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The Effect of Property Rights on Entrepreneurship: Evidence from Some Factor-driven, Efficiency-driven, and Innovation- driven Countries

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Abstract

Entrepreneurship is influenced by many factors and environments such as institutions. Institutions have an important role to play in the individual's tendency toward necessity and opportunity entrepreneurship. The purpose of this paper was to examine the impact of institutional quality (property rights) on opportunity and necessity entrepreneurship. The results, based on unbalanced panel data from 2005 to 2015, showed that property rights did not have a significant effect on the opportunity entrepreneurship in the factor-driven group while it had a negative impact on necessity entrepreneurship. In the efficiency-driven group, protecting property rights would provide the perfect context for opportunity entrepreneurship and reduce necessity entrepreneurship, but in the innovation-driven group, strengthening property rights increased both opportunity and necessity entrepreneurship. These results indicate that the impact of property rights on (opportunity- and necessity-) entrepreneurship depends on the level of economic development of countries.

1. Introduction

Entrepreneurship is a multidimensional and interdisciplinary phenomenon. This phenomenon is influenced by different cultural, social, political, economic, and institutional factors and environments. Entrepreneurship has many different types. Opportunity entrepreneurship (OE) and necessity entrepreneurship (NE) are part of a prevalent pair that was introduced by Global Entrepreneurship Monitor (GEM). Each of these entrepreneurs has different motivations; therefore, their motivation structure is different. These types of entrepreneurs are affected by numerous factors and environments, including institutional factors. On the other hand, it is believed that the level of economic development of countries can

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affect the relationship between the institutional quality and entrepreneurial activities.

Institutional factors as well as the types of entrepreneurship vary considerably. Each of the institutional variables does not have the same effect on the types of entrepreneurship in different countries with different levels of economic development. The legal system and, especially the status of property rights, is an institutional variable that has been considered in some studies and its impact on entrepreneurial activities has been investigated. These studies include [Stephan and Levin \(1996\)](#), [Henrekson \(2007\)](#), [Nystrom \(2008\)](#), [Bowen and De-Clercq \(2008\)](#), [Kobeissi \(2010\)](#), [Troilo \(2011\)](#), [Estrin and Mickiewicz \(2010, 2011\)](#), [Pathak et al. \(2013\)](#), [Estrin et al. \(2013\)](#), and [Fuentelsaz et al. \(2015\)](#). These studies have either focused on a single country or considered a group of homogeneous or heterogeneous countries. This article was hoped to contribute to the literature by considering the level of economic development in countries and examining the impact of property rights on OE and NE in the factor-driven (early stages of development), efficiency-driven (middle stages), and innovation-driven (final stages of development) countries. It was concluded that the status of property rights, which depends on a country's level of economic development, had a different impact on OE and NE.

The rest of the paper is organized as follows: Section 2 is devoted to the theoretical background. In section 3, we focus on the modeling and methods of estimation. Section 4 presents the empirical results. Section 5 is devoted to discussion. Section 6 summarizes the results and offers some conclusions.

2. Theoretical Background

Various divisions of entrepreneurship have thus far been introduced. [Baumol \(1990\)](#) divided entrepreneurship into productive, unproductive, and destructive, [Dau and Cuervo-Cazurra \(2014\)](#) into formal and informal, and Reynold into two categories of OE and NE ([Fuentelsaz et al., 2015](#)). There are some other classifications¹. In the present study, the authors zoomed in on the two categories introduced by [Fuentelsaz et al. \(2015\)](#), namely, OE and NE.

Opportunity Entrepreneurs are people who seek to discover opportunities and exploit them; what they do is considered a kind of productive entrepreneurship. On the contrary, necessity entrepreneurs, whose effort is regarded as a form of unproductive entrepreneurship, need to be forced to work because they do not have access to other business options. OEs use existing opportunities and seek to increase their income while NEs need resources and do not fight for better working options ([Kelley et al., 2012](#)). It, therefore, is clear that each of these individuals has their own motivational structure. This structure is influenced by numerous social, economic, managerial, cultural, political, and

1. These are Public/State; Innovators versus Imitators; Productive, Evasive, and Socially destructive; Productive financial, Productive managerial and Financial managerial; Institutional versus Traditional; Nascent; and Abiding, Evasive, and Altering. See [Samadi \(2018\)](#) for further study.

institutional factors. Institutional environments play an important role in shaping the motivational structure of people, especially entrepreneurs, in society.

The institutional approach, contexts, and factors, and generally environmental factors, are important incentives for encouraging entrepreneurial activities (Fuentelsaz et al., 2015). One of the important theories in this field is the institutional theory of entrepreneurship. This theory attempts to explain the role of institutional factors (such as bureaucracy, the status of tax system, the status of property rights, social capital, the business environment, fiscal freedom, laws and regulations, social security, corruption, financial capital, etc.) and describes the process of entrepreneurship as well as the role of entrepreneurs in making institutional changes. From the perspective of this theory, entrepreneurial activities and the formation of the motivational structure of entrepreneurs are influenced by formal institutions (such as constitutions, laws and regulations, contracts, etc.) and informal institutions (such as attitudes, beliefs, social norms, etc.). Each of these institutions is influenced by various channels. In what follows, we only look at the role of property rights on OE and NE.

It is possible that OE would be followed by a specific discovery or invention. The commercialization of the invention and business startup is the next step that the entrepreneur can do. This will not happen unless the entrepreneur ensures the benefits and returns that will result from this commercialization and business startup for it is possible that their invention has already been copied elsewhere, hence blighting the benefits of their efforts. Thus, if an entrepreneur cannot ensure others of the returns that may follow their investment on his/her, say, startup, he/she cannot be deemed as an OE. Secured property rights affect the motivational structure of individuals and foster entrepreneurship in them. If people's property right is properly defined and secured, individuals will prefer investing in entrepreneurial activities (Whiting, 2006; Fuentelsaz et al., 2015; Zali & Razavi, 2012).

An entrepreneur has an incentive for innovation and entrepreneurship when the benefits of the asset created by them (Rodrik, 2000) and the benefits of exchanging that asset (Estrin et al., 2013) is guaranteed.

On the other hand, poor property rights will increase the transaction costs and the risk of entrepreneurial activities for the entrepreneurs. This increased transaction costs and risk will impede innovation and, in turn, prevent the OEs from creating opportunities and NEs from any entrepreneurial activities (Estrin & Mickiewicz, 2011; Fuentelsaz et al., 2015; Autio & Acs, 2010).

3. Model

The types of entrepreneurship in countries with different economic, cultural, and political structures are influenced by various factors. According to Samadi (2019), in the factor-driven, efficiency-driven, and innovation-driven countries, institutions are the drivers of entrepreneurship in the short-run. It is not possible to consider all factors, including economic, social, cultural, political, managerial, institutional, educational, environmental, etc., in an econometric model; therefore,

the factor(s) should be chosen. In various empirical studies in this field, *economic factors*, such as unemployment rate, income tax, government size and expenditures, physical capital, gross domestic product, foreign direct investment, monetary base, research and development expenditures, and so on, as well as *institutional factors*, such as property rights, fiscal freedom, corruption, rule of law, business freedom, political stability, regulatory quality, social capital, bureaucracy, and so on, have been explored.

In the current study, the authors, inevitably, had to choose some variables among all the possible variables. These variables were thought to influence both OE and NE more significantly than other variables. Accordingly, the *property rights* (Isazade & Mehranfar, 2012; Stephan & Levin, 1996; Henrekson, 2007; Bowen & De-Clercq, 2008; Nystrom, 2008; Kobeissi, 2010; Estrin & Mickiewicz, 2010; Troilo, 2011; Estrin & Mickiewicz, 2011; Pathak et al., 2013; Estrin et al., 2013; Harper, 2013; Fuentelsaz et al., 2015), *fiscal freedom* (Estrin & Mickiewicz, 2010; Troilo, 2011; Herrera-Echeverri et al., 2013; Fuentelsaz et al., 2015), *corruption* (Torrini, 2005; Aidis et al., 2008; Bowen & De-Clercq, 2008; Amoros-Espinosa, 2009; El-Harbi & Anderson, 2010; Castano et al., 2015; Aparicio et al., 2016), *business freedom* (El-Harbi & Anderson, 2010; Fuentelsaz et al., 2015), and *unemployment rate* (Beheshti et al., 2009; Carree et al., 2002; Parker & Robson, 2004; Noorderhaven et al., 2004; Torrini, 2005; Nystrom, 2008; Koellinger & Minniti, 2009; Faria et al., 2010; Fuentelsaz et al., 2015; Halicioglu & Yolac, 2015) were taken as independent variables and OE and NE were selected as the dependent variables. Equation (1) is the econometric model adopted in this paper:

$$\begin{aligned} \ln(E_{it}) = & \beta_0 + \beta_1 \ln(Pro_{it}) + \beta_2 \ln(Fis_{it}) + \beta_3 \ln(Cpi_{it}) + \beta_4 \ln(Bus_{it}) \\ & + \beta_5 \ln(Unem_{it}) + U_{it} \end{aligned} \quad (1)$$

where, E_{it} is entrepreneurship (Nec_{it} for NE and Opp_{it} for OE), Pro_{it} , Fis_{it} , Cpi_{it} , and Bus_{it} indicate property rights, fiscal freedom, corruption and business freedom (as institutional factors) respectively, and $Unem_{it}$ is unemployment rate (as an economic factor). \ln stands for the natural logarithm of the variables.

By performing the Pearson correlation test (results are not reported) among the variables of model (1) for the efficiency-driven and innovation-driven groups, because of the correlation between $\ln(Pro_{it})$ and $\ln(Cpi_{it})$, these variables were considered separately in the model. Therefore, for these countries, models (2) and (3) were estimated.

$$\begin{aligned} \ln(E_{it}) = & \beta_0 + \beta_1 \ln(Pro_{it}) + \beta_2 \ln(Fis_{it}) + \beta_3 \ln(Bus_{it}) \\ & + \beta_4 \ln(Unem_{it}) + U_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} \ln(E_{it}) = & \alpha_0 + \alpha_1 \ln(Cpi_{it}) + \alpha_2 \ln(Fis_{it}) + \alpha_3 \ln(Bus_{it}) \\ & + \alpha_4 \ln(Unem_{it}) + U_{it} \end{aligned} \quad (3)$$

Also, in the factor-driven group, models (4) to (6) were estimated due to the correlation between $\ln(E_{it})$, $\ln(Cpi_{it})$, and $\ln(Fis_{it})$.

$$\ln(E_{it}) = \beta'_0 + \beta'_1 \ln(Pro_{it}) + \beta'_2 \ln(Bus_{it}) + \beta'_3 \ln(Unem_{it}) + U_{it} \quad (4)$$

$$\ln(E_{it}) = \alpha'_0 + \alpha'_1 \ln(Fis_{it}) + \alpha'_2 \ln(Bus_{it}) + \alpha'_3 \ln(Unem_{it}) + U_{it} \quad (5)$$

$$\ln(E_{it}) = \delta_0 + \delta_1 \ln(Cpi_{it}) + \delta_2 \ln(Bus_{it}) + \delta_3 \ln(Unem_{it}) + U_{it} \quad (4)$$

Before estimating models (2) to (6), a set of pretests had to be used for the selection of the type of estimation method (Fig. 1). Initially, a cross-sectional dependence test was used to determine cross-sectional dependency or independency. Also, the structural breaks test was used to diagnose the existence or absence of structural breaks in the data. Based on the results of these tests, Hadri and Rao unit root tests (in the absence of cross-sectional dependency and structural breaks in the data), IPS and ADF tests, or CIPS and CADF (in other modes) were the available options to the researchers. Moreover, based on the F-Leamer, Breusch-Pagan, and Hausman tests, it was also possible to determine the method for estimating the unbalanced panel data model.

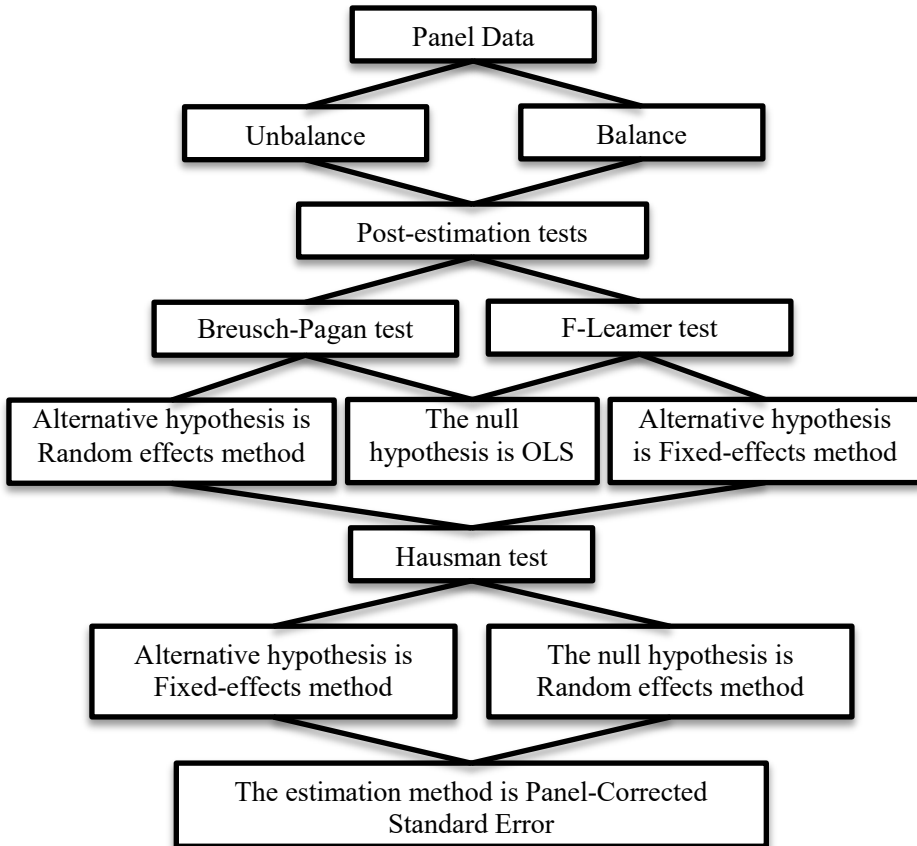


Figure 1. Determining the type of model estimation technique

Source: My own findings

4. Empirical Results

4.1 Data and Pretests

Unbalanced panel data were used for countries belonging to the factor-driven group in the period 2008-2014, countries belonging to the efficiency-driven group in the period 2005-2015, and countries belonging to the innovation-driven group for the years 2005-2015¹.

The Heritage Freedom Index² has been used for *property rights*. This index examines the free choice of individuals, optional transactions, competitiveness, and security of property rights. A higher rating indicates more effective property rights legal protection. This indicator is derived from the weighted average of five factors, including physical property rights, intellectual property rights, strength of investor protection, risk of expropriation, and quality of land administration. The *fiscal freedom* is one of the sub-indices of the Heritage Freedom Index. This indicator reflects the financial pressure imposed on the private sector by government revenues. The *business freedom* shows the ability to start, run, and stop a business by the private sector due to some limiting of laws and regulations. Business freedom score for each country is between 0 and 100. One hundred is the freest business environment. *Corruption Perceptions Index*³ has been used for the corruption. It has a numerical value between 0 and 100, within which zero indicates a very corrupt country and a hundred means a very healthy country. The *unemployment rate* data were also been taken from the International Monetary Fund⁴.

To measure entrepreneurship, several indicators can be used⁵. In this article, and in line with most of the previous studies, two indices of *Necessity-Based Early-Stage Entrepreneurial Activity* and *Opportunity-Based Early-Stage Entrepreneurial Activity* were considered. These data were extracted from the GEM⁶ Report.

Initially, by performing a Pesaran's (2004) cross-sectional dependence test, the cross-sectional dependency or independency of the variables was identified in factor-driven, efficiency-driven, and innovation-driven groups. Then, Pesaran's unit root test (in the presence of cross-sectional dependency) and Im, Pesaran and Shin unit root test (in the presence of the cross-sectional independency) were used⁷. Furthermore, Hadri and Rao unit root test were used in the presence of Structural Breaks. The results showed that all the variables were stationary in all the three groups, namely, factor-driven, efficiency-driven, and innovation-driven. By using the F-Leamer, Breusch-Pagan and Hausman tests for models (2) to (6), the estimation method was determined. F-Leamer test chooses between a pooled

1. The time period is based on the availability of data. The list of countries is presented in Appendix A.

2. www.heritage.org/index/explore

3. www.transparency.org/research/cpi/overview

4. www.imf.org/external/pubs/ft/weo

5. See appendix B and Samadi (2018) for further study.

6. www.gemconsortium.org

7. The results are shown in appendix C, Tables C1-C3.

data model and a fixed effect model. The null hypothesis indicated that the coefficients and intercept were identical in the studied countries. Accordingly, the rejection of the null hypothesis expresses the fixed effect model whereas the acceptance of the null hypothesis means using the least squares for estimating the model. The results of this test are presented in Table 1 for factor-driven, efficiency-driven, and innovation-driven countries.

The Breusch-Pagan test is used to select between the random effects and the pooled data models. In this test, the null hypothesis means the use of the pooled data model and the rejection of the null hypothesis means the use of the random effects model. The results of the Breusch-Pagan test for factor-driven, efficiency-driven, and innovation-driven groups are presented in Table 2.

Table1. The results for F-Leamer test

Factor-driven Countries	Opp.	4	F Stat.	2.38
			Prob.	0.1013
		5	F Stat.	1.77
	Nec.		Prob.	0.1862
		6	F Stat.	1.38
			Prob.	0.2804
Efficiency-driven Countries	Opp.	4	F Stat.	2.66
			Prob.	0.0773
		5	F Stat.	0.18
	Nec.		Prob.	0.9104
		6	F Stat.	2.53
			Prob.	0.0883
Innovation-driven Countries	Opp.	2	F Stat.	3.48
			Prob.	0.00
		3	F Stat.	3.87
	Nec.		Prob.	0.00
		2	F Stat.	3.34
			Prob.	0.00
Innovation-driven Countries	Opp.	3	F Stat.	3.49
			Prob.	0.00
		2	F Stat.	5.54
	Nec.		Prob.	0.00
		3	F Stat.	4.25
			Prob.	0.00
Innovation-driven Countries	Opp.	2	F Stat.	10.47
			Prob.	0.00
		3	F Stat.	8.97
	Nec.		Prob.	0.00
		2	F Stat.	8.97
			Prob.	0.00

Note:

The data used for the Factor-driven countries belonged to the period of 2008-2014; for both Efficiency-driven and Innovation-driven countries, the data were used from the period of 2005-2015.

Table 2. The results for Breusch-Pagan test

Factor-driven Countries	Opp.	4	LM Stat.	0.00
			Prob.	1.000
		5	LM Stat.	0.00
	Nec.		Prob.	1.000
		6	LM Stat.	0.00
			Prob.	1.000
Efficiency-driven Countries	Opp.	4	LM Stat.	0.00
			Prob.	1.000
		5	LM Stat.	0.00
	Nec.		Prob.	1.000
		6	LM Stat.	0.00
			Prob.	1.000
Innovation-driven Countries	Opp.	2	LM Stat.	21.39
			Prob.	0.0000
		3	LM Stat.	32.46
	Nec.		Prob.	0.0000
		2	LM Stat.	11.41
			Prob.	0.0004
Factor-driven Countries	Opp.	3	LM Stat.	13.06
			Prob.	0.0002
		2	LM Stat.	55.87
	Nec.		Prob.	0.0000
		3	LM Stat.	29.25
			Prob.	0.0000
Efficiency-driven Countries	Opp.	2	LM Stat.	101.86
			Prob.	0.0000
		3	LM Stat.	89.39
	Nec.		Prob.	0.0000
		2	LM Stat.	101.86
			Prob.	0.0000
Innovation-driven Countries	Opp.	3	LM Stat.	89.39
			Prob.	0.0000
		2	LM Stat.	101.86
	Nec.		Prob.	0.0000
		3	LM Stat.	89.39
			Prob.	0.0000

Note:

The data used for the Factor-driven countries belonged to the period of 2008-2014; for both Efficiency-driven and Innovation-driven countries, the data were used from the period of 2005-2015

Hausman test can be used to select the method of random effects versus the fixed effects model for estimating unbalanced panel data. Based on this test, the rejection of the null hypothesis implies the use of the fixed effects method. The results of the Hausman test for efficiency-driven and innovation-driven groups are presented in Table 3.

Table 3. The results for Hausman test

			H Stat.	Prob.	
Efficiency-driven	Opp.	2	6.90	0.1413	
		3	3.85	0.4262	
	Nec.	2	11.92	0.0180	
		3	11.80	0.0189	
	Innovation-driven	Opp.	2	4.76	0.3132
			3	8.12	0.0872
Nec.		2	12.04	0.0171	
		3	21.94	0.0002	

Note: The data used for the Efficiency-driven and Innovation-driven countries belong to the period of 2005-2015.

4.2 Factor-driven Countries

Considering the pretests and tests for determining the type of model in this group with two OE and NE indices, for estimating models (4) to (6), the ordinary least squares method was used. The results of the estimation for these models are presented in Table (4).

Table 4. The results for factor-driven countries: OLS method

Variables	Entrep. type	Models								
		(4)			(5)			(6)		
		Coeff.	t Stat.	Prob.	Coeff.	t Stat.	Prob.	Coeff.	t Stat.	Prob.
Ln(Pro)	Opp.	0.07	-0.58	0.56	-	-	-	-	-	-
	Nec.	-0.206	-2.60	0.01*	-	-	-	-	-	-
Ln(Fis)	Opp.	-	-	-	0.78	6.52	0.00*	-	-	-
	Nec	-	-	-	0.50	4.32	0.00*	-	-	-
Ln(Cpi)	Opp.	-	-	-	-	-	-	-0.13	-1.38	0.18
	Nec	-	-	-	-	-	-	-0.16	-4.34	0.00*
Ln(Bus)	Opp.	1.02	7.34	0.00*	0.06	0.46	0.65	1.03	19.44	0.00*
	Nec	1.08	11.15	0.00*	0.24	2.42	0.02**	0.90	15.93	0.00*
Ln(Unem)	Opp.	-0.22	-1.78	0.08***	-0.02	-0.43	0.67	-0.24	-2.56	0.01*
	Nec	-0.14	-1.33	0.19	0.14	1.92	0.06***	-0.00	-0.01	0.98
R ²	Opp.	0.99			0.99			0.99		
	Nec	0.99			0.99			0.99		
F stat.	Opp.	1207.80			3402.27			1637.21		
	Nec	3143.10			3756.38			2400.21		

Notes:

- * significant at 1% level, ** significant at 5% level and *** significant at 10% level.
- (-) indicates that the variable in the model was not used.
- The data used for the OE and NE belonged to the period of 2008-2014.

The results of the estimation from model (4), as shown in Table 4, show that one percent improvement in the status of property rights reduces NE by 0.20% but does not have a significant effect on OE. The weak institutional quality, including the imperfect protection of property rights, in factor-driven countries makes markets inefficient in these countries and their potential for entrepreneurship remains intact.

The results also showed that:

- one percent increase in business freedom increases both OE and NE by 1.02% and 1.08 %, respectively. The easier the business administrative process (greater business freedom), the more OE and NE are promoted.
- one percent increase in the unemployment rate reduces OE by 0.22% but have no significant effect on NE. A higher unemployment rate is associated with a lower rate of new investment and a low rate of business startups.

The results of the estimation from model (5), presented in Table 4, show that one percent increase in the fiscal freedom increases OE and NE by 0.78% and 0.50%, respectively. More fiscal freedom increases the incentive for both OE and NE by potential profits. Business freedom and unemployment rate had no significant effect on OE but increase NE by 0.24% and 0.14%, respectively.

The results of the estimation from model (6), as presented in Table 4, show that one percent increase in the corruption perception reduces the NE by 0.16% but does not have a significant effect on OE. The lower the corruption perception index, the more a person faces a corrupt environment that is constantly changing and unpredictable. In such a situation, NE is needed due to the lack of job opportunities for everyone. Business freedom also increases the OE and NE by 1.03% and 0.90%, respectively. In addition, the unemployment rate reduced OE by 0.24% but had no significant effect on NE.

4.3 Efficiency-driven Countries

The results of estimating models (2) and (3) with two indices, i.e. OE and NE, are presented for efficiency-driven countries by using the Panel-Corrected Standard Error (PCSE) method in Table 5.

The results of the estimation from model (2), as shown in Table 5, show that one percent improvement in the status of property rights increases OE by 0.13% and reduces the NE by 0.14 %. According to some studies, property rights are expected to increase OE and NE but reduces NE in efficiency-driven countries. This reduction could be due to the fact that NE is caused by a lack of labor replacement in the market and as the only option to continue living. In such a situation, entrepreneurs do not pay enough attention to the institutional environment and start an activity without considering the necessary conditions of investment.

Table 5. The results for efficiency-driven countries: Panel-Corrected Standard Error (PCSE) method

Variables	Entrep. type	models					
		(2)			(3)		
		Coeff.	Z Stat.	Prob.	Coeff.	Z Stat.	Prob.
Ln(Pro)	Opp.	0.1357	1.66	0.097***	-	-	-
	Nec.	-0.1425	-2.60	0.009*	-	-	-
Ln(Cpi)	Opp.	-	-	-	0.1875	2.04	0.042**
	Nec.	-	-	-	-0.1966	-2.35	0.019*
Ln(Fis)	Opp.	0.3287	1.80	0.072***	0.2930	2.35	0.019*
	Nec.	1.1095	6.05	0.000*	1.1473	6.25	0.000*
Ln(Bus)	Opp.	0.4970	2.08	0.037**	0.6031	4.12	0.000*
	Nec.	-0.4407	-2.02	0.043**	-0.5454	-2.71	0.007*
Ln(Unem)	Opp.	-0.1366	-2.86	0.004*	-0.1609	-4.50	0.000*
	Nec.	0.4177	6.23	0.000*	0.4305	6.83	0.000*
R ²	Opp.	0.99			0.99		
	Nec.	0.98			0.98		
Wald chi2(4)	Opp.	19452.80			43278.24		
	Nec.	13391.10			14947.91		

Notes:

1. * significant at 1% level, ** significant at 5% level and *** significant at 10% level.
2. (-) indicates that the variable in the model was not used.
3. The data used for the OE and NE belonged to the period of 2005-2015.

Furthermore, one percent increase in the fiscal freedom increases OE and NE by 0.32 and 1.10%, respectively. More fiscal freedom is associated with a smaller public sector and greater economic freedom, ergo increasing both OE and NE. It was also observed that the business growth was reflected more in OE because such businesses had more potential to succeed and make income, thus having more potential to create employment.

One percent increase in the unemployment rate reduces OE by 0.13% and increases NE by 0.41%. Comparing two groups of OE and NE, for a group of entrepreneurs motivated by necessity (NE), due to the lack of other job options, unemployment has a greater impact on their decision to start up a new business. However, for entrepreneurs motivated by opportunity (OE), regardless of what they do to live, they are highly likely to start a new company in order to take advantage of a good opportunity.

The results of the estimation from model (3), presented in Table 5, show that one percent increase in the corruption perception increases OE by 0.18% and reduces NE by 0.19%. The lower the corruption perception index, the more a person may face a corrupt environment that is constantly changing and unpredictable. In such a situation, a person is dissatisfied with the existing structures and organizations and may resort to self-employment (NE). Another finding is that one percent increase in the fiscal freedom increases OE by 0.29% and increases NE by 1.14%. Also, one percent increase in the business freedom increases OE by 0.60% and reduces NE by 0.54 %. One percent increase in the

unemployment rate reduces OE and increases NE by 0.16% and 0.43%, respectively.

4.4 Innovation-driven Countries

The results of estimating models (2) and (3) with two indices, i.e. OE and NE, are presented in Table 6.

Table 6. The results for innovation-driven countries: Panel-Corrected Standard Error (PCSE) method

Variables	Entrep. type	models					
		(2)			(3)		
		Coeff.	Z Stat.	Prob.	Coeff.	Z Stat.	Prob.
Ln(Pro)	Opp.	0.1523	2.04	0.042**	-	-	-
	Nec.	0.2256	1.90	0.057**	-	-	-
Ln(Cpi)	Opp.	-	-	-	0.2834	2.40	0.016*
	Nec.	-	-	-	-0.4086	-1.88	0.060**
Ln(Fis)	Opp.	0.1055	1.80	0.072***	0.1212	2.15	0.031**
	Nec.	1.0219	7.72	0.000*	1.1836	7.00	0.000*
Ln(Bus)	Opp.	0.7447	8.21	0.000*	0.7383	8.05	0.000*
	Nec.	-0.7972	-4.38	0.000*	-0.4249	-1.97	0.049**
Ln(Unem)	Opp.	-0.2038	-5.81	0.000*	-0.1642	-4.76	0.000*
	Nec.	0.5492	8.66	0.000*	0.3269	3.64	0.000*
R ²	Opp.	0.99			0.99		
	Nec.	0.97			0.95		
Wald chi2(4) stat.	Opp.	58679.32			89603.04		
	Nec.	7302.17			4538.66		

Notes:

1. * significant at 1% level, ** significant at 5% level and *** significant at 10% level.
2. (-) indicates that the variable in the model was used.
3. The data used for the OE and NE belonged to the period of 2005-2015.

The results of the estimation from model (2), shown in Table 6 show that one percent improvement in the status of property rights increases OE and NE by 0.15% and 0.22%, respectively. Protecting property rights creates confidence in entrepreneurs to receive rewards in the future, and the poor protection of the property rights increases the risk of entrepreneurial activities. As intellectual property protection is the main motive for entrepreneurial action, it helps entrepreneurs to protect their ideas against imitators.

Another factor that influences entrepreneurship is fiscal freedom. One percent increase in the fiscal freedom increases OE and NE by 0.10% and 1.02%, respectively. Moreover, one percent increase in the business freedom increased OE by 0.74% but reduced NE by 0.79%. Business freedom is a reference to simplify all executive processes. When business freedom is limited, self-employment becomes a means of achieving independence in such a limited condition.

Another finding is that one percent increase in the unemployment rate reduces OE by 0.20% but increases NE by 0.54%. Unemployment as a pressure

factor may reduce opportunities for obtaining wage-earning jobs. Unemployment is essentially a pressure factor on self-employment. Compared to wage earners, the cost of opportunities for unemployed people to become self-employed is relatively low and these low costs will encourage them for taking steps to become self-employed.

The results of the estimation from model (3), as presented in Table 6, show that one percent increase in corruption perception increases OE by 0.28% and reduces NE by 0.40%. The greater the corruption perception index, less corruption is in the environment and more opportunities are present for OE. The tendency for OE in such an environment increases with lower transaction costs and lower uncertainty level.

Furthermore, one percent increase in the fiscal freedom increases OE and NE by 0.12% and 1.18%, respectively. One percent increase in the business freedom increases OE by 0.73% but reduces NE by 0.42%. One percent increase in the unemployment rate reduces OE by 0.16% but increases NE by 0.32%.

Diagnostic tests are presented in Appendix B (Tables B1-B3). The results showed that there was no *heteroscedasticity*, autocorrelation, and multicollinearity.

5. Discussion

The status of property rights protection is an important institutional factor affecting the entrepreneurial environment and entrepreneurs' motivational structure. The lack of a well-defined and efficient system of property rights is an impediment to entrepreneurs and entrepreneurial activities and prevents capital formation and transformation of individuals' assets into real capital (Aidis et al., 2009). Countries are different in terms of property rights protection as well as the level of economic development. Also, entrepreneurship levels and rates vary in countries. In order to examine the relationship between property rights protection and the level of economic development in different countries, on one hand, and the state of entrepreneurship in them, on the other hand, it is possible to classify countries by GEM to factor-driven, efficiency-driven, and innovation-driven countries. Accordingly, in this article, the effect of the status of property rights (as an institutional factor) on the status of entrepreneurship was examined. The summary of the results is presented in Table 7.

Table 7. The summary of the results of the impact of property rights on entrepreneurship

Country type \ Entrepreneurship type	Factor-driven	Efficiency-driven	Innovation-driven
	Opp.	not significant	+
Nec.	-	-	+

A basic feature of factor-driven countries is that they are not able to create value for innovation (Acs et al., 2008). Factor-driven countries selected in this

article were countries that did not have proper development or a good institutional quality. In these countries, the status of property rights protection and entrepreneurship was not appropriate. Also, NE played a greater role in the economy than OE. The findings of this study indicated that the status of property rights had no significant effect on OE while it had a negative impact on NE in the countries referred to earlier. Underdevelopment, high unemployment rate, high income inequality level in most of these countries, along with inappropriate status of property rights, created an uncertainty about the future and became the main obstacles to entrepreneurship. This result is in agreement with the theoretical findings of [Henrekson \(2007\)](#) and [Williams and Vorley \(2015\)](#) and in line with the findings of studies done by [Aidis et al. \(2008\)](#) for Russia and [Fuentelsaz et al. \(2015\)](#) for a group of countries.

Opposite to these countries are the innovation-driven countries that are reported to be rich in terms of entrepreneurial activities¹. In these countries, the proper status of property rights has led to the enhancement of OE and NE activities. This finding is also consistent with findings from studies done by [Torrini \(2005\)](#) and [Nystrom \(2008\)](#) for OECD countries, [El-Harbi and Anderson \(2010\)](#) for 36 countries, [Troilo \(2011\)](#) for 44 countries, [Sambharya and Musteen \(2014\)](#) for 43 mostly innovation-driven countries, and [Fuentelsaz et al. \(2015\)](#) for 63 GEM countries.

Efficiency driven countries are countries that stand in the middle stage of economic development. One of the main features of this group of countries is that self-employment rate (an indicator for NE) follows a downward trend ([Acs et al., 2008](#)). Moreover, in most countries belonging to this group, the status of property rights is improving. Accordingly, the claim that improving property rights can reduce NE and increase OE is not unwarranted.

6. Concluding Remarks

Many empirical studies have been done to examine the factors that affect the level and type (or nature) of entrepreneurship. These studies have been conducted on almost all countries of the world (individually or collectively). In these studies, numerous factors affecting entrepreneurial activity have been investigated and, empirically, tested. The empirical assessment of the impact of institutional factors, in general, and property rights, in particular, has been less explored. Some of the studies that have attempted to explore such area include the following: [Simon-Moya et al. \(2014\)](#), [Fuentelsaz et al. \(2015\)](#), [Aparicio et al. \(2016\)](#), [Angulo-Guerrero et al. \(2017\)](#), and [Brixiova and Egert \(2017\)](#). These studies did not take into consideration the categories suggested by GEM and ignored the impact of the level of economic development in different countries and the status of property rights in them on entrepreneurship. Accordingly, the present study was undertaken and hoped to fill this gap in the literature.

1. To find out more about three reasons for an increased level of entrepreneurial activity in this group of countries, see [Acs et al. \(2008\)](#).

The findings of this article showed that the impact of property rights on types of OE and NE was dependent on the level of economic development of a country. In addition, it was found that improving institutional quality could not necessarily lead to an improvement in entrepreneurship. Based on this finding, it could be proposed that codification policies meant to support entrepreneurship in a given country must focus on that country's level of economic development, i.e. whether it belongs to the factor-driven, efficiency-driven, or innovation-driven group.

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Appendices

Appendix A: The list of countries

Factor-driven countries	Efficiency-driven countries	Innovation-driven countries
Guatemala	Argentina	Belgium
Iran	Bosnia and Herzegovina	Denmark
Jamaica	Brazil	Finland
Uganda	Chile	France
	China	Germany
	Colombia	Greece
	Croatia	Ireland
	Ecuador	Italy
	Hungary	Japan
	Latvia	Korea
	Malaysia	Netherlands
	Mexico	Norway
	Peru	Slovenia
	Romania	Spain
	Russia	Sweden
	South Africa	Switzerland
	Turkey	United Kingdom
	Uruguay	United States

Appendix B: Entrepreneurship Measures

Types of entrepreneurship	Proxy	Sources
OE	<i>Opportunity-Based Early-Stage Entrepreneurial Activity</i>	Acs and Amoros, 2008; Aparicio et al., 2016; Castano et al., 2015; Fuentelsaz et al., 2015; Sambharya and Musteen, 2014; Stephen et al., 2005; Valdez and Richardson, 2013
	<i>Total Early-Stage Entrepreneurial Activity</i>	Koellinger and Minniti, 2009; Levie and Autio, 2008; Wennekers et al., 2005
	<i>Patent Grants</i>	El-Harbi and Anderson, 2010
NE	<i>Necessity-Based Early-Stage Entrepreneurial Activity</i>	Acs and Amoros, 2008; Fuentelsaz et al., 2015; Sambharya and Musteen, 2014; Valdez and Richardson, 2013
	<i>Total Early-Stage Entrepreneurial Activity</i>	Autio and Acs, 2010; Wennekers et al., 2005;
	<i>Self-employment Rate</i>	El-Harbi and Anderson, 2010

Appendix C: Cross-sectional dependence and unit root tests**Table C1. The results of Pesaran's Cross-Sectional Dependence test**

variables	Factor-driven			Efficiency-driven			Innovation-driven		
	CD Stat.	significant level	Independence or dependence	CD Stat.	significant level	Independence or dependence	CD Stat.	significant level	Independence or dependence
Ln(Nec)	-1.27	0.20	Independence	-0.70	0.48	Independence	1.79	0.07	Independence
Ln(Opp)	-0.31	0.75	Independence	0.85	0.39	Independence	2.15	0.03	dependence
Ln(Pro)	-1.64	0.101	Independence	-0.54	0.58	Independence	2.50	0.01	dependence
Ln(Fis)	-0.89	0.37	Independence	0.21	0.83	Independence	4.84	0.00	dependence
Ln(Bus)	1.22	0.22	Independence	0.63	0.52	Independence	17.00	0.00	dependence
Ln(Cpi)	0.03	0.97	Independence	4.29	0.00	dependence	7.90	0.00	dependence
Ln(Unem)	-0.77	0.44	Independence	4.29	0.00	dependence	15.09	0.00	dependence

Table C2. The results of Pesaran Unit Root Test

variables	Efficiency-driven								Innovation-driven								
	Test with intercept				Test with trend				Test with intercept				Test with trend				
	With no lag		with one lag		With no lag		with one lag		With no lag		with one lag		With no lag		with one lag		
	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	z Stat.	Prob.	
Ln(Opp)	-	-	-	-	-	-	-	-	-	-2.99	0.00	-0.76	0.22	-1.64	0.05	1.95	0.97
Ln(Pro)	-	-	-	-	-	-	-	-	-	-2.88	0.00	1.28	0.90	-1.88	0.03	0.17	0.57
Ln(Fis)	-	-	-	-	-	-	-	-	-	0.28	0.61	0.97	0.83	1.66	0.87	1.94	0.97
Ln(Bus)	-	-	-	-	-	-	-	-	-	0.05	0.52	1.74	0.95	-3.25	0.00	1.11	0.86
Ln(Cpi)	0.58	0.72	3.34	1.00	1.73	0.95	3.63	1.00	-1.17	0.12	-0.60	0.27	-0.42	0.33	3.27	0.99	1.00
Ln(Unem)	1.15	0.87	2.63	0.99	1.23	0.89	6.36	1.00	2.46	0.99	2.81	0.99	5.30	1.00	3.38	1.00	1.00

Note: (-) indicates that the Pesaran unit root test was not done for that variable. Instead, due to the existence of a cross-sectional independency between the variables, Im, Pesaran and Shin unit root test were done.

Table C3. The results of Im, Pesaran and Shin unit root test

variables	Factor-driven					
	Test with intercept				Test with trend	
	With no lag		with one lag		With no lag	
	w-t-bar Stat.	Prob.	w-t-bar Stat.	Prob.	w-t-bar Stat.	Prob.
Ln(Nec)	-1.8175	0.0346	0.9981	0.8409	-2.4013	0.0082
Ln(Opp)	-1.7677	0.0386	2.5587	0.9947	-11.9132	0.0000
Ln(Pro)	0.7284	0.7668	-0.2989	0.3825	0.7881	0.7847
Ln(Bus)	-0.5386	0.2951	-0.8118	0.2085	-0.9607	0.1684
Ln(Unem)	-9.1667	0.0000	-6.7541	0.0000	-7.0927	0.0000
Ln(fis)	0.7024	0.7588	-2.1586	0.0154	0.0716	0.5286
Ln(Cpi)	-0.4817	0.3150	-0.0943	0.4624	0.0832	0.5332

Note: The data used for the Factor-driven countries belonged to the period of 2008-2014.

Table C3(Continued). The results of Im, Pesaran and Shin unit root test

variables	Efficiency-driven				Innovation-driven											
	Test with intercept		Test with trend		Test with intercept		Test with trend									
	With no lag	with one lag	With no lag	with one lag	With no lag	with one lag	With no lag	with one lag								
	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.	w-t-bar Stat. Prob.								
Ln(Nec)	-3.49	0.00	-3.64	0.00	-2.11	0.01	-1.16	0.12	-3.44	0.00	-0.79	0.21	-2.89	0.00	-0.41	0.34
Ln(Opp)	-6.32	0.00	-4.08	0.00	-4.91	0.00	-3.04	0.00	-	-	-	-	-	-	-	-
Ln(Pro)	-11.6	0.00	-3.1	0.00	-7.05	0.00	-8.53	0.00	-	-	-	-	-	-	-	-
Ln(Bus)	-6.3	0.00	1.13	0.87	-5.19	0.00	1.95	0.97	-	-	-	-	-	-	-	-
Ln(fis)	-1.96	0.02	-4.55	0.00	-1.72	0.04	-3.3	0.00	-	-	-	-	-	-	-	-

Notes:

1. (-) indicates that the Im, Pesaran, and Shin unit root test were not done for that variable. Instead, due to the existence of a cross-sectional dependence between the variables, Pesaran unit root test was done.

2. The data used for Efficiency-driven and Innovation-driven countries belonged to the period of 2005-2015.

Appendix D: Diagnostic Tests

Table D1. The results of Heteroscedasticity test

Factor-driven Countries	Opp.	4	BP Stat.	1.41	
			Prob.	0.2349	
		5		BP Stat.	1.82
				Prob.	0.1778
		6		BP Stat.	0.56
				Prob.	0.4542
Efficiency-driven Countries	Nec.	4	BP Stat.	6.71	
			Prob.	0.0096	
		5		BP Stat.	7.41
				Prob.	0.0065
		6		BP Stat.	4.54
				Prob.	0.0331
Innovation-driven Countries	Opp.	2	LR Stat.	47.26	
			Prob.	0.0001	
		3		LR Stat.	48.23
				Prob.	0.0001
	Nec.	2		Wald Stat.	707.59
				Prob.	0.0000
	3		Wald Stat.	684.49	
			Prob.	0.0000	
Factor-driven Countries	Opp.	2	LR Stat.	68.50	
			Prob.	0.0000	
		3		LR Stat.	55.06
				Prob.	0.0000
	Nec.	2		Wald Stat.	564.55
				Prob.	0.0000
	3		Wald Stat.	690.01	
			Prob.	0.0000	

Notes:

1. The Wald test was used to determine the existence or absence of Heteroscedasticity in the fixed effects model and the Likelihood-ratio test was used to determine the existence or absence of a Heteroscedasticity in the random effects model. For OLS model, Breusch-Pagan test was used to determine Heteroscedasticity.

2. The null hypothesis was Homoscedasticity. Null hypothesis was rejected and it could be concluded that there was Heteroscedasticity for both NE and OE indices in the Efficiency-driven and Innovation-driven countries and OE index in the Factor-driven countries.

Table D2. The results of Autocorrelation test

Factor-driven Countries	Opp.	4	F Stat.	4.734
			Prob.	0.1178
	Opp.	5	F Stat.	4.966
			Prob.	0.1122
	Opp.	6	F Stat.	4.886
			Prob.	0.1141
Efficiency-driven Countries	Nec.	4	F Stat.	0.672
			Prob.	0.4726
	Nec.	5	F Stat.	0.839
			Prob.	0.4272
	Nec.	6	F Stat.	0.572
			Prob.	0.5043
Innovation-driven Countries	Opp.	2	F Stat.	0.004
			Prob.	0.9497
	Opp.	3	F Stat.	0.276
			Prob.	0.6062
	Nec.	2	F Stat.	9.273
			Prob.	0.0063
Nec.	3	F Stat.	10.181	
		Prob.	0.0054	
Innovation-driven Countries	Opp.	2	F Stat.	2.731
			Prob.	0.1168
	Opp.	3	F Stat.	2.805
			Prob.	0.1123
	Nec.	2	F Stat.	0.500
			Prob.	0.4891
Nec.	3	F Stat.	0.617	
		Prob.	0.4430	

Notes:

1. The Wooldridge test was used to determine the existence or absence of Autocorrelation.
2. The null hypothesis was no serial correlation. Null hypothesis was accepted and it could be concluded that the data did not have first-order autocorrelation for factor-driven and innovation-driven countries for both NE and OE indices and efficiency-driven countries for OE index.

Table D3. The results of Multicollinearity test

Countries	Model	Amount of VIF for The explanatory variables				
		Ln(Pro)	Ln(Fis)	Ln(Bus)	Ln(Cpi)	Ln(Unem)
Factor-driven	4	1.40	-	1.79	-	1.86
	5	-	1.16	1.49	-	1.42
	6	-	-	1.43	1.07	1.42
Efficiency-driven	2	1.51	1.18	1.70	-	1.06
	3	-	1.17	1.27	1.13	1.06
Innovation-driven	2	1.54	1.07	1.44	-	1.16
	3	-	1.16	1.38	1.77	1.31

Note: The variance inflation factor (VIF) value of each regressors is less than 10, so there is no Multicollinearity between the explanatory variables.