Lee et al., 1988).

Our study analyses the links between human capital, intellectual property rights and entrepreneurial activity using the Global Entrepreneurship Monitor survey data for 15 emerging and developing countries during the period 2009-2013. It applies linear regressions on panel data models.

A number of key findings and contributions emerge from the present work. First, it examines the implications of emerging and developing countries' specificities for the determinants of entrepreneurship. Second, it examines the combined effect on entrepreneurship of two determinants often studied separately in entrepreneurship literature. Third, it highlights the link between IPR's regimes and entrepreneurship types. A low IPR regime is associated with necessity oriented entrepreneurship. Finally, this work contributes insights into how IPR protection differentially influences countries according to their levels of human capital. A strong IPR system helps countries with skilled individuals to raise their level of opportunity driven entrepreneurship. A key conclusion is that strengthening intellectual property rights' protection and improving human capital level simultaneously in emerging and developing countries are important for entrepreneurship policy because they attract opportunity entrepreneurs, that is, such a policy attracts better, not just more, entrepreneurs.

The rest of the paper is organized as follows: In Section 2 we discuss theoretical issues and empirical results relative to previous studies and propose research hypotheses. In Section 3 we introduce the data and empirical methodology. Empirical findings are presented and discussed in Section 4. Section 5 concludes.

II. Literature review and hypotheses

A. Opportunity Driven Entrepreneurship (ODE)

Opportunity driven entrepreneurs found a new firm to exploit an opportunity. According to Casson (1982), entrepreneurial opportunities are the situations in which new goods, services, raw materials, and organizing methods are introduced and sold at greater than their cost of production. The term "new" here means new in the domestic market, and not in the world. There are two types of entrepreneurial opportunities in emerging and developing countries: 1) domestic innovations, i.e., new products created by entrepreneurs and 2) foreign imported products adopted by entrepreneurs. So, what are the implications of such definition for the impact of IPR and human capital on opportunity driven entrepreneurship in emerging and developing countries?

1. IPR and opportunity driven entrepreneurship

According to several scholars, property rights systems form the backbone of the modern set of institutions that characterise the market economy (Aidis et al., 2012). Acemoglu and Johnson (2005) show that property rights have pronounced effects on investment, financial development and long run economic growth. Parker (2007) notes that property rights that are well protected help promote entrepreneurship and innovation. In addition, weaker property rights are likely to foster the development of predatory forms of entrepreneurial activities (Henrekson, 2007).

Intellectual property rights form the most important component of property rights, relevant for entrepreneurship.

Baumol (1993) points out that entrepreneurs tend to operate in areas that offer the highest financial returns. Thus, entrepreneurs activities vary according to the structure of rewards of the economy. When this structure changes, for market, political or institutional reasons, entrepreneurs will be the first economic agents to identify and respond to the opportunities generated by these changes.

Strengthening IPR protection in a given country can change the structure of the economy's rewards by increasing the potential returns generated by investment in innovation activities. Therefore, it allows for the formation of new firms in order to exploit these innovations.

Previous studies confirm the Baumol's arguments. On the one hand, Arrow (1962) stresses that the protection of new ideas through robust IPR prevents imitation and consequently ensures return on investment. Empirical studies such as those carried out by Allred and Park (2007), Ang (2010), Lin et al. (2010) and Lo (2011) show that IPR affect positively technological innovation. On the other hand, a number of studies conclude that IPR encourage individuals to exploit their innovations by setting up new businesses. Using data on 1,397 patents assigned to the Massachusetts Institute of Technology during the 1980-1996 period, Shane (2001) shows that the effectiveness of patent protection is one factor which influences the likelihood that new technology will be exploited through firm formation. Claessens and Laeven (2003) found that industries that rely on intangible assets show a disproportionately lower rate of growth in countries characterized by weak

intellectual property rights. Klapper et al. (2006) find that there is more entry in R&D intensive industries in countries that protect property better.

Although there are technological creation activities in many emerging and developing countries, these countries are deploying a great learning effort to make efficient use of technologies imported from advanced countries. Therefore, the imitative and adaptive nature of innovation in these countries requires weak IPR regimes. Low levels of protection help local firms in the early stages of industrialization build their technological capabilities by allowing imitation and reverse engineering (Kim, 2003). Empirical studies on East Asian economies (Japan, the Republic of Korea and Taiwan), the most successful economies in the world in terms of catch-up experience, suggest that relatively low levels of IPR protection encourage technological learning during the early years of industrialization (Kumar, 2003).

Strengthening IPR in emerging and developing countries has adverse effects. On the one hand, it increases the ability of innovators to appropriate the rent of innovation, and attracts consequently more opportunity entrepreneurs. On the other hand, it hinders individuals from setting up a new firm based on foreign product. In this case, and under a stricter legal regime of IPR protection, the cost of exploiting opportunity will be very high as prices will raise for imported products and new technologies (Maskus, 2000).

Based on these arguments, we cannot predict the nature of link between the protection of intellectual property rights and the new business formation by entrepreneurs who exploit entrepreneurial opportunities. Therefore, our first research hypothesis H1A is formulated as follows:
H1A: A strong IPR system may affect significantly (positively or negatively) the propensity for opportunity driven entrepreneurship.

2. Human capital and opportunity driven entrepreneurship

Human capital is the set of knowledge and skills acquired by individuals through education, experiences and training (Becker, 1964). Human capital may stimulate entrepreneurship. Indeed, well skilled individuals may be able to get more relevant information with regard to the process of starting a business compared to those with lower human capital (Bruderl et al., 1992). Moreover, it helps entrepreneurs to select promising projects: When individuals with high skills leave their job to exploit an opportunity, they may set up larger and financially better equipped businesses thanks to their past higher earnings.

Human capital allows to facilitate the number of opportunities entrepreneurs identify (Corbett, 2007; Ucbasaran et al., 2008). Shane and Venkataraman (2000) highlighted the key role of human capital in discovery and exploitation of entrepreneurial opportunities. Shane (2000) emphasises the importance of three dimensions of prior knowledge to the process of entrepreneurial discovery: prior knowledge of markets, prior knowledge of ways to serve markets and prior knowledge of customer problems. Prior information is mainly developed from work experience and education. It influences the entrepreneur's ability to comprehend, extrapolate, interpret, and apply new information he gets. Westhead et al. (2005) argue that experienced entrepreneurs have a high level of "entrepreneurial alertness" which involves a distinctive set of perceptual and cognitive processing skills that direct the

opportunity identification process. Bayon et al. (2016) found that human capital inputs and output are significant factors in influencing the decision to exploit innovative opportunities in Spain. Kollinger's (2008) study revealed the significantly positive role that human capital inputs like education, labor market experience as well as entrepreneurial self-confidence play in influencing some individuals to choose more innovative opportunities.

Based on these arguments, we formulate our second research hypothesis as follows:
H1B: Human capital will increase the propensity for opportunity driven entrepreneurship.

3. IPR, human capital and opportunity driven entrepreneurship

The question to ask now is: How does human capital interact with intellectual property rights to influence opportunity based entrepreneurs?

Literature on IPR points out that strengthening IPR protection is not always a good solution to stimulate innovation. Léger (2005) showed that a strong IPR system discourage innovation activities in corn industry in Mexico. Some authors highlight that high IPR standards are efficient only under certain conditions (Maskus, 2004; Siebeck et al., 1990). They are beneficial in markets characterized by weak entry barriers, labor market flexibility, developed international trading system, strong institutional system and high level of human capital. Introduced differently, high levels of protection have no effect or are even associated with negative effects on the economy. Such prerequisites are not reachable in some developing countries. Therefore, other factors should be exist in order to make IPR efficient. Ortega and Lederman (2010) emphasize the complementarity role between intellectual property rights and human capital in raising R&D expenditures. Human capital is crucial for technological change (Nelson and Phelps, 1966). Well qualified individuals generate knowledge that can be used to introduce innovations. Furman et al. (2002), Griffith et al. (2004), Van Uden et al. (2014) and Loukil (2016) showed that human capital has a positive and significant effect on technological innovation.

Thus, we reframe the argument of Baumol (1993) cited above to say that strengthening IPR protection in a given country can change the structure of the economy's rewards by increasing the potential returns generated by investment in innovation activities, *which are generated by skilled human resources*. Therefore, it allows for the formation of new firms in order to exploit these innovations.

H1C: A strong IPR system will increase the propensity for opportunity driven entrepreneurship more among countries with higher levels of human capital compared to countries with lower levels of human capital.

B. Necessity Driven Entrepreneurship (NDE)

Necessity driven entrepreneurship is the creation of new firms based on existing products or services in the national market in order to provide for the elementary needs. In this case, entrepreneurs are imitators and not innovators as in the case of ODE.

1. IPR and necessity driven entrepreneurship

The impact of IPR protection on entrepreneurial income is ambiguous (Kihlstrom and Laffont, 1979; Evans and Jovanovic, 1989). If IPR create new profit opportunities for new

firms by creating new opportunities that can be imitated and exploited perfectly by new small businesses, then they will have a positive impact on a country's entrepreneurial activity. But, if IPR protection laws act to restrict access to technology for imitative firms, then a negative effect will dominate. Indeed, the protection of IPR may lead to an intense monopoly power granted to national innovators. This causes the restriction of access to the stock of knowledge on which the entrepreneur can be based to imitate, which prevents the creation of new businesses based on imitation.

Thus, our research hypothesis is formulated as follows:
H2A: A strong IPR system may significantly increase or decrease the propensity for necessity driven entrepreneurship.

2. Human capital and necessity driven entrepreneurship

In the case of necessity driven entrepreneurship, entrepreneurs have no job, their financial resources are limited and they have not high qualifications. Entrepreneurial activity is considered as a source of revenue (Singer et al., 2015). So, NDE is conducted by individuals with low human capital levels. According to Bruderl et al. (1992), individuals with few human capital resources are often forced into self-employment. If unemployment is the main incentive for setting up a business, there may not be time to look for good opportunities, make detailed plans, get appropriate funding, and seek advice.

Baptista et al. (2014) found that founders' backgrounds have little influence on the early success of necessity-based entrepreneurs.

Thus, our next research hypothesis is:
H2B: Human capital is negatively associated with the necessity driven entrepreneurship.

3. IPR, human capital and necessity driven entrepreneurship

As IPR may affect positively or negatively the level of necessity entrepreneurship, we cannot decide on the nature of combined effect of institutions and human capital on NDE. If IPR decrease the necessity entrepreneurship level, then we predict that a high level of IPR protection combined with high level of human capital will be negatively associated with the level of NDE.

H2C: A strong IPR system will decrease the propensity for necessity driven entrepreneurship more among countries with higher levels of human capital compared to countries with lower levels of human capital.

C. Other determinants of entrepreneurship

One determinant of entrepreneurship that has galvanized a lot of theoretical and empirical attention is demand. The increase in demand for goods and services, attributed to population growth, per capita income growth and changing tastes, leads to market expansion (Weneker et al., 2005) and is therefore associated with a high rate of business creation (Gaygisiz and Koksal, 2003).

Unemployment is one of the documented determinants of entrepreneurship. The nature of the relationship between unemployment and new firm formation cannot be determined

theoretically. On the one hand, according to the so-called 'push hypothesis' the impact should be positive. Oxenfeldt (1943) pointed out that individuals confronted with unemployment and low prospects for wage employment turn to self-employment as a viable alternative. On the other hand, the 'pull hypothesis' suggests that the impact should be negative. Lucas (1978) and Jovanovic (1982) suggest that the unemployed tend to possess lower endowments of human capital and entrepreneurial talent required to start and sustain a new firm.

The literature emphasizes the level of financial development as a factor affecting the new firm formation. The probability of individuals becoming entrepreneurs is increasingly higher with the degree of their wealth and the volume of assets they control (Evans and Leighton, 1989). Capital is an important determinant of business formation because it influences not only the ability of firms to penetrate the market but also their ex post performance. Empirical studies have shown that sufficient financial resources allow new firms to survive (Kauermann et al., 2005) and grow (Bamford et al., 2004).

III. Methodology

A. Sample description

Our sample includes 15 emerging and developing countries(1). The period of study is from 2009 to 2013. This choice is based on the limited data concerning the dependent variable: entrepreneurship.

B. Measurement of variables

1. Dependent variable

Entrepreneurship is measured with reference to GEM data which are quite popular in entrepreneurship analysis because they rely on a considerable number of countries and distinguish different types of entrepreneurs. In this study, we use two measures of entrepreneurship as defined in Singer et al. (2015, p. 24): ODE and NDE.

Opportunity Driven Entrepreneurship (ODE) is the improvement driven opportunity entrepreneurship defined in the GEM report. It represents the percentage of individuals involved in early-stage entrepreneurial activity who (1) claim to be driven by opportunity as opposed to finding no other option for work; and (2) who indicate that the main driver for being involved in this opportunity is being independent or increasing their income, rather than just maintaining their income.

Necessity Driven Entrepreneurship (NDE) is the percentage of individuals involved in early-stage entrepreneurial activity who claim to be driven by necessity (having no better choice for work) as opposed to opportunity.

2. Independent variables

Our measure for protection degree of intellectual property rights (IPR) is based on the index of World Economic Forum which conducts a survey covering business leaders in various countries. The survey aims to see whether they view intellectual property is well protected,

with a scale ranging between 1 (disagree) and 7 (strongly agree). The average score for all respondents in a country gives the index for that country. The results of this survey are published in the Global Competitiveness Report (GCR). So, we have obtained data from different issues of that report. This index is used by Desai et al. (2003), Livramento and Foray (2007) and Estrin et al. (2011).

However, this metric is imprecise for purposes of quantitative estimation of impact because of its ordinal nature and because the survey respondents' perceptions regarding what constitutes strong and weak IPR are likely to vary. That's why IPR in our study is a dummy variable taking the value of zero for the lowest rating (<= 3.5) and the value of one for the highest rating (> 3.5).

Human capital is measured by education level. The variable EDUC is the gross enrollment ratio for secondary school(2). Data are from World Bank's World Development Indicators.

Control variables are: GDP per capita (GDP), population growth rate (POPG); unemployment rate (UNEMP) and financial development level (FD).

The data on GDP per capita are in constant 2010 US dollars. The variable is transformed in natural logarithm.

POPG is the annual population growth rate.

Unemployment rate refers to the share of the labor force that is without work but available for and seeking employment.

Financial development is measured by domestic credit to private sector as share of GDP.

Data on control variables come from the World Bank's World Development Indicators (WDI).

C. Descriptive statistics

Table 1 provides the descriptive statistics on the dummy variable (IPR).

Table 1. *Summary statistics of the variable IPR*

Dummy Variable	Percentage	
	Group 1 (variable taking value of 0)	Group 2 (variable taking value of 1)
IPR	38	37

Table 2 provides the descriptive statistics on the entrepreneurship variables (ODE, NDE) as well as the other explanatory variables (EDUC, GDP, POPG, UNEMP, FD).

Table 2. *Summary statistics*

	Mean	Median	Stand. dev	Minimum	Maximum
ODE	44.2	43	11.4	9.8	71.8
NDE	27.1	28	8.2	10.2	46.6
EDUC	98.8	96.6	10.4	65.5	110.4
GDP	9881.7	10276.2	2922	4682.7	14551
POPG	0.6	0.9	0.9	-2	1.8
UNEMP	9.7	7.4	5.4	3	25.1
FD	61.3	50.8	36.4	12.4	149.2

D. Statistical models

The present paper uses linear regression models. Due to the limited number of observations, we use a static approach which cannot address the endogenous issues caused by the inverse causality between entrepreneurship and some explanatory variables such as unemployment rate and GDP per capita. In the present research, endogeneity problem is resolved by using the first lag of all explanatory variables. To observe the long-term impacts on entrepreneurship, we follow Dvoulety (2017) and put into the regression models with a two year lag.

The general forms of models to be estimated in this study are:

$$ODE_{it+l} = \beta 0 + \beta 1\ IPR_{it} + \beta 2\ EDUC_{it} + \beta 3\ IPREDUC_{it} + \beta 4\ X_{it} + \varepsilon_{it} \quad (1)$$

$$NDE_{it+l} = \beta 0 + \beta 1\ IPR_{it} + \beta 2\ EDUC_{it} + \beta 3\ IPREDUC_{it} + \beta 4\ X_{it} + \varepsilon_{it} \quad (2)$$

i = 1,…, N denotes the country (in our study, N = 15); t = 1,…, T denotes the time period (in our study, T = 5) and l is the time lag, it is equal to 1 and 2.

ODE and NDE represent entrepreneurship variables. IPR is the indicator of intellectual property rights protection. EDUC is the level of human capital. IPREDUC is an interaction term between IPR and EDUC, IPREDUC = IPR * EDUC.

X is a vector of control variables, X = (GDP, POPG, UNEMP, FD) and ε is the error term.

Linear models are estimated by the software STATA 12.

IV. Presentation and interpretation of results

Before presenting the regression models, we proceed to analyse the independence of the explanatory variables. This is the multi collinearity test. To check the condition of absence of multi-collinearity, we use the simple correlation matrix and assume a limit of 0.7. According to the correlation matrix, strongest correlations are found between IPR index and the interaction term IPREDUC (the correlation coefficient is equal to 0.98). Thus, these two variables should not be introduced in the same model in order to guarantee reliability of results.

A. Analysis of simple correlations

We begin our analysis by examining simple correlations. The matrix of simple correlations allows us to examine the correlation coefficients in order to study the null hypothesis of the absence of correlation between two variables. Table 3 summarizes the results found.

Table 3. *Simple correlations between the dependent variable and the explanatory variables*

Explanatory variables	Model (1): Dependent variable = ODE			Model (2): Dependent variable = NDE		
		Model with one year lag	Model with two year lag		Model with one year lag	Model with two year lag
	Predicted sign	Correlation	Correlation	Predicted sign	Correlation	Correlation
IPR	+/-	0.107	0.159	+/-	-0.255**	-0.402***
EDUC	+	-0.315***	-0.288**	-	0.274**	0.258**
IPREDUC	+	0.039	0.105	-	-0.207*	-0.368***
GDP	+	0.064	0.058	+	0.05	-0.044
POPG	+	0.303***	0.352***	+	-0.264**	-0.192*
UNEMP	-	-0.415***	-0.39***	+	0.345***	0.289**
FD	+	0.224*	0.272**	+	-0.035	-0.106
*, **; ***: significant correlations at the 10%, 5% and 1% thresholds.						

The analysis of simple correlations shows that the variable relative to intellectual property rights protection is positively but not significantly related to ODE. In contrast, IPR is negatively and significantly related to necessity driven entrepreneurship. Contrary to the predicted signs, the variable relative to human capital is negatively and significantly related to ODE and is positively and negatively related to NDE. The interaction term IPREDUC is positive but not significant in the model relative to ODE. As expected, this term is negative and significant for the case of NDE.

For control variables, the correlation coefficient for GDP per capita is not significant. Population growth has, as expected, a positive and significant sign in the model 1. However, it has a negative sign and is significant in model 2. Unemployment rate is negative and significant in the case of ODE. It has a positive sign and is significant in the case of NDE. For the financial development, the correlation is positive and significant in the model 1. This variable is negatively but not significantly related to necessity driven entrepreneurship.

B. Findings

1. Estimation results of Model 1 (Dependent variable: ODE)

To test hypotheses H1A, H1B and H1C, we have estimated eight models when the dependent variable is ODE: four models with one year lag and four other models with two year lag.

Before examining results, it is necessary to verify some tests applied on panel data.

We begin by models with one year lag.

First, the homogeneous or heterogeneous specification of the data generating process should be checked. If the test performed (individual presence test) shows that there are individual specificities, the Ordinary Least Squares (OLS) method is inappropriate and in this case, we apply Hausman test to determine whether the coefficients of the two estimates (fixed and random) are statistically different.

In models (1.1), (1.2), (1.3) and (1.4) the Lagrange multiplier test gives values of 12.43; 8.55; 8.36 and 8.38 respectively and the associated p-values are below the threshold of 1%. We then reject the null hypothesis of absence of specific effects, so it is necessary to introduce individual effects.

The probability of the Hausman test in the four cases is greater than 1% (0.6435 in model (1.1); 0.2253 in model (1.2); 0.3494 in model (1.3) and 0.3495 in model (1.4)). Based on the Hausman test, we choose the random effects model for these models.

The Breush-Pagan test allows us to detect heteroskedasticity. In models (1.1), (1.2), (1.3) and (1.4), the probabilities of the test are equal to 0.0032; 0.0101; 0.0061 and 0.0058 respectively which are inferior than 5%. We therefore conclude that there is a problem of heteroskedasticity for these models.

The Wooldridge test allows us to detect the auto-correlation whose null hypothesis is the absence of auto-correlation errors. In models (1.1), (1.2), (1.3) and (1.4) the probabilities of the test are equal respectively to 0.4084; 0.3469; 0.3500 and 0.3495 confirming the absence of an auto-correlation error problem for all these estimated models.

In the following, we present the results of the linear regressions with a correction of the problem of heteroscedasticity for the four models.

Columns 2, 3, 4 and 5 of Table 4 provide the results of the four linear regression models.

We turn now to the models with two year lag.

In models (1.5), (1.6), (1.7) and (1.8) the Lagrange multiplier test gives values of 20.07; 15.74; 16.55 and 16.90 respectively and the associated p-values are below the threshold of 1%. We then reject the null hypothesis of absence of specific effects, so it is necessary to introduce individual effects.

The probability of the Hausman test in the four cases is greater than 1% (0.4269 in model (1.5); 0.4075 in model (1.6); 0.6354 in model (1.7) and 0.5919 in model (1.8)). Based on the Hausman test, we choose the random effects model for these models.

In models (1.5), (1.6), (1.7) and (1.8), the probabilities of the Breush-Pagan test are equal to 0.1190; 0.4197; 0.1447 and 0.2206 respectively which are superior than 5%. We therefore conclude that there is not a problem of heteroskedasticity for these models.

In models (1.5), (1.6), (1.7) and (1.8) the probabilities of the Wooldridge test are equal respectively to 0.6892; 0.7863; 0.7169 and 0.6776 confirming the absence of an auto-correlation error problem for all these estimated models.

In the following, we present the results of the linear regressions without any corrections.

Results of these estimated models are reported in columns 6, 7, 8 and 9 of Table 4.

Table 4. *Results of model estimates (1)*

Independent variables	Dependent variable: ODE							
	Model 1.1	Model 1.2	Model 1.3	Model 1.4	Model 1.5	Model 1.6	Model 1.7	Model 1.8
Constant	76.871 (54.803)	86.415 (57.686)	83.723 (61.318)	82.390 (61.951)	66.146 (75.357)	74.235 (68.085)	111.119 (74.508)	123.072 (75.862)
IPR (-1)	-0.614 (2.599)		-0.065 (3.318)					
IPR (-2)					3.247 (4.245)		7.074 (4.372)	
EDUC (-1)		0.086 (0.138)	0.074 (0.175)	0.072 (0.157)				
EDUC (-2)						0.383** (0.190)	0.502** (0.203)	0.453** (0.193)
IPREDUC (-1)				-0.003 (0.034)				
IPREDUC (-2)								0.083* (0.045)
GDP (-1)	-2.981 (5.936)	-4.962 (7.131)	-4.526 (7.913)	-4.364 (7.894)				
GDP (-2)					-2.132 (8.068)	-7.161 (7.840)	-12.424 (8.782)	-13.208 (8.791)

Independent variables	Dependent variable: ODE							
	Model 1.1	Model 1.2	Model 1.3	Model 1.4	Model 1.5	Model 1.6	Model 1.7	Model 1.8
POPG (-1)	-0.247 (2.599)	-0.311 (2.641)	-0.263 (2.658)	-0.256 (2.649)				
POPG (-2)					0.584 (2.941)	0.966 (2.737)	0.587 (2.823)	0.591 (2.821)
UNEMP (-1)	-1.508*** (0.282)	-1.582*** (0.352)	-1.574*** (0.387)	-1.567*** (0.392)				
UNEMP (-2)					-1.306*** (0.487)	-1.527*** (0.468)	-1.732*** (0.498)	-1.780*** (0.501)
FD (-1)	0.158*** (0.052)	0.174*** (0.066)	0.170*** (0.064)	0.171*** (0.064)				
FD (-2)					0.148** (0.075)	0.237*** (0.076)	0.219*** (0.077)	0.219*** (0.077)
Observations	75	75	75	75	75	75	75	75
F/Chi2	51.59***	67.68***	70.42***	67.99***	14.94**	20.55***	22.29***	23.13***
R2	0.54	0.56	0.56	0.56	0.52	0.61	0.58	0.57

Standard Errors are in parentheses.
*, **, ***: Coefficients are significant at 10 %, 5 % and 1 %.
IPR, EDUC, IPREDUC, GDP, POPG, UNEMP and FD denote respectively: intellectual property rights indicator, secondary school enrollment ratio, interaction term IPR*EDUC, GDP per capita, population growth rate, unemployment rate and financial development level (domestic credit to private sector (%GDP)).

In all specifications, the Fisher/Chi2 statistic testing the joint significance of the explanatory variables is significant. This allows us to reject the null hypothesis that the regression coefficients β are zero. Therefore, our models are globally significant.

According to specifications (1.1), (1.3), (1.5) and (1.7) the coefficient of IPR is not significant. Thus, IPR standards have no influence on opportunity driven entrepreneurship in emerging and developing countries. Therefore, the first hypothesis H1A of our research is not verified. Contrary to the work of Shane (2001), our result does not confirm the argument of Baumol (1993).

The coefficient relative to education is positive. It is significant (at 5% threshold) only in specifications (1.6), (1.7) and (1.8). Based on the model (1.6) (as it has the highest R2), the coefficient implies that a 1% increase in gross enrollment in secondary education leads to 0.38% increase in the level of opportunity entrepreneurship. Our result validates the hypothesis H1B: Human capital is a key factor to identify and to exploit innovative opportunities. It is coherent with the studies of Bayon et al. (2016) and Kollinger (2008).

In specifications (1.4) and (1.8), we introduce the interacted term IPREDUC. Results from the fourth model indicate that the coefficient relative to this variable is not significant. In contrast, according to the eighth model, IPREDUC is as expected positive and significant (at 10% threshold). Based on the specification (1.8), the result implies that an increase of IPR index by 1 point raises the level of ODE more in countries with higher human capital than in countries with lower human capital by 0.083 percentage points. Hence, our hypothesis H1C is verified. This finding highlights the importance of human capital when deciding to enhance the quality of institutions. A certain level of education should exist among people in order to be able to respond to the opportunities generated by such changes. Considering both the insignificant effect of IPR and the significant effect of IPREDUC, our result confirms the arguments of Maskus (2004) and Siebeck et al. (1990) who claim

that other factors, such as human capital, should be present to make IPR efficient in emerging and developing countries. Thus, our study confirms the complementarity between human capital and intellectual property rights in entrepreneurial activity, especially, the opportunity based one.

Concerning control variables, the financial development level stimulates opportunity entrepreneurship. In contrast, unemployment rate decreases the level of entrepreneurs based on opportunities.

2. Estimation results of Model 2 (Dependent variable: NDE)

To test hypotheses H2A, H2B and H2C, we have estimated eight models when the dependent variable is NDE: four models with one year lag and four other models with two year lag.

For the models with one year lag, the Hausman test recommends the random effects model for the four specifications (2.1), (2.2), (2.3) and (2.4). The Breush-Pagan test and the Wooldridge test indicate that there is only a problem of auto-correlation for the first and second specifications. However, there are problems both of heteroskedasticity and of auto-correlation error for the third and fourth specifications. In the following, we present results of the linear regressions with a correction of auto correlation problems for the models (2.1) and (2.2), and with a correction of heteroscedasticity and auto correlation problems for the models (2.3) and (2.4). Results of these estimated models are reported in columns from 2 to 5 of the Table 5.

For the models when the dependent variable is necessity driven entrepreneurship with two year lag, we choose the fixed effects model for the four models (2.5), (2.6), (2.7) and (2.8). The Breush-Pagan test and the Wooldridge test indicate that there is only a problem of auto-correlation error in the four specifications.

In the following, we present the results of the linear regressions with a correction of the auto correlation problem for the models (2.5), (2.6), (2.7) and (2.8). Results of these estimated models are reported in columns 6, 7, 8 and 9 of Table 5.

Table 5. *Results of model estimates (2)*

Independent variables	Dependent variable: NDE							
	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 2.5	Model 2.6	Model 2.7	Model 2.8
Constant	-35.195 (40.191)	-10.764 (47.937)	-55.954** (26.577)	-60.072** (26.842)	-917.805*** (198.431)	-923.255*** (190.677)	-956.047*** (203.414)	-974.663*** (204.604)
IPR (-1)	-5.653** (2.591)		-6.744*** (1.851)					
IPR (-2)					-1.527 (4.548)		-1.801 (4.590)	
EDUC (-1)		-0.041 (0.153)	-0.121 (0.096)	-0.078 (0.089)				
EDUC (-2)						-0.153 (0.220)	-0.160 (0.223)	-0.139 (0.223)
IPREDUC (-1)				-0.073*** (0.020)				
IPREDUC (-2)								-0.026 (0.048)

Independent variables	Dependent variable: NDE							
	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 2.5	Model 2.6	Model 2.7	Model 2.8
GDP (-1)	6.432 (4.315)	4.173 (5.584)	10*** (3.112)	9.993*** (3.152)				
GDP (-2)					104.978*** (26.586)	107.281*** (26.195)	110.743*** (27.871)	112.479*** (27.95)
POPG (-1)	-0.161 (1.615)	-0.358 (1.956)	0.508 (1.042)	0.316 (1.054)				
POPG (-2)					-23.033*** (8.355)	-23.151*** (8.129)	-22.357** (8.466)	-22.059** (8.457)
UNEMP (-1)	0.728*** (0.271)	0.748** (0.358)	0.852*** (0.171)	0.867*** (0.173)				
UNEMP (-2)					1.316 (1.169)	0.962 (1.015)	1.2 (1.190)	1.310 (1.201)
FD (-1)	-0.009 (0.044)	-0.054 (0.057)	-0.034 (0.026)	-0.033 (0.026)				
FD (-2)					-0.262 (0.171)	-0.237 (0.174)	-0.239 (0.176)	-0.242 (0.176)
Observations	75	75	75	75	60	60	60	60
F/Chi2	15.79**	7.89	45.84***	45.26***	4.69***	4.81***	3.95***	3.99***
R2	0.54	0.28	0.18	0.19	0.36	0.37	0.37	0.38

Standard Errors are in parentheses.
*, **, ***: Coefficients are significant at 10 %, 5 % and 1 %.
IPR, EDUC, IPREDUC, GDP, POPG, UNEMP and FD denote respectively: intellectual property rights indicator, secondary school enrollment ratio, interaction term IPR*EDUC, GDP per capita, population growth rate, unemployment rate and financial development level (domestic credit to private sector (%GDP)).

In the specification (2.2), the Fisher/Chi2 statistic testing the joint significance of explanatory variables is not significant. In the other specifications, the Fisher/Chi2 statistic is significant. This allows us to reject the null hypothesis that the regression coefficients β are zero. Therefore, these models are globally significant and our interpretation will be based on these seven specifications.

According to the first and third specifications, IPR variable affects negatively and significantly the level of necessity entrepreneurship. Therefore, the hypothesis H2A is confirmed. According to the specification (2.1) (as it has the highest R2), an increase of IPR index by 1 point causes a decrease in NDE by 5.6 percentage points. Our result suggests that, as expected, intellectual property rights hinder individuals who have no job to set up new businesses. Strengthening IPR standards causes the restriction of access to the stock of knowledge on which the entrepreneur can be based to imitate.

In specifications (2.3), (2.4), (2.6), (2.7) and (2.8) the coefficient relative to education is, as expected, negative but not significant. The finding does not validate our research hypothesis H2B. It is not coherent with Bruderl et al. (1992) who claim that individuals with few human capital resources are often forced into self-employment.

Based on the specification (2.4), the combined effect between intellectual property rights and human capital on NDE is negative and significant at 1%. It implies that increasing IPR index by 1 point leads to a reduction in necessity driven entrepreneurship level more in countries with higher human capital than in countries with lower human capital by around 0.07 percentage points. Thus, our hypothesis H2C is confirmed.

Concerning control variables, we note that GDP per capita and the unemployment rate have a positive and significant (at 1% threshold) impact on the level of necessity entrepreneurship. In contrast, population growth affect negatively and significantly the necessity driven entrepreneurship.

V. Conclusion

The purpose of the present paper was to assess the effect of intellectual property rights, human capital and the interaction between them on entrepreneurial activities in developing and emerging countries. Entrepreneurship is defined by referring to the Global Entrepreneurship Monitor data which distinguish two types: opportunity driven entrepreneurship and necessity driven entrepreneurship. Analysis of theoretical issues and previous empirical studies allows us to formulate a number of research hypotheses.

Using linear regressions on panel data for 15 countries during the period 2009-2013, our study confirms some hypotheses and invalidates some others.

The present paper contributes to the already substantial body of entrepreneurship literature. Its main originality is to examine the interaction that may exist between institutions, especially intellectual property rights and human capital, an issue that is neglected in previous studies. It has important implications on both academic and political levels.

To summarize findings and identify the implications, we note that: 1) The improvement of intellectual property rights has no influence on opportunity driven entrepreneurship. In contrast, it affects negatively necessity driven entrepreneurship. 2) The improvement of the education level allows to increase opportunity driven entrepreneurship. However, it has no influence on the level of necessity entrepreneurship. These results imply that human capital is a key factor to attract better entrepreneurs in emerging and developing countries. 3) For countries with higher human capital level, the strenghtening of the IPR system increases the level of opportunity driven entrepreneurship. Therefore, the TRIPS agreement is beneficial for emerging and developing countries only if the factor of human capital is well developed. 4) For countries with higher human capital level, the strenghtening of the IPR system decreases the necessity driven entrepreneurship. Thus, we confirm the complementary role of intellectual property rights and human capital in eliminating more entrepreneurs and in attracting entrepreneurs with higher quality which is a great challenge for emerging and developing countries.

Our analysis suffers however from some weaknesses. For example, the endogeneity problem was addressed by using first lag of the explanatory variables. Lack of adequate data does not permit to use the Generalised Method of Moments (GMM) which allows to overcome this problem and to deal with omitted dynamics in static panel data models, owing to the ignorance of the impacts of lagged values of the dependent variable. Second, the measure of human capital takes into account only general issue of human capital. It ignores its specific aspect such as entrepreneurs' experience.

For further analyses, we propose new avenues. One possibility is to use other measures for intellectual property rights and human capital and compare the results with those found in

the present paper. A second way is to carry out a survey to identify entrepreneurs who are based on new domestic product and those based on foreign imported product and examine the implications of the two types of entrepreneurial opportunities for the relationship between intellectual property rights, human capital and opportunity driven entrepreneurship.

Notes

(1) In this paper, we adopt the ranking of countries according to the report of the International Monetary Fund (IMF, 2012), which classifies countries into two categories: "Advanced Economies" and "Emerging and Developing Economies". Countries included in our sample are: Argentina, Brazil, Chile, Colombia, Croatia, Hungary, Jamaica, Latvia, Malaysia, Panama, Peru, Romania, Russia, South Africa and Uruguay.

(2) According to the World Bank Database, gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. This ratio can be over 100% as it includes students whose age exceeds the official age group (e.g. repeaters). Thus, if there is late enrollment, early enrollment, or repetition, the total enrollment can exceed the population of the age group that officially corresponds to the level of education – leading to ratios greater than 100%.

References

Acemoglu, D. and Johnson, S., 2005. Unbundling institutions. *Journal of Political Economy*, 113, pp. 949-995.

Acs, Z., 2006. Start-ups and entry barriers: Small and medium-sized firms population dynamics. In: M. Casson, B. Yeung, A. Basu and N. Wadeson (eds.) *The Oxford handbook of entrepreneurship*. Oxford University Press, pp. 194-224,

Aidis, R., Estrin, S. and Mickiewicz, T., 2012. Size matters: entrepreneurial entry and government *Small Business Economics*, 39 (1), pp. 119-139.

Allred, B.B. and Park, W.G., 2007. The influence of patent protection on firm innovation investment in manufacturing industries. *Journal of International Management* 13, pp. 91-109.

Ang, J.B., 2007. Financial reforms, patent protection, and knowledge accumulation in India. *World Development, 38* (8), (2007), pp. 1070-1081.

Arrow, J.K., 1962) Economic welfare and the allocation of resources for invention. In: Universities-National Bureau (ed.) *The rate and direction of inventive activity: economic and social factors.* UMI.

Bamford, C.E., Dean, T.J and Douglas, T.J., 2004. The temporal nature of growth determinants in new bank foundings: Implications for new venture research design *Journal of Business Venturing*, 19 (6), pp. 899-919.

Baptista, R., Karaoz, M. and Mendonça, J., 2014. The impact of human capital on the early success of necessity vs. opportunity-based entrepreneurs. *Small Business Economics*, 42(4), pp. 831-847.

Baumol, W., 1993. *Entrepreneurship, Management, and the Structure of Payoffs*, Cambridge London: The MIT Press.

Baumol, W.J., 1990. Entrepreneurship: productive, unproductive and destructive, *Journal of Political Economy*, 98 (5), pp. 893-921.

Bayon, M. C., Lafuente, E. and Vaillant, Y., 2016. Human capital and the decision to exploit innovative opportunity. *Management Decision*, 54 (7), pp. 1615-1632.

Becker, G.S., 1964. *Human capital: A theoretical and empirical analysis, with special reference to education*. Chicago, IL: University of Chicago Press.

Blanchflower, D.G. 2004. Self-Employment: More may not be better. *NBER Working Paper*, No. 10286.

Bruderl, J., Preisendorfer, P. and Ziegler, R., 1992. Survival chances of newly founded business organizations. *American Sociological Review*, 57 (2), pp. 227-242.

Casson, M. 1982. *The entrepreneur.* Totowa, NJ: Barnes & Noble Books.

Claessens, S. and Laeven, L., 2003. Financial development, property rights, and growth *Journal of Finance*, 58, pp. 2401-2436.

Coleman, J., 1988. Social capital in the creation of human capital. *American Journal of Sociology*, 94, pp. 95-120.

Corbett, A.C., 2007. Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, *22*(1), pp. 97-118.

Davidsson, P. and Honig, B., 2003. The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, *18*(3), pp. 301-331.

Desai, M., Gompers, P. and Lerner, J., 2003. Institutions, capital constraints, and entrepreneurial firm dynamics: evidence from Europe *NBER working paper*, No. 10165,

Dvoulety, O., 2017. Determinants of Nordic entrepreneurship. *Journal of Small Business and Enterprise Development*, 24 (1), pp. 12-33.

Eesley, C., 2016. Institutional barriers to growth: Entrepreneurship, human capital and institutional change. *Organization Science, Articles in Advance*, pp. 1-17.

Estrin, S., Korosteleva, J. and Mickiewicz, T., 2009. Better means more: property rights and high-growth aspiration entrepreneurship *IZA Discussion Paper,* No. 4396.

Estrin, S., Korosteleva, J. and Mickiewicz, T., 2011. Which institutions encourage entrepreneurs to create larger firms? *IZA Discussion Paper*, No. 5481.

Evans, D. and Jovanovic, B., 1989. An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy* 97 (4), pp. 519-535.

Evans, D.S. and Leighton, L.S., 1989. Some empirical aspects of entrepreneurship. *American Economic Review* 79 (3), pp. 519-533.

Furman, J.L., Porter, M.E. and Stern, S., 2002. The determinants of national innovative capacity. *Research Policy* 31, pp. 899-933.

Gaygisiz, E. and Koksal, M.Y., 2003. Regional variations in new firm formation in Turkey: cross-section panel data evidence. *ERC Working papers in Economics* 03/08, September.

Gimeno, J., Folta, T., Cooper, A. and Woo, C., 1997. Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly*, 42, pp. 750-84.

Griffith, R., Redding, S. and Reenen, J. V., 2004. Mapping the two faces of R&D: productivity growth in a panel of OECD industries. *The Review of Economics and Statistics* 86, pp. 883-95.

IMF, 2012. Growth resuming, dangers remain. World Economic Outlook April 2012.

Henrekson, M., 2007. Entrepreneurship and institutions. *Comparative Labor Law and Policy Journal*, 28, pp. 717-742.

Johnson, S., McMillan, J. and Woodruff, C. Property rights and finance. *The American Economic Review* 92 (5), pp. 1335-1356.

Jovanovic, B., 2002. Selection and Evolution of Industry. *Econometrica* 50, (1982), pp. 649-670.

Kauermann, G., Tutz, G. and Bruderl, J., 2005. The survival of newly founded firms: A case-study into varying-coefficient models. *Journal of the Royal Statistical Society Series A-Statistics in Society* 168 (1), pp. 145-158.

Kihlstrom, R.E. and Laffont, J.J., 1979. A general equilibrium theory of firm formation based on risk aversion. *Journal of Political Economy* 87 (4), pp. 719-748.

Kim, L., 2003. Technology transfer & intellectual property rights: The Korean experience. International Centre for Trade and Sustainable Development (ICTSD).

Kim, L., 1980. Stages of development of industrial technology in a developing country: A model. *Research Policy*, 9, pp. 254-277.

Klapper, L., Laeven, L. and Rajan, R., 2006. Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics* 82, pp. 591-629.

Koellinger, P., 2008. Why are some entrepreneurs more innovative than others?, *Small Business Economics* 31 (1), pp. 21-37.

Kumar, N., 2003. Intellectual property rights, technology and economic development: Experiences of Asian countries. *Economic and Political Weekly* 38 (3), pp. 209-226.

Lee, J., Bae, Z.T. and Choi, D.K., 1988. Technology development processes: A model for a developing country with a global perspective. *R&D Management*, 18 (3), pp. 235-250.

Léger, A., 2005. Intellectual property rights in Mexico: do they play a role? *World Development* 33 (11), pp. 1865-1879.

Lin, C., Lin, P. and Song, F., 2010. Property rights protection and corporate R&D: evidence from China. *Journal of Development Economics* 93, pp. 49-62.

Livramento, I.M.H. and Foray, D., 2007. Does IPR protection affect high growth entrepreneurship? A cross-country empirical examination. *Working Paper*.

Lo, S., 2011. Strengthening intellectual property rights: experience from the 1986 Taiwanese patent reforms. *International Journal of Industrial Organization*, pp. 1-13.

Loukil, K., 2016. Role of human resources in the promotion of technological innovation in emerging and developing countries. *Economic Alternatives* 3, pp. 341-352.

Lucas, R. E. On the Size Distribution of Business Firms. *Bell Journal of Economics* 9, pp. 508-523.

Maskus, K.E., 1978. The economics of intellectual property rights and globalization: dancing the dual distortion. In: K.E. Maskus (eds.) *Intellectual property rights in the global economy*. Institute for International Economics, Washington, DC, (2000).

Maskus, K., 2004. The WTO, intellectual property rights and the knowledge economy. In: K. Maskus (ed.) Cheltenham. UK: Edward Elgar Publishing.

Minniti, M. and Lévesque, M., 2008. Recent development in the economics of entrepreneurship. *Journal of Business Venturing* 3 (6), pp. 603-612.

Nelson, R. and Phelps, E., 1966. Investment in humans, technological diffusion and economic growth. *The American Economic Review*, 56(1/2), pp. 69-75.

North, D.C., 1991. Institutions. *The Journal of Economic Perspectives* 5 (1), pp. 97-112.

OECD., 2001. The well-being of nations the role of human and social capital.

Ortega, C.B. and Lederman, D., 2010. Intellectual property rights, human capital and the incidence of R&D expenditures. *Japan and the World Economy* 11, pp. 557-574.

Oxenfeldt, A., 1943. *New Firms and Free Enterprise*. Washington, D.C.: American Council on Public Affairs.

Parker, S., 2007. Law and the economics of entrepreneurship. *Comparative Labor Law and Policy Journal* 28, pp. 695-716.

Pissarides, F., Singer, M. and Svejnar, J., 2003. Objectives and constraints of entrepreneurs: evidence from small and medium-size enterprises in Russia and Bulgaria. *Journal of Comparative Economics* 31, pp. 503-531.

Reynolds, P., Hayand, M. and Camp, S.M., 1999. *Global Entrepreneurship Monitor*, 1999 Executive Report, Paul D. Reynolds, Michael Hay and Kauffman Center for Entrepreneurial Leadership at the Ewing Marion Kauffman Foundation.

Reynolds, P., Storey, D.J. and Westhead, P., 2007. Cross-national comparisons of the variation in new firm formation rates. *Regional Studies*, 41 (1), pp. 123-136.

Robinson, P.B. and Sexton, E.A., 1994. The effect of education and experience on self-employment success. *Journal of Business Venturing*, *9*(2), pp. 141-157.

Shane, S., 2001. Technology regimes and new firm formation. *Management Science* 47 (9), pp. 1173-1190.

Shane, S. and Venkatraman, S., 2000. The promise of entrepreneurship as a field of research. *Academy of Management Journal*, 25, pp. 217-226.

Shane, S., 2000. Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11, pp. 448-469.

Siebeck, W.E., Evenson, R.E., Lesser, W. and Primo Braga, C.A., 1990. Strengthening protection of intellectual property in developing countries, a survey of a literature. *World Bank Discussion Papers*, No. 112.

Singer, S., Amoros, J. E. and Moska, D., 2015. Global entrepreneurship monitor 2014 Global report, Global entrepreneurship research association.

Song, J., Almeida, P. and Wu, G., 2003. Mobility of engineers and international knowledge transfer: Technological catching-up in the Korean and Taiwanese semi-conductor industries. *APEC Study Center Columbia Business School Discussion Paper*, No 19.

Ucbasaran, D., Westhead, P. and Wright, M., 2008. Opportunity identification and pursuit: does an entrepreneur's human capital matter?, *Small Business Economics*, 30 (2), pp. 153-173.

Van Der Sluis, J., Praag, M.V. and Vijverberg, W., 2005. Entrepreneurship, selection and performance: A meta-analysis of the impact of education in less developed countries. *World Bank Economic Review* 19, pp. 225-261.

Van Uden, A., Knoben, J. and Vermeulen, P., 2014. Human capital and innovation in developing countries: A firm level study. *Working Paper, Radboud University Nijmegen Institute for Management Research.*

Wenekers, S., Stel, A.V., Thurik, R and Reynolds, P., 2005. Nascent entrepreneurship and the level of economic development. *Small Business Economics* 24 (3), pp. 293-309.

Wennerkers, S. and Thurik, R., 1999. Linking entrepreneurship and economic growth. *Small Business Economics* 13(1), pp. 27-55.

Westhead, P., Ucbasaran, D. and Wright, M., 2005. Decisions, actions, and performance: Do novice, serial, and portfolio entrepreneurs differ? *Journal of Small Business Management*, 43, pp. 393-417.