THE RELATIONSHIP BETWEEN ENTREPRENEURSHIP AND ECONOMIC FREEDOM

By

Bernardo Bandeira de Mello

Submitted to

Central European University

Department of Economic and Business

In partial fulfillment of the requirements for the degree of Master of Arts in Economics

Supervisor: András Danis

Vienna, Austria

2022

ABSTRACT

This study contributes to the empirical literature on the determinants of entrepreneurship across different countries. This paper examines the relationship between entrepreneurship and institutional settings, measured by the economic freedom index. The methodology used was a panel data regression with time and country fixed effects for 57 different countries across the globe from 2001 to 2018. The measurement used for entrepreneurship is the Total Entrepreneurial Activity (TEA) created by the Global Entrepreneurship Monitor (GEM) and the measurement for economic freedom was the Economic Freedom Index created by the Fraser Institute which assesses the quality of institutions for five different sectors: size of government, legal system and property rights, sound money, freedom to trade internationally, and regulations of credit, labor, and business. The empirical findings of this study point out for positive relationship between the government size score and entrepreneurship rates, as well to a negative relationship between trade freedom, and business regulation with the TEA. Also, the analysis indicates that countries that used to be communist tend to have smaller entrepreneurship rates, while Latin American countries are inclined to have higher rates.

ACKNOWLEGMENTS

The completion of this study could not have been possible without the assistance of my supervisor András Danis. His advice and guidance helped me along all the steps of writing this master thesis.

I also would like to thank all my family specially my parents Maria Paula and Alexandre that helped me whenever necessary, not only during the writing of the project but since the beginning when I first approached them with the idea of pursuing a masters abroad. The same could be said about my girlfriend Bruna, that not only supported me to come far away to complete my dream but encouraged me during all the steps of this journey, and without her assistance during these two years it would have been tremendously more difficult.

Finally, I would like to thank my friends back home mostly from the groups “Cartola” and “Bote esse”, few people in the world were happier for me and also provided company during many nights, especially during the pandemic. And also, Szilvia Flanek and all my classmates that endured this long ride through exams, assignments, and all academic work that we have done together.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. INTRODUCTION

Entrepreneurship in the economic literature has been increasingly gaining importance in the last few decades. If in the past, just a few researchers explored it, today it has changed to been seen as a fundamental determinant for economic growth (Reynolds et al, 1990). Naturally, entrepreneurship rates are expected to vary across time and different regions, however, the truth is that the determinants of entrepreneurial activity are still relatively unexplored. In one of the most influential works in the field, Wennekers et. al. (2005) pointed out to cultural factors to be cidered a fundamental element in explaining the differences across countries. For Sobel et al. (2007) the institutional backgrounds of a nation could be an essential element in explaining these unexplored differences in entrepreneurship. For him, countries with a fair judicial system, security of property rights, smaller bureaucracy, and effective contract enforcement would provide the necessary backbone for the proliferation of new entrepreneurs.

In the economic literature, the idea that institutions are fundamental for society is present for at least 30 years. Influential studies such as Acemoglu et al. (2001) revealed the importance of the quality of the institutions for economic growth, and North (1991, 1994) highlighted the significant influence that both formal and informal institutions have on shaping the incentive structure in society and therefore impacting economic performance. With such an effect, would be natural to expect that the institutions would also affect the decision of an individual to become an entrepreneur.

Economic freedom has been one of the most used measurements for institutions in previous studies in the field. Also, it is possible to notice that the idea of economic freedom being an important factor for economic development has been a foundation in the theory since the

beginning, with prominent works such as Smith (1776) and Ricardo (1821). However, the assessment of the impact of economic freedom has been mostly focused on inequality and economic growth.

The question that remains is: if the relationship between economic freedom and macroeconomic terms has been investigated and found to be significant, could a similar link be found in more micro-level terms such as entrepreneurship? This direct connection between economic freedom and entrepreneurship is also relatively unexplored, a few studies such as Nyström (2008) and Bjørnskov and Foss (2008) were the first to try to contribute. However, for the former, the study focused only on developed countries from the OCDE and the measurement for entrepreneurship used was still self-employment, which could be said, that today there exist better approaches. And the latter analyzed a cross-country study just for a single year.

Based on the previous studies and analysis, a hypothesis regarding the causal relationship of these variables would be that, even though it is difficult to say with perfect exogeneity as it is in many relationships in the macroeconomic literature, economic freedom could be a strong determinant for entrepreneurship which, as previously discovered, has a strong effect on economic performance, consequently the topic could have major relevance. With these points in mind, this study tries to contribute to the literature on the determinants of entrepreneurship across countries by using a fixed effect panel data model with a dataset from 2001 to 2018 for 57 countries across all continents of the globe. The measurement used for entrepreneurship was first used by Reynolds et al. (2005) and it is called TEA (Total Early-stage Entrepreneurial Activity) – the percentage of the economic active population involved with entrepreneurship - and for economic freedom was used the Economic Freedom Index, an index provided by the Fraser Institute that tries to measure the degree of freedom of a country by evaluation five different areas: size of government, legal

system and property rights, sound money, freedom to trade internationally and regulation of credit, labor, and business.

The rest of this paper is organized as follows: Section 2 goes through all the extensive literature on entrepreneurship, institutions, and economic freedom and finalizes the intersection of them. Section 3 describes the data used and how the variables are defined. Section 4 is the methodology, and it explains all the empirical background for the panel data analyses that will be implemented and a few specifications of the model. Section 5 presents the empirical findings with regression tables and the interpretation of the coefficients. Finally, section 6 concludes the study and suggests future research.

2. LITERATURE REVIEW

The last few years have seen an enormous increase in the number of economic studies involving entrepreneurship. Entrepreneurs today are considered to be important, and for some as Sobel et al (2007) could be characterized as essential for development and economic progress. The interest in studying the impact of entrepreneurs, in the beginning, focused mostly on the influence of entrepreneurship on economic growth. In one of the first study cases in the field, Saxenian (1994) pointed out the high capacity for promoting entrepreneurship as the reason behind the superior performance of the economy of Silicon Valley. Following the same line, Baumol (2002) suggested that an important part of the unexplained growth in the traditional production functions models could be clarified by entrepreneurship activity. For him, while the traditional factors, such as physical and human capital, for example, accounted for much of the economic output, the capacity to create innovation while founding new companies could also be crucial for the economy.

The next question to be answered was how entrepreneurship could help to explain the great differences in the rates of economic growth between geographic areas. Reynolds et al. (1990) and Zacharakis et al. (2000) even affirmed that big differences such as one-third to one-half of a nation's economic growth rate could be explained by variations in entrepreneurship rates. Other studies such as Ovaska and Sobel (2005) presented the case for entrepreneurship rates to be an explanation for the divergent economic path of former Soviet States. Berkowitz and DeJong (2005) went for a different approach where they discovered that within the same country, differences in entrepreneurship rates explained some of the variations in economic growth when analyzed for different periods. This relationship inside a country was also found to be true when analyzed across U.S. States (Kreft and Sobel, 2005).

However, what is the actual definition here of entrepreneurship and how can it be measured? It is possible to say that the first to introduce the concept and term of the entrepreneur was Cantillon (1755), even two decades before the *Wealth of Nations*. During the history of economic literature, many concepts and definitions were made regarding entrepreneurship. One of the first and most famous definitions is from Schumpeter (1911) where he describes entrepreneurship as innovation. For him, the role of the entrepreneur introduces "new combinations" – new markets, industrial combinations, new products, etc – removing the economy from its previous equilibrium in a process that has been called "creative destruction" (Schumpeter, 1942).

Another conceptualization that is worth highlighting, is entrepreneurship as alertness and discovery. Mainly composed by Kizner (1997) following the footsteps of Hayek (1968), it defines the source of the entrepreneurial up-hand as its alertness. In a general concept, the entrepreneur is attentive to a production method or invention, thus his alertness will guarantee that he will be the first one to put up in the economy, and their profit comes from having these insights or pieces of knowledge that it was hidden for others. From both of the previous definitions and following the work of Bjørnskov & Foss (2008), the definition of entrepreneurship used in this study can be described as the "manifest ability and willingness of the individual to pursue new economic opportunities and to introduce their ways of seizing these opportunities in the market in the face of uncertainty". Opportunities, in this case, can be said to be new production methods, new products, new modes of organization, etc.

The other major question to be answered is to understand the measurement of entrepreneurship. The problem is that this measurement can be very tricky because many of the elements that determine entrepreneurship are not easily quantified, making it to be very

heterogeneous when compared between different regions. As Audretsch & Keilbach (2004) defined, to include a perfect measurement of entrepreneurship would be necessary to include a variety of policies, institutions, and historical, social, and cultural traditions. Despite that, the concept and measurements of entrepreneurship in the economic literature have evolved and transformed over time. It is possible to see, to cite a few examples, research that uses self-employment for this measurement (Nyström, 2008) or other papers used the number of new firms started in a region relative to the size of that region, named 'entrepreneurship capital' (Audretsch & Keilbach, 2004). In another suggestion, Reynolds et al. (2005) used a different methodology, it still followed the lines of entrepreneurship capital but now its main indicator was the Total Entrepreneurship Activity (TEA) – the fraction of the adult population involved with the entrepreneurial process. Used for many different studies regarding the comparison between distinct regions, this new indicator had substantial success as it was more uniform between different countries.

Independent of the measurement and definition, one thing is for certain, entrepreneurship will vary over time and in different locations. Wennekers et al. (2005) analyzed the problem and contributed by saying that cultural factors played a major role in the distinct states of entrepreneurship in different countries. One good example would be to compare the United States, where the country has a relatively large number of entrepreneurs exploring many different industries, to Sweden, also a developed country but the formation of new enterprises is rare. Nonetheless, there is still a big factor in the air, and that is what is called the political institutions. Many authors previously referred to institutions as one of the determinants in entrepreneurship, Baumol (1990) predicted this effect by analyzing historical evidence from different societies across time such as ancient Rome, early China, and Middle Ages. Boettke et al (2001) also pointed

out this effect by comparing different institutions between communist and capitalist countries, and how they shape economic behavior. However, it was Sobel et al. (2007) that better defined the importance of the institutions impacting the entrepreneurs, for him nations with institutions that provide effective contract enforcement, a fair judicial system, and security of property rights would be the ones where individuals would be more likely to engage in the creation of new wealth. Those would be the individuals that would have been influenced to take the "hidden" opportunities and transform them in the economy.

To understand better the impact of institutions on entrepreneurship, it would first be important to define what institutions are and what research has been done relating them to the economic literature. It is possible to describe institutions as the "rules of the game", which could be informal as norms, customs, and social networks and could also be formal, such as the judiciary and bureaucracy (Nyström, 2008). Since the work of North (1991, 1994) there exist arguments for how important those institutions are in shaping the incentive structure present in society. It is important to refer to the influential work of Acemoglu et al. (2001) where it was presented the argument of how the quality of these institutions is crucial for the growth of a nation's economy.

One of the most commonly used measures of institutions is the state of economic freedom of a country. The general idea that economic freedom is important for economic development is present in the economic literature since the primordial works of the literature. Smith (1776) in his famous book the *Wealth of Nations* already suggested the principle of the "invisible hand" of the greater social benefits and public good brought about by individuals acting in their self-interests for the well-functioned markets, and Ricardo (1821) advocated for the crucial part of free trade for the development of economies. For the measurement of economic freedom, various empirical studies used the Economic Freedom Index (EFI) published annually by the Fraser Institute

(Gwartney et al. 2021), in general, these studies explored the relationship between the economic freedom variables and macro-economic variables such as inequality and growth (Carter 2007, Doucouliagos and Ulubasoglu 2006).

Knowing this crucial role of institutions in shaping the incentive structures in a society, it would be natural to assume that the decision to become an entrepreneur would also be affected by the same relationship. The institutions of economic freedom are found to have this economic impact on the macro-level, however, could the same be said about the micro-level, therefore impacting entrepreneurship? This relationship is somewhat unexplored in the empirical economic literature. The first contributions were Sober et al. (2007) and Bjørnskov and Foss (2008) who found a positive and significant effect for government size, in other words, the smaller the government sectors tend to be, the higher the entrepreneurship rate. Nevertheless, both these works focused on a cross-section study but for only one single year. Nyström (2008) also tried to explore this relationship, this time with panel data. The study also confirmed the government size effect to be significant and positive, and also found positive effects for countries that possess better legal structure and better regulations for credit, labor, and business. However, the paper focused on the period 1972-2002, does not include countries from outside the OCDE, and used self-employment as a measurement of entrepreneurship.

3. DATA

This section provides context, description, and sources of the variables used in the analysis, the measurements for entrepreneurship, economic freedom, and other few macroeconomic variables for the controls in the used regression. All variables are collected for the countries with intersected available data that ranges from the period 2001 to 2018 and contains 57 countries. The chosen nations are from all continents in the world, with developed and developing economies, and different historical economic backgrounds.

3.1 Entrepreneurship

For this work, the choice of measurement for entrepreneurship will be the Total early-stage Entrepreneurial Activity (TEA). The assessment can be defined as the fraction of the 18-64 population who are either nascent entrepreneurs or owner-manager of a new business. The data is gathered by the Global Entrepreneurship Monitor (GEM), a research project that performs an annual assessment of the national level of entrepreneurial activity in multiple, diverse countries. The TEA specifically comes from the Adult Population Survey (APS) - a comprehensive questionnaire, administered to a minimum of 2000 adults in each GEM country, designed to collect detailed information on the entrepreneurial activity, attitudes, and aspirations of respondents. These variables developed by the GEM allowed for what appears to be the first time a measurement of business creation that also accounts for the social context (Wennekers et al, 2005).

Table 1 Summary statistics: Total Entrepreneurial Activity (TEA) – 2001-2018

	Mean	SD	Min	Max
Angola	28.6	7.75	21.5	40.8
Argentina	14.1	3.97	6.0	20.8
Australia	11.8	2.15	7.8	14.7
Austria	7.8	3.23	2.4	10.9
Belgium	4.1	1.11	2.7	6.2
Bosnia	7.3	2.15	4.0	10.3
Brazil	15.4	3.03	11.3	21.0
Canada	12.3	4.10	7.1	18.8
Chile	19.2	5.89	9.2	26.8
Colombia	22.0	2.41	18.5	27.4
Croatia	6.9	2.04	2.6	9.6
Denmark	5.2	1.04	3.6	7.2
Ecuador	27.2	6.99	15.8	36.0
Egypt	10.4	3.13	7.0	14.3
Estonia	14.3	3.36	9.4	19.4
Finland	5.7	1.26	3.1	8.2
France	4.8	1.23	1.6	6.1
Germany	4.9	0.63	3.8	6.3
Greece	6.8	1.38	4.8	9.9
Guatemala	19.7	4.45	12.3	27.5
Hong Kong	5.4	3.29	3.0	9.9
Hungary	7.3	2.28	1.9	10.9
Indonesia	16.1	5.58	7.5	25.5
India	10.5	2.31	6.6	16.0
Ireland	8.5	1.49	6.2	11.4
Iran	12.4	1.97	9.2	16.0
Iceland	11.3	1.14	10.1	13.6
Israel	8.2	3.00	5.0	12.8
Italy	4.5	1.43	2.4	9.1
Jamaica	15.9	4.37	9.9	22.7
Japan	3.6	1.22	1.5	5.4
Korea	9.8	3.40	6.6	14.7
Latvia	10.5	3.60	4.5	14.2
Mexico	13.0	4.84	5.3	21.0
Malaysia	7.4	5.45	2.9	21.6
Netherlands	7.3	2.58	3.6	12.3
Norway	7.4	1.16	5.7	9.1
Panama	14.8	4.18	9.5	20.8
Peru	26.4	6.30	20.2	40.3
Poland	8.3	1.97	4.0	10.7
Portugal	7.5	2.03	3.8	10.0
Romania	7.6	3.19	4.0	11.3
Russia	4.4	1.17	2.5	6.3
Singapore	7.5	2.62	4.8	11.6
Slovakia	11.0	1.66	9.5	14.2
Slovenia	5.3	1.35	2.6	8.0
Spain	5.9	0.90	4.3	7.6
Sweden	5.6	1.60	3.4	8.2
Switzerland	7.0	0.99	5.0	8.5
Thailand	19.4	3.52	13.7	26.9
Turkey	10.1	3.80	5.6	16.1
Uganda	31.7	3.79	25.2	35.8
UAE	8.1	3.25	3.7	13.3
United King.	7.0	1.45	5.4	10.7

Uruguay	13.9	1.68	11.7	16.7
United States	11.6	1.99	7.6	15.6
South Africa	7.3	2.02	4.2	11.0

3.2 Economic Freedom Index

Published by the Fraser Institute, the index published in Economic Freedom of the World tries to quantify the amount in which institutions and government policies agree with economic freedom. Berggren (2003) defined the index as an attempt to measure the degrees to which a country's economy aligns itself with the free market. Starting in 1970, the index was issued every fifth year until 2000. From there it is now published every year. Their last public edition in 2019, contained jurisdiction for 165 countries, with available data for at least 120 countries starting from 2000.

The Index is a "grade" composed of the average of five different areas: size of government, legal structure and security of property rights, access to sound money, freedom to trade internationally, and regulation of credit, labor, and business. Each of the five areas is composed of smaller components totaling 37 subcomponents. All the components and subcomponents are placed on a zero-to-ten scale that reflects the data distribution. Thus, all the five sectors' grades are derived from the average of the smaller scores.[1]

Size of the Government – The goal of this component is to try to measure the amount in which there is government intervention in the economy. It contains grades for top marginal tax rates, state ownership of assets, transfers, and subsidies, government investment, and government consumption.

[1] For details about the raw data underlying the objective components of the index and how they were transformed to the zero-to-ten scale, see the Appendix of Gwartney et al (2021).

Legal system & property rights – The idea behind this component is to measure how well property and contractual rights are established and enforced in the examined countries. It is composed of judicial independence, impartial courts, protection of property rights, military interference in law and politics, the integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, and reliability of police.

Sound Money – This element of the index comes with the idea that a stable monetary environment is important for the characterization of an "economic free" economy. It is constituted by money growth, the standard deviation of inflation, inflation of the most recent year, and the freedom to own foreign currency bank accounts.

Freedom to trade internationally – This section of the index tries to measure the size of the impact that protectionism has on the country's respective economies. It is made of grades for trade tariffs (mean tariff rate, revenue from trade taxes, and standard deviation of tariff rates), regulatory trade barriers, black market exchange rates, and controls of the movement of capital and people.

Regulation of credit, labor, and business – The most complex component of the index, this section includes a large range of aspects. First, is the credit market regulation, which is composed of ownership of banks, private sector credit, and interest rate controls. Second, the labor market regulations grade is constituted of hiring regulations and minimum wage, hiring and firing regulations, centralized collective bargaining, hours regulations, mandated cost of worker dismissal, and conscriptions. Finally, the last piece of this index is the business regulations, divided into administrative requirements, regulatory burden, starting a business, impartial public administration, licensing restrictions, and tax compliance.

Table 2 Economic Freedom Index (2001-2018) - Descriptive Statistics – Mean (Standard Deviation)

	Summary	Government Size	Legal System	Sound Money	Trade Freedom	Business Regulation
Angola	5.1	6.4	3.4	5.3	5.1	5.2
	(0.35)	(0.96)	(0.13)	(1.46)	(0.99)	(0.34)
Argentina	5.9	6.8	4.5	6.5	5.7	5.9
	(0.51)	(0.81)	(0.19)	(1.02)	(1.38)	(0.26)
Australia	8.2	6.9	8.4	9.4	7.6	8.5
	(0.09)	(0.17)	(0.13)	(0.13)	(0.16)	(0.20)
Austria	7.9	5.6	8.2	9.5	8.4	7.6
	(0.05)	(0.12)	(0.14)	(0.11)	(0.29)	(0.09)
Belgium	7.6	4.9	7.2	9.6	8.5	7.9
	(0.08)	(0.19)	(0.38)	(0.15)	(0.25)	(0.28)
Bosnia	6.8	6.1	4.7	8.3	7.5	7.3
	(0.15)	(0.39)	(0.38)	(0.21)	(0.28)	(0.22)
Brazil	6.5	7.1	5.5	8.0	6.9	4.9
	(0.21)	(0.25)	(0.33)	(0.72)	(0.19)	(0.27)
Canada	8.2	6.7	8.1	9.5	8.1	8.7
	(0.06)	(0.15)	(0.13)	(0.18)	(0.35)	(0.15)
Chile	7.9	7.8	6.7	9.2	8.4	7.3
	(0.08)	(0.27)	(0.23)	(0.25)	(0.28)	(0.21)
Colombia	6.6	6.7	4.7	7.9	6.7	7.0
	(0.20)	(0.33)	(0.11)	(0.26)	(0.27)	(0.55)
Croatia	6.9	5.2	5.6	8.7	7.8	7.1
	(0.43)	(0.45)	(0.53)	(0.65)	(0.38)	(0.28)
Denmark	8.1	4.8	8.7	9.6	8.8	8.5
	(0.07)	(0.26)	(0.17)	(0.16)	(0.20)	(0.18)
Ecuador	6.2	7.4	4.2	6.4	7.2	6.1
	(0.20)	(0.83)	(0.23)	(1.32)	(0.41)	(0.43)
Egypt	5.8	5.7	3.5	8.5	6.1	5.0
	(0.36)	(0.43)	(0.29)	(1.02)	(0.60)	(0.28)
Estonia	8.0	6.6	7.3	9.2	8.6	8.0
	(0.11)	(0.32)	(0.38)	(0.24)	(0.11)	(0.28)
Finland	7.9	5.2	8.7	9.5	8.5	7.7
	(0.08)	(0.19)	(0.07)	(0.12)	(0.26)	(0.18)
France	7.6	5.3	7.3	9.6	8.5	7.4
	(0.08)	(0.29)	(0.25)	(0.13)	(0.20)	(0.11)
Germany	7.9	6.2	8.0	9.5	8.4	7.1
	(0.09)	(0.15)	(0.13)	(0.09)	(0.35)	(0.78)
Greece	7.1	5.8	6.0	9.3	8.2	6.4
	(0.23)	(0.84)	(0.31)	(0.60)	(0.32)	(0.53)
Guatemala	7.5	8.9	4.6	9.3	8.4	6.5
	(0.22)	(0.44)	(0.40)	(0.20)	(0.21)	(0.22)
Hong Kong	9.0	8.8	7.8	9.4	9.5	9.2
	(0.10)	(0.21)	(0.25)	(0.17)	(0.12)	(0.19)
Hungary	7.5	5.8	6.4	9.4	8.2	7.5
	(0.11)	(0.32)	(0.15)	(0.27)	(0.16)	(0.33)
Indonesia	6.7	8.2	4.3	8.2	6.9	6.2
	(0.46)	(0.25)	(0.46)	(1.21)	(0.13)	(0.56)
India	6.4	7.5	5.3	7.0	5.6	6.5
	(0.14)	(0.18)	(0.18)	(0.57)	(0.26)	(0.22)
Ireland	8.1	6.3	8.0	9.5	8.9	8.0
	(0.13)	(0.30)	(0.22)	(0.17)	(0.16)	(0.40)
Iran	5.6	6.4	3.8	7.7	4.9	5.1
	(0.26)	(0.28)	(0.09)	(0.47)	(1.06)	(0.46)
Iceland	7.5	6.3	8.3	8.1	7.2	7.8
	(0.52)	(0.52)	(0.09)	(1.21)	(0.63)	(0.66)
Israel	7.4	6.3	5.9	9.3	8.5	6.9
	(0.20)	(0.38)	(0.19)	(0.21)	(0.16)	(0.60)

Italy	7.6	6.1	6.6	9.6	8.5	7.2
	(0.08)	(0.23)	(0.21)	(0.16)	(0.27)	(0.45)
Jamaica	7.4	8.0	5.5	8.6	7.5	7.6
	(0.17)	(0.23)	(0.25)	(0.41)	(0.32)	(0.51)
Japan	7.9	6.1	7.6	9.7	8.0	8.0
	(0.08)	(0.26)	(0.10)	(0.14)	(0.39)	(0.31)
Korea	7.6	7.1	6.4	9.5	7.7	7.1
	(0.10)	(0.18)	(0.20)	(0.11)	(0.23)	(0.33)
Latvia	7.9	7.2	6.8	9.1	8.5	7.8
	(0.14)	(0.28)	(0.25)	(0.24)	(0.15)	(0.39)
Mexico	6.9	7.5	5.0	8.0	7.2	6.8
	(0.14)	(0.44)	(0.20)	(0.23)	(0.22)	(0.18)
Malaysia	6.8	5.9	5.3	7.4	7.2	8.0
	(0.48)	(0.54)	(0.26)	(1.10)	(0.18)	(0.61)
Netherlands	7.9	4.9	8.3	9.5	8.8	7.8
	(0.06)	(0.23)	(0.07)	(0.13)	(0.15)	(0.16)
Norway	7.7	5.5	8.8	9.1	7.8	7.5
	(0.10)	(0.27)	(0.13)	(0.57)	(0.31)	(0.20)
Panama	7.6	7.9	5.3	9.4	8.5	7.0
	(0.14)	(0.28)	(0.19)	(0.36)	(0.24)	(0.13)
Peru	7.7	8.0	5.3	9.5	8.6	7.3
	(0.06)	(0.23)	(0.15)	(0.23)	(0.16)	(0.29)
Poland	7.1	5.6	6.2	9.1	7.4	7.3
	(0.30)	(0.16)	(0.31)	(0.61)	(0.37)	(0.38)
Portugal	7.6	6.0	7.2	9.6	8.5	6.6
	(0.13)	(0.23)	(0.14)	(0.17)	(0.23)	(0.50)
Romania	7.4	7.3	5.9	8.4	8.1	7.1
	(0.61)	(0.26)	(0.44)	(1.51)	(0.70)	(0.55)
Russia	6.3	6.5	5.0	7.6	6.2	6.3
	(0.44)	(0.18)	(0.10)	(1.82)	(0.52)	(0.36)
Singapore	8.7	7.6	8.3	9.5	9.4	8.9
	(0.08)	(0.24)	(0.10)	(0.33)	(0.17)	(0.20)
Slovakia	7.5	6.5	6.2	9.2	8.0	7.7
	(0.31)	(0.38)	(0.23)	(0.70)	(0.28)	(0.37)
Slovenia	7.2	5.3	6.3	9.3	8.1	7.0
	(0.13)	(0.20)	(0.22)	(0.36)	(0.20)	(0.26)
Spain	7.8	6.6	7.2	9.6	8.3	7.3
	(0.11)	(0.35)	(0.10)	(0.16)	(0.28)	(0.28)
Sweden	7.8	4.7	8.3	9.6	8.5	7.9
	(0.07)	(0.10)	(0.18)	(0.15)	(0.24)	(0.40)
Switzerland	8.5	7.8	8.8	9.6	7.9	8.5
	(0.11)	(0.17)	(0.08)	(0.20)	(0.61)	(0.24)
Thailand	6.7	7.2	5.3	7.3	6.5	6.9
	(0.12)	(0.21)	(0.41)	(0.71)	(0.16)	(0.24)
Turkey	6.6	7.5	5.3	7.3	7.2	6.0
	(0.45)	(0.35)	(0.35)	(2.08)	(0.10)	(0.51)
Uganda	7.2	7.8	4.2	8.8	7.4	7.8
	(0.22)	(0.42)	(0.23)	(0.42)	(0.32)	(0.56)
UAE	7.1	6.3	4.7	8.4	8.4	7.8
	(0.12)	(0.66)	(0.15)	(0.45)	(0.09)	(0.37)
UK	8.3	6.6	8.2	9.6	8.8	8.2
	(0.16)	(0.32)	(0.16)	(0.15)	(0.27)	(0.33)
Uruguay	7.3	7.1	5.8	8.7	8.1	6.7
	(0.12)	(0.31)	(0.09)	(0.43)	(0.13)	(0.31)
United States	8.4	7.4	7.9	9.7	8.1	8.7
	(0.19)	(0.37)	(0.30)	(0.17)	(0.21)	(0.22)
South Africa	6.9	6.3	6.2	8.0	6.7	7.4
	(0.09)	(0.38)	(0.23)	(0.20)	(0.26)	(0.10)

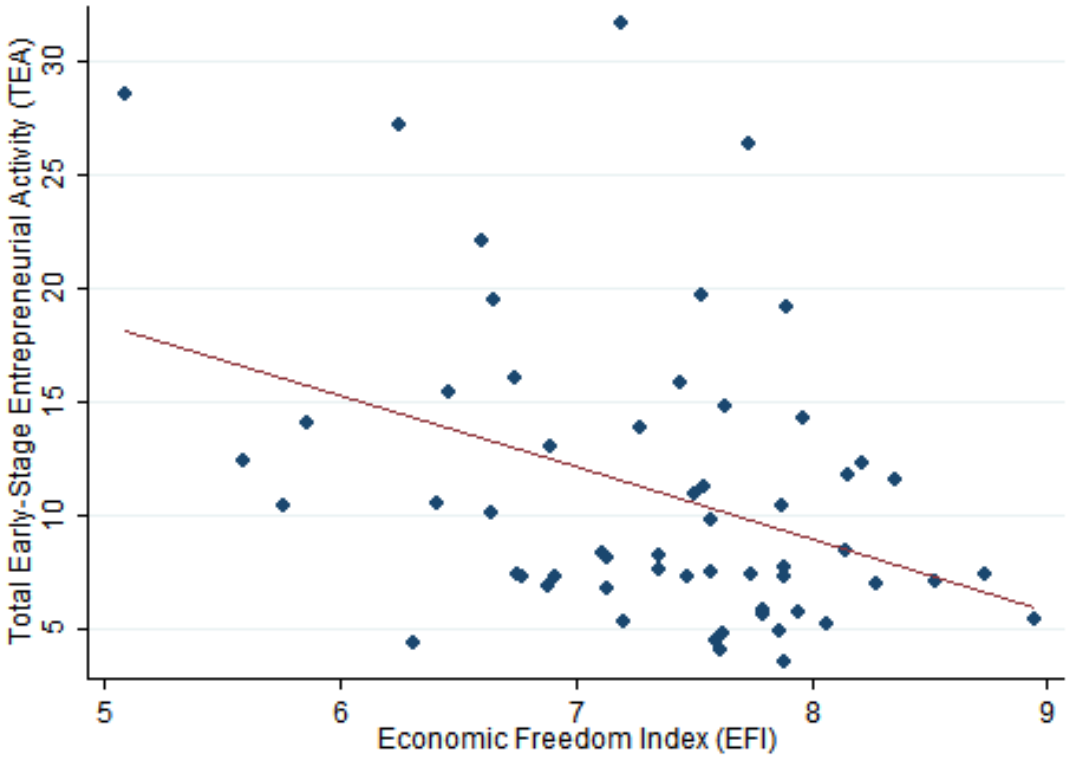


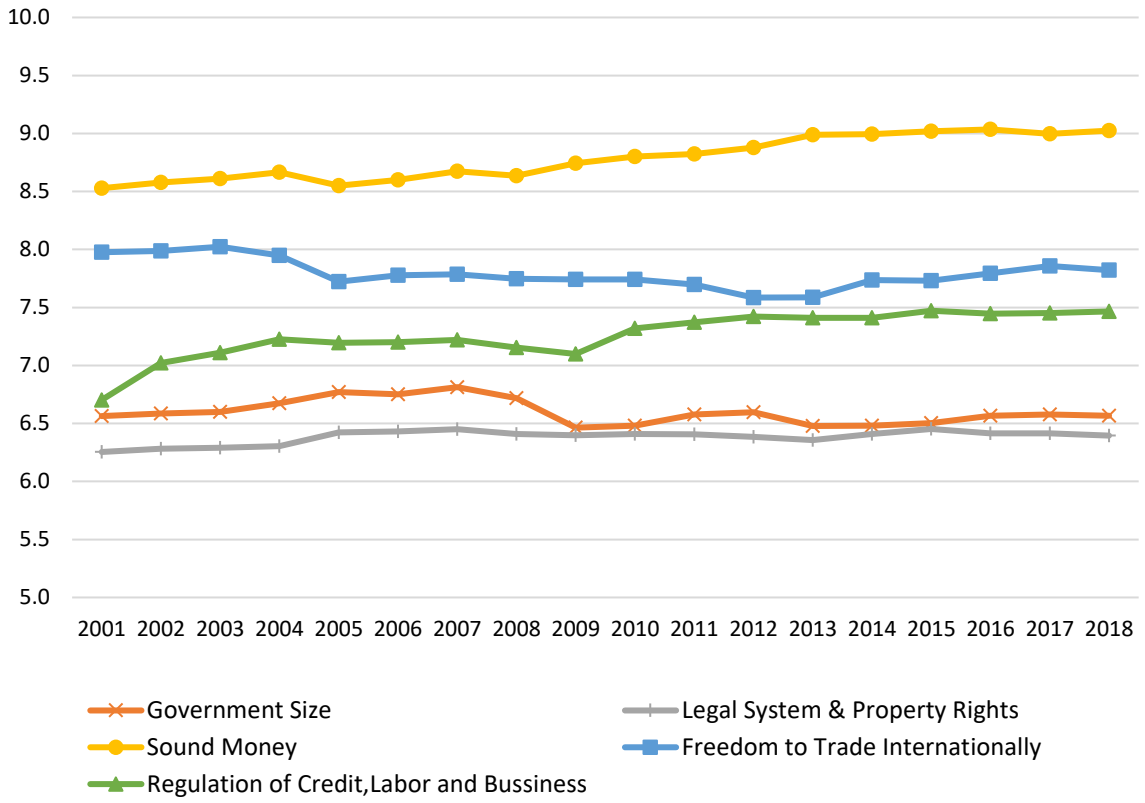
Fig. 1 Entrepreneurship and Economic Freedom in analyzed countries, 2001-2018.

At first, glance, looking to only the direct relation between the Total Entrepreneurship Activity and the average of all indexes in the Economic Freedom Index (Summary) in Figure 1 it is possible to see a negative relationship. In general, that goes against the initial theoretical thought that countries that are considered to be "more free", which means, their institutions are better and work in line with what is considered to be economic freer, would incentivize their population to engage more with entrepreneurial activity. However, the idea of the study will be to understand this relationship more thoroughly.

It is also interesting to follow the development of the economic freedom index variables among the analyzed years present in Figure 2. It is possible to see a positive trend towards more economic freedom for the sample of countries, more specifically the indexes of sound money and

the regulation of credit, labor, and business are the ones that had to most significant improvement over the 18 years. Moreover, of the 5 variables only freedom to trade internationally showed a downwards trend, staying below the initial value in 2001. This movement can in a sense be explained by the rise of protectionism in the global markets over the last decade[2].

Fig. 2 Evolution of the average economic freedom variables in the 57 analyzed countries, 2001-2018.



3.3 Control Variables

Besides the dependent variable and the economic freedom index, additional control variables were used as independent variables in the chosen econometric method. The control variables are GDP per capita, annual GDP growth, unemployment rate, military expenditure, and agricultural land. All data are extracted from the World Development Index present on the World

[2] European Central Bank (ECB) Economic Bulletin, Issue 3/2019.

Bank website. The variables are for all the intersecting with the previous two datasets and contain observations from 2001 to 2018.

It could be expected that the economic freedom variables are correlated and that could occasion multicollinearity errors in the analysis. However, as Table 3 presents these correlations cannot be regarded as strong enough that it could be expected any troubles in the study, with one exception. The correlation between GDP per capita measured in logs and some of the economic freedom variables are considered to be high, therefore a few alternatives to correct this possible threat were implemented in the robustness tests run in the study.

Table 3 Correlation between chosen variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) TEA	1.000									
(2) Government Size	0.505	1.000								
(3) Legal System & Property Rights	-0.490	-0.295	1.000							
(4) Sound Money	-0.347	-0.152	0.585	1.000						
(5) Freedom to trade internationally	-0.306	-0.052	0.616	0.660	1.000					
(6) Business Regulation	-0.242	-0.028	0.694	0.530	0.614	1.000				
(7) Log GDP per Capita	-0.540	-0.402	0.824	0.544	0.540	0.576	1.000			
(8) Unemployment	-0.195	-0.227	-0.128	-0.053	-0.141	-0.182	-0.150	1.000		
(9) Agricultural Land	-0.022	0.000	-0.063	-0.057	-0.072	-0.069	-0.174	0.261	1.000	
(10) Military Expenditure	0.036	-0.039	-0.165	-0.178	-0.113	-0.116	-0.019	-0.014	-0.196	1.000

4. METHODOLOGY

For this study, a combination of time series and cross-section will be used for the analysis. In other words, a Panel Data, with unbalanced values and fixed effects will be implemented which will be advantageous because of the possibility to control for the individual heterogeneity of each country, and control for the time-specific effect from the chosen period from 2001 to 2018, in the available 57 countries of the analysis.

The regression equation could be described as:

$$TEA_{it} = Govsz_{it} + LegalSyst_{it} + SndMoney_{it} + TradeFreed_{it} + BussReg_{it} + X'_{it} + CountryFE_i + YearFE_t + \varepsilon_{it}$$

Where *i* and *t* stand for the country and year, respectively. The first five variables for the measurement of economic freedom are, as previously said, based on grades from 0 to 10. And the X stands for the vector of control variables. Moreover, to account for the fact that each country appears multiple times in the dataset, the standard errors are clustered.

To start, an assumption of this study is the exogeneity relationship of the 5 economic freedom variables. For the first four variables of the index Government Size, Legal System and Property Rights, Sound Money, and Freedom to Trade Internationally, it is difficult to imagine a direct link where the rate of entrepreneurs in a country could be a reason that any of these components it is affected. Most of the grades of how those indexes are composed are distant from any direct relationship with the dependent variable and could be expected to vary in response to other macro decisions in the countries. The reliability of a currency or the strength of the legal system behind a nation, for example, could not be expected to be influenced by the percentage of

the population involved with entrepreneurship. For the last variable, the Regulation of Credit, Business, and Labor it was found in a few specific cases that some entrepreneurs with too much power could affect specific regulations (Clark and Lee, 2006). However, it was still a sporadic effect, and it would be a stretch to apply the same scenario to all the 57 analyzed countries, and therefore, will also be assumed to be exogenous for this study.

Two other potential threats could be omitted variables and measurement errors regarding the Economic Freedom Index. In this case, both of these potential problems are related and can be answered by understanding how the measurement works. First, the crucial ingredients of economic freedom are freedom to competence, enforcement of property rights, voluntary exchange, and personal choice. When all those elements are present the choices of individuals will decide what and how goods and services are produced. Based on this definition, the index created by the Fraser Institute reports all these points and, with the 37 subcomponents of the five major areas the measurement is considered by the literature to be the most complete regarding economic freedom, widely used in many different studies. Moreover, the indicator is based on clear procedures and quantifiable data. The subjective analysis of the researchers in the project are not considered to influence the rating of any country, the goal is to avoid errors or different interpretations. A diverse set of objective variables are implemented and therefore provides a good measure for a cross-country comparison concerning the major analyzed areas. Nonetheless, a dose of caution could go along in understating the concept utilized by the index. The reality is that economic freedom is multidimensional and complex, meaning that it is not easy to quantify, it has been consistently updated and improved over the years. As Milton Friedman noted in the first publication of *Economic Freedom of the World*, the Index is a work in progress and must always be open to modifications that can improve its accuracy and comprehensiveness.

Before analyzing the empirical results, it is important to establish a defined relationship on how it is expected that the variables of the economic freedom and the controls could influence entrepreneurship, defined by the TEA. The first one is the grades for the government size, as explained in the data, a higher grade for this point would indicate that the country possesses lower tax rates and a smaller government sector. It is possible to cite at least 3 main mechanisms that would be possible to see this relationship, the first and most simple one, is the logic that with a bigger government there would be fewer market opportunities to be explored by new entrepreneurs. Also, governments that possess a larger policy focused on social security can affect the incentives for people to become entrepreneurs. Lastly, Henrekson (2005) argued that incentives for wealth formation, important for enabling entrepreneurship, can be reduced in societies with an extensive social security system.

The second is Legal System and Property rights, based on the empirical work of Berggren and Karlson (2005) where it was shown that wealth creation is strongly influenced by economic freedom in terms of the private property rights, a similar link could be thought to exists between entrepreneurship and the institutions of legal quality. It is a fairly natural assumption to think that the incentives to become an entrepreneur would be reduced if exists big risks that the property rights from the creation of a company are not guaranteed.

The grade for sound money could be expected to impact entrepreneurship through the idea of financial stability, as risk-takers the entrepreneurs sometimes could get in positions to have debts to pay in the future, and countries with problems with interest rates or high inflation rates could represent a real risk.

A country's freedom to trade in international markets has a clear relation with entrepreneurship. To start, a country that has access to international trade has a bigger potential

for new markets for entrepreneurs. Following the same line of thought, the costs to realize international trade would be significantly reduced for the owners of these countries.

The last variable is the grade for the regulation of business, credit, and labor, probably the most studied of the Economic Freedom Index concerning entrepreneurship. For example, the work by van Stel et al. (2006), found a direct link between the entrepreneurship rates and labor market regulations, as well as the minimum capital requirements to start a business. Also, it was shown that the entrepreneurship rates tend to decrease with a lower bureaucratic quality (Alfaro and Charlton, 2006). Another relationship that would be natural to think about would be between the time to open a new company and the entrepreneurship rate. Ciccone & Papaioannou (2006) investigated the case and found it to be relevant, their research analyzed the impact of the number of barriers to funding a new enterprise and conclude that in places where the number of barriers is low it tends to have a higher rate of new firm formation. Also, it would be expected to assume that easier access to credit, in other words, a good regimented market for credit, influences the incentives for the population to engage in entrepreneurial activities.

The control variables vector in the main regression contains six different components. First, the GDP per capita, measured in its logarithmic form to reduce non-normality between the analyzed countries and in both current US Dollars and also in PPP for robustness, is expected to control for the difference in the income levels through demand and amount of capital available. Second, the unemployment rate, measured as a percentage of the total labor force could have an ambiguous effect as it would be possible to imagine that a higher unemployment rate could incentivize the society to engage more in entrepreneurial activities as an alternative to the lack of jobs, and in contrast, it could be seen also as a macroeconomic determinant for the higher demand for products and services from the society, in this case, a lower rate would also increase the TEA.

The percentage of agricultural land in a country will also be included, as someone can expect that nations with lower opportunities to become a farmer, for example, could incentivize people to become entrepreneurs. Military expenditure was also added, as it was not included in the government size, and also it would be expected to see a relationship where countries with higher military spending would have smaller levels of entrepreneurship as fewer people could become entrepreneurs.

A few robustness tests will be applied in the analysis. For example, a regression without fixed effects, where the interpretation will not be capturing specifically the differences in the changes in the Economic Freedom Index scores have on entrepreneurship within each country but analyzing the data as a whole. In tests like this, following the idea of Bjørnskov and Foss (2008), two dummies will also be added to controls for regional variances, for countries in Latin America and Post-Communist countries. The first one would reflect the impact that decades of import-substituting industrialization would have on entrepreneurship, and the latter the impact of decades of communism.

A few limitations of the study need to be highlighted in order to guarantee that the results are interpreted accurately. First, part of the data consists of a sample of transition or developing countries, which means, a subset of the analyzed sample is either unavailable for some specific years and also the present data for some of these countries could be questionable, as there is not a way to attest their legitimacy. Another major challenge for this analysis is the measurement of entrepreneurship. Even though the TEA is the most modern and used measurement for the literature in the last few years, it still is not perfect. One of the problems is that the Global Entrepreneurship Monitor does not distinguish between formal and informal – if the entrepreneur decided to formally register the firm - types of entrepreneurship, and therefore, in some cases could

be overestimating the variable, even more for developing countries where the presence of informal markets is more common. The last point that deserves attention when interpreting the results is the initial assumption of exogeneity of the economic freedom variables, although it theoretically makes sense, it is still a strong assumption that requires caution as it cannot be proved. Based on the extensive analyzed literature, no method for particular identification strategy has yet been used in any work of the determinants of entrepreneurship field, for example an instrumental variable or natural experiment.

5. RESULTS

Table 4 First regression results

	(1) TEA	(2) TEA	(3) TEA
Government size	1.426**	1.322**	1.088*
	(0.550)	(0.564)	(0.545)
Legal system and security of property rights	0.451	0.524	0.559
	(0.734)	(0.709)	(0.719)
Sound money	0.185	0.332	0.439
	(0.331)	(0.378)	(0.370)
Freedom to trade internationally	-1.253**	-1.195**	-1.079**
	(0.496)	(0.500)	(0.499)
Regulation of credit, labor, and business	-0.469	-0.527	-0.897*
	(0.431)	(0.478)	(0.522)
Log GDP Per Capita (Current US$)		-1.872	-2.101
		(1.457)	(1.463)
Annual GDP Growth		-0.0333	-0.0414
		(0.0562)	(0.0583)
Unemployment		-0.138**	-0.173**
		(0.0615)	(0.0672)
Agricultural Land			-0.118
			(0.0707)
Military Expenditure			-1.592**
			(0.689)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
N	710	710	692
R^2	0.174	0.186	0.207
adj. R^2	0.148	0.156	0.175

Notes: Standard errors in parentheses. The standard errors are clustered by countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4 presents the results of the fixed-effects model estimation. The control variables are added in three steps for a better interpretation of the coefficients. In general, a similar picture is seen on the three estimations for two of the five economic freedom variables: size of government and freedom to trade internationally, both of these coefficients are found to be statistically

significant in all regressions. To better capture the sign of the government size index it is important to recall that a higher grade on this section means a smaller government sector. Therefore, it follows the predicted hypothesis that a positive sign on this coefficient means that a country with less government intervention and lower taxes would improve the entrepreneurship rate of these countries. An interpretation of the coefficient for column (3) would mean that an increase of 1 point in the government size grade from the economic freedom index would, on average, increase the entrepreneurship rate of a country measured through TEA by 1.088 percentage points. These results for the government size index are consistent with previously obtained results from both Nyström (2008) and Bjørnskov and Foss (2008), even though they implemented different methodologies as explained before.

The other significant coefficient for all three estimations was the freedom to trade internationally. However, this result follows a different route from the predicted theory. It would be expected to encounter a positive relationship, as in the theory the potential for a bigger market and smaller exporting/importing costs would attract more entrepreneurs. Nonetheless, it is possible to come up with a plausible explanation for the negative coefficient: in countries where the freedom to trade is higher, it is also expected to see much more imports for products and services as well. Therefore, instead of having entrepreneurs create a new company to support the local market, these countries are only importing these goods and those potential entrepreneurs are discouraged. All three coefficients for this sub-index are similar and the one present in column (3) shows that an increase of 1 point in the grade for freedom to trade internationally would mean, on average, a decrease of 1.079 percentage points in the TEA.

One other coefficient for the economic freedom index that was found to be significant was the regulation of credit, labor, and business. But, just as in the previous case, the sign of the

coefficient was different from the one expected by theory, as it was negative. This could be explained by the theory proposed by van Stel, Storey, and Thurik (2006) where the impact of business regulation is mostly influencing the distribution of productive and unproductive nascent entrepreneurs and does not necessarily impact the total amount of entrepreneurship as measured by the TEA. From the chosen controls only unemployment and military expenditure were found to be statistically significant. The former has a negative sign and points out the explanation that a higher unemployment rate would see a smaller demand for products and services in the economy, therefore, decreasing the TEA. The latter, the military expenditure also acts as predicted by theory, as it was not included in the government size score, it would be natural to expect that a country with a higher military expenditure would decrease the total amount of entrepreneurs as more people would be working in the military.

One of the most unexpected facts about the results was not finding significance for the control of income, the GDP per capita. In previous work for the literature both Nyström (2008) and Bjørnskov and Foss (2008) with the former using self-employment and the latter also TEA found significant value for this control, indicating that it was an important control for the analyses. Table 5 presents the same estimations however with the GDP per capita now measured in PPP for checking it would affect the results. Nevertheless, the results appear to be very similar to the first one, with the same signs and significances for each of the variables.

Even though Table 3 showed that the correlation between the economic freedom variables was not strong enough that could be a concern for the chosen estimation, Table 6 tries to test each of these sub-indices individually to understand better their behavior as determinants for entrepreneurship This time it was also included the variable called “Summary” that represents the

Table 5 Regression results with GDP Per Capita Measured in PPP.

	(2) TEA	(3) TEA
Government size	1.357**	1.168**
	(0.587)	(0.557)
Legal system and security of property rights	0.390	0.419
	(0.752)	(0.769)
Sound money	0.190	0.311
	(0.351)	(0.356)
Freedom to trade internationally	-1.168**	-1.053**
	(0.466)	(0.463)
Regulation of credit, labor, and business	-0.484	-0.831*
	(0.456)	(0.497)
Log GDP Per Capita (PPP)	-0.997	-1.712
	(2.688)	(2.941)
Annual GDP Growth	-0.0237	-0.0278
	(0.0558)	(0.0571)
Unemployment	-0.0962*	-0.135**
	(0.0533)	(0.0582)
Agricultural Land		-0.126*
		(0.0704)
Military Expenditure		-1.501**
		(0.687)
Country Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	710	692
R^2	0.179	0.199
adj. R^2	0.149	0.167

Notes: Standard errors in parentheses. The standard errors are clustered by countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

averages of all five economic freedom variables. Again, the results are similar to those present in the first estimation. The variables summary, legal system and property rights, sound money and now even regulation of credit, labor, and business were all statistically insignificant, while government size and freedom to trade internationally were significant, had the same sign and the

values were slightly smaller. The same can be said for all the control variables, only unemployment and military expenditure were significant and also had the same signs.

Table 6 Regression results for each individual economic freedom variable and their average.

	(1) TEA	(2) TEA	(3) TEA	(4) TEA	(5) TEA	(6) TEA
Summary	0.218					
	(0.618)					
Government size		0.921*				
		(0.523)				
Legal system and security of property rights			0.435			
			(0.695)			
Sound money				0.448		
				(0.321)		
Freedom to trade internationally					-0.843**	
					(0.409)	
Regulation of credit, labor, and business						-0.929
						(0.563)
Log GDP Per Capita (Current US$)	-1.715	-1.621	-1.745	-2.141	-1.499	-1.768
	(1.412)	(1.341)	(1.361)	(1.517)	(1.394)	(1.393)
Annual GDP Growth	-0.086	-0.088	-0.085	-0.079	-0.064	-0.069
	(0.059)	(0.058)	(0.058)	(0.057)	(0.057)	(0.06)
Unemployment	-0.189***	-0.168**	-0.190***	-0.198***	-0.180***	-0.201***
	(0.067)	(0.068)	(0.067)	(0.069)	(0.065)	(0.068)
Agricultural Land	-0.052	-0.071	-0.058	-0.055	-0.059	-0.074
	(0.079)	(0.077)	(0.078)	(0.074)	(0.081)	(0.08)
Military Expenditure	-1.982**	-1.696**	-1.963**	-2.105***	-1.803**	-2.050**
	(0.774)	(0.692)	(0.774)	(0.786)	(0.732)	(0.79)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	692	692	692	692	692	692
R^2	0.172	0.181	0.173	0.176	0.181	0.178
adj. R^2	0.143	0.153	0.144	0.148	0.153	0.150

Standard errors in parentheses. The standard errors are clustered by countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Regression with lagged economic freedom variables

	(1) TEA	(2) TEA	(3) TEA	(4) TEA
Summary (-1)				0.815
				(0.489)
Government size (-1)	1.065*	0.938	0.817	
	(0.629)	(0.638)	(0.602)	
Legal system and security of property rights (-1)	0.816	0.864	0.919	
	(0.834)	(0.772)	(0.752)	
Sound money (-1)	0.588	0.672	0.757*	
	(0.386)	(0.416)	(0.388)	
Freedom to trade internationally (-1)	-1.340**	-1.289**	-1.109**	
	(0.556)	(0.530)	(0.453)	
Regulation of credit, labor, and business (-1)	-0.218	-0.289	-0.505	
	(0.406)	(0.460)	(0.523)	
Log GDP Per Capita (Current US$)		-1.844	-1.816	-1.531
		(1.453)	(1.430)	(1.464)
Annual GDP Growth		-0.0409	-0.0577	-0.0984*
		(0.0524)	(0.0565)	(0.0585)
Unemployment		-0.149**	-0.188**	-0.188**
		(0.0658)	(0.0760)	(0.0737)
Agricultural Land			-0.165**	-0.104
			(0.0726)	(0.0824)
Military Expenditure			-1.679**	-2.016**
			(0.665)	(0.804)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	683	683	665	665
R^2	0.174	0.186	0.210	0.176
adj. R^2	0.148	0.156	0.177	0.148

Notes: Standard errors in parentheses. The standard errors are clustered for countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Another valuable test to understand the analysis is to add lags of the economic freedom variables as explanatory variables. The effects of economic freedom on entrepreneurship might manifest themselves with a delay of multiple years. To address that, lag variables of 1 year are included in Table 7. Also, the Summary index, the average of all five indices, is added to the regression to see if would impact the previous results obtained in Table 6. Observing the first three columns in the table, it is possible to see that only the coefficient referent to the lagged freedom to trade internationally is significant across all the regressions. In the main regression with all the controls, the trade freedom would decrease, on average, 1.109 percentage points in the entrepreneurship rates with an increase of 1 in its index score. Another significant coefficient from the five main sectors is the sound money with an increase of 0.757 in the entrepreneurship rate if its grade would go up by one. The sound money lag coefficient being significant is expected because the stability of a currency normally is a long-term process, as, for example, inflation that is measured in this category takes, in general, a few years to change considerably. Based on the initial analysis of the results it is possible to say that the impact of economic freedom on entrepreneurship is indeed a process that takes time to develop. That can be characterized as a plausible behavior because impacts on the incentive structures for entrepreneurs from institutions are not expected to be immediate. In the next years, with additional data to a panel data analysis, lag variables of five or maybe ten years could also be implemented without a major loss of observations, thus also measuring their impacts as determinants of entrepreneurship.

One of the major concerns of the used methodology is regarding the measurement of entrepreneurship, as mentioned before, even though the TEA is the most modern and used measurement is still not perfect, mainly because it does not distinguish between formal and informal types of entrepreneurship. It would be natural to expect that the entrepreneurship rate

recorded in Egypt or Indonesia could not be the same as the one in Switzerland, a country where the informal market is one of the lowest in the world[3]. To try to control for that the same regression estimation method was applied but now only for countries that are considered to be developed and would naturally have a smaller informal entrepreneurship rate, guaranteeing a more uniform comparison between the TEA rates in the analyzed countries. A sample of 20 countries was chosen following the definition of developed economies from the UN. The Table 6 results are in general different from the ones previously obtained, government size, legal system, and freedom to trade internationally were found to be insignificant. Sound money was found to be significant and positively related to the entrepreneurial rate. The two significant variables that behaved similarly were first the negative sign for regulation of credit, labor, and business, showing that indeed it was not following the predicted theory for the general results, or the developed economies results. And second, unemployment again shows a negative relationship with the entrepreneurial rate.

A similar approach to the Table 8 was used in Table 9, but now the analysis is focused on countries that are characterized to be Developing Economies, again using the same criteria defined by the United Nations. In those countries, the presence of an informal economy and therefore informal entrepreneurship are all considered to be bigger, thus analyzing them separately can also smooth the variance of the measurement. The results presented in this table reflect different coefficients than those in developed countries. All the five economic freedom indices are insignificant, besides government size possesses a positive coefficient suggesting that an increase of 1 point in the score for government size would increase the entrepreneurship rate by 1.604

[3] Quarterly Informal Economy Survey (QIES) by World Economics, London

percentage points for developing countries. This show that the magnitude of the government size is bigger for this grouping of countries, and it carries a greater impact. It also can be observed that

Table 8 Developed countries regression

	(1) TEA	(2) TEA	(3) TEA
Government size	0.559	0.476	0.678
	(0.619)	(0.624)	(0.680)
Legal system and security of property rights	1.040	1.243	1.298
	(0.848)	(0.776)	(0.848)
Sound money	0.759*	0.877**	0.867*
	(0.366)	(0.355)	(0.454)
Freedom to trade internationally	-0.903	-0.664	-1.037
	(0.777)	(0.762)	(0.985)
Regulation of credit, labor, and business	-0.584	-0.757	-1.081*
	(0.440)	(0.557)	(0.628)
Log GDP Per Capita (Current US$)		-1.757*	-2.058
		(0.911)	(1.419)
Annual GDP Growth		-0.00519	-0.00485
		(0.0371)	(0.0411)
Unemployment		-0.150*	-0.166**
		(0.0757)	(0.0780)
Agricultural Land			-0.0835
			(0.110)
Military Expenditure			0.324
			(1.228)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
N	294	294	285
R^2	0.358	0.384	0.406
adj. R^2	0.306	0.327	0.343

Notes: Robust Standard errors in parentheses. The standard errors are clustered for countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

differently from most of the previous regressions, and also from the developed countries, the unemployment coefficient is now statistically insignificant, pointing out that it is not an essential determinant for entrepreneurship rates. Nevertheless, both the military expenditure and agricultural land continued to be statistically significant and with a negative coefficient.

Table 9 Developing countries regression

	(1) TEA	(2) TEA	(3) TEA
Government size	1.942**	2.118**	1.604*
	(0.902)	(0.916)	(0.876)
Legal system and security of property rights	-0.632	-0.703	-0.215
	(1.511)	(1.466)	(1.276)
Sound money	-0.0551	0.225	0.224
	(0.565)	(0.646)	(0.587)
Freedom to trade internationally	-1.467**	-1.230*	-1.026
	(0.698)	(0.666)	(0.688)
Regulation of credit, labor, and business	-0.575	-0.958	-1.019
	(0.897)	(1.013)	(1.000)
Log GDP Per Capita (Current US$)		-2.765	-2.851
		(1.822)	(1.958)
Annual GDP Growth		-0.0296	-0.00698
		(0.105)	(0.103)
Unemployment		-0.381*	-0.358
		(0.210)	(0.227)
Agricultural Land			-0.384*
			(0.197)
Military Expenditure			-2.016*
			(1.040)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
N	284	284	281
R^2	0.161	0.185	0.221
adj. R^2	0.091	0.106	0.138

Standard errors in parentheses. The standard errors are clustered for countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The final regression estimation of this study is present in Table 10. This time the fixed effect for each country was removed and the coefficients now reflect the impact that each of the economic freedom variables and the controls had on TEA for all the analyzed data, not within each country anymore. To start only one of the coefficients of the new estimation for the economic freedom variables was significant, and that was the government size. Following the same pattern as for the fixed effect estimation, the effect of government size was found to be positive, meaning that a smaller government and lower taxes would tend to increase the entrepreneurial rate for the analyzed countries. In fact, an increase of 1 point in the score for this index would rise the TEA, on average, by 0.6 percentage points. Regarding the control variables, first, unemployment also follows the same pattern as most of the previous estimations with a significant and negative coefficient. However, this time the GDP per capita is also significant and has a quite large impact on the entrepreneurship rate. On average, an increase of 1% in the GDP per capita would decrease the total entrepreneurship activity of a country by almost 3.5 percentage points. In this estimation, as mentioned before, two other control variables were added: Post-Communism and Latin America. Both were dummies that had values of 1 if the country belonged to each of these categories. The Post-Communist coefficient was found to be significant and had a negative sign, confirming what was the hypothesis that countries that had a communist past were expected to have a lower entrepreneurship rate. The other variable for the Latin American countries was added to try to understand if the impact of decades of import substitution industrialization reflected on their entrepreneurship rate. The found coefficient was found to be significant at 1% value and had a large positive value, countries in Latin America had, on average, 5.8% higher entrepreneurship rates.

Table 10 Results of regression without fixed effects.

	(1) TEA	(2) TEA	(3) TEA
Government size	2.569***	1.707***	0.639*
	(0.511)	(0.448)	(0.329)
Legal system and security of property rights	-1.200	0.0509	0.271
	(0.720)	(0.869)	(0.817)
Sound money	-1.241	-0.941	-0.098
	(0.667)	(0.624)	(0.688)
Freedom to trade internationally	0.304	0.413	-0.165
	(0.682)	(0.705)	(0.498)
Regulation of credit, labor, and business	0.161	-0.059	0.971
	(0.820)	(0.709)	(0.648)
Log GDP Per Capita (Current US$)		-2.836*	-3.409*
		(1.347)	(1.350)
Annual GDP Growth		-0.0590	-0.0304
		(0.0810)	(0.0841)
Unemployment		-0.294***	-0.224**
		(0.0758)	(0.0770)
Agricultural Land			-0.009
			(0.02)
Military Expenditure			0.630
			(0.417)
Post-Communist			-2.213*
			(1.231)
Latin America			5.821***
			(1.546)
Constant	8.735	32.68**	31.26**
	(7.619)	(11.95)	(11.54)
N	710	710	692
R^2	0.432	0.507	0.616
adj. R^2	0.414	0.489	0.599

Notes: Robust Standard errors in parentheses. The standard errors are clustered for countries.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6. CONCLUSION

In general, most of the previous work on entrepreneurship focused on the individual characteristics of the entrepreneurs or their impact on economic growth. However, political, and institutional backgrounds were found to be also important elements to better understand the differences in entrepreneurship across the globe. This study tries to answer the question of what is the relationship between institutional settings in terms of economic freedom, and entrepreneurship. The main goal of the research is to contribute to the empirical literature of what are the determinants of entrepreneurship across different countries around the world. This work contributes to the literature by being the first to use a more contemporary panel data analysis to understand the impact of institutions on the entrepreneurship rates measured by the TEA (Total Early-stage Entrepreneurial Activity) provided by the Global Entrepreneurship Monitor (GEM). As previously stated, the institutional setting is measured by the Economic Freedom Index created by the Fraser Institute which consists of five different grades that analyze the size of the government, quality of the legal system, access to sound money, conditions for the country to trade internationally and the quality of regulations of credit, labor, and business. The empirical analysis is constituted of data for 57 countries across all continents that range from 2001 to 2018 and accounts for time and country fixed effects.

The empirical findings of this study point to a positive and significant relationship between government size and entrepreneurship. In other words, countries that possess smaller governments with lower taxes rates, on average, tend to have higher entrepreneurship rates. When compared with all the countries in the analysis both coefficients for the indexes of freedom to trade internationally and regulations of credit, labor, and business were also found to be statistically significant, but they were negative. Within the robustness tests, one of the estimations that focused

only on developed countries showed a positive and significant relationship between the access to sound money and the TEA. While the estimation for the developing countries continued to point out the relationship between government size and entrepreneurship. Also, the tests where the lagged economic freedom variables were included indicated that it is not possible to exclude the possibility of the effects on entrepreneurship manifesting themselves with a delay of some years. It is important to draw attention to that in every single estimation the coefficient for unemployment used as a control variable was found to be negative and significant. Finally, another test that used the estimation but without fixed effects for each country agreed with the positive relationship of the government size for the entrepreneurship rates, and also pointed out for significant relationship between post-communist countries have lower rates for the entrepreneurial activity and a positive relationship for countries in Latin America.

A note of caution is required for the interpretation of the results. This study had a few limitations, which was the measurement of entrepreneurship. Even though the TEA is the most used and modern measurement for entrepreneurial rates, it fails in distinguishing between formal and informal entrepreneurs, and therefore the variance between the values registered for different countries can have a high variance between them, skewing the analysis. Second, data points for some countries were unavailable for a few years and the values in the dataset for a few of the developing countries could be over or underestimated as their measurement cannot be guaranteed to be precise.

Nevertheless, regardless of the limitations of the analysis, the findings of this work in many ways follow the results of previous studies in the literature on economic freedom and entrepreneurship. These results should not necessarily be considered over or underestimations, they need to be treated with the respective prudence. The interest in those topics, more specifically,

entrepreneurship is increasing over the last few years and is unquestionably a field that needs to be further investigated.

7. REFERENCES

Acemoglu, D., Johnson, S., & Robinson, J. (2001). The colonial origins of comparative development: An empirical investigation. American Economic Review, 9, 1369–1401.

Alfaro, L., & Charlton, A. (2006). International financial integration and entrepreneurship. CEP Discussion Paper No 755, Centre for Economic Performance, London School of Economics and Political Science.

Audretsch, D.B., Keilbach, M., (2004a). Does entrepreneurship capital matter? Entrep. Theory. Pract. 28 (5), 419–429.

Audretsch, D.B., Keilbach, M., (2004b). Entrepreneurship and regional growth: an evolutionary interpretation. J. Evol. Econ. 14 (5), 605–616.

Audretsch, D.B., Keilbach, M., (2005). Entrepreneurship capital and regional growth. Ann. Reg. Sci. 39 (3), 457–46

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

Baumol W. J. (2002). Free Market Innovation Machine: Analysing the Growth Miracle of Capitalism. Princeton University Press, Princeton.

Berggren, N., & Karlson, N. (2005). Äganderättens konsekvenser och grunder. [The Consequences and Foundations of Property Rights]. Stockholm: Ratio.

Berkowitz, D., & DeJong, D. N. (2005). Entrepreneurship and post-socialist growth. Oxford Bulletin of Economics and Statistics, 67, 25–46.

Boettke, P. J. (2001). Calculation and coordination: Essays on socialism and transitional political economy. New York, NY: Routledge

Bjørnskov, C., & Foss, N. J. (2008). Economic freedom and entrepreneurial activity: Some cross-country evidence. Public Choice, 134, 307–328.

Cantillon, R. (1755). In H. Higgs (Ed.), Essai sur la nature de commerce en géneral. London: Macmillan, 1931.

Carter, J. R. (2007). An empirical note on economic freedom and income inequality. Public Choice, 130, 163–177.

Ciccone, A., & Papaioannou, E. (2006). Red tape and delayed entry. CEPR Discussion paper No. 5996, Centre for Economic Policy Research, London.

Clark, J. R. and D. R Lee, (2006) "Freedom, Entrepreneurship and Economic Progress, Journal of Entrepreneurship", 15 1:1-17

Coyne, C. J., & Leeson, P. T. (2004). The plight of underdeveloped countries. Cato Journal, 24, 235–249.

Doucouliagos, C., & Ulubasoglu, M. A. (2006). Economic freedom and economic growth: Does specification make a difference? European Journal of Political Economy, 22, 60–81.

Freytag, A., & Thurik, R. (2007). Entrepreneurship and its determinants in a cross-country setting. Journal of Evolutionary Economics, 17, 117–131.

Gwartney, James & Lawson, Robert. (2003). The Concept and Measurement of Economic Freedom. European Journal of Political Economy. 19. 405-430.

Gwartney, J., Lawson, R., Hall, J., & Murphy, R. (2021). Economic freedom of the world: 2021 annual report. The Fraser Institute. www.freetheworld.com

Hayek, F. A. (1946). The meaning of competition. In Individualism and economic order. Chicago: University of Chicago Press.

Henrekson, M. (2005). Entrepreneurship: A weak link in the welfare state. Industrial and Corporate Change, 14, 437–467.

Joskow P, Rose NL (1989) The effects of economic regulation, Chapter 25. In: Schmalensee R, Willig R (eds) Handbook of industrial organization, vol 2. North-Holland, Amsterdam

Kirzner, I. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. Journal of Economic Literature, 35, 60–85.

Kreft, S. F., & Sobel, R. S. (2005). Public policy, entrepreneurship, and economic freedom. Cato Journal, 25, 595–616, Fall.

North, D. (1991). Institutions. Journal of Economic Perspectives, 5, 97–112.

North, D. (1994). Economic performance through time. American Economic Review, 84, 359–368.

Nyström, Kristina. (2008). The Institutions of Economic Freedom and Entrepreneurship: Evidence from Panel Data. Public Choice. 136. 269-282. 10.1007/s11127-008-9295-9.

Ovaska, T., & Sobel, R. S. (2005). Entrepreneurship in post-socialist economies. Journal of Private Enterprise, 21, 8–28, Fall.

Ricardo, D. (1821). Principles of political economy and taxation. London: John Murray.

Reynolds, P. D., Hay, M., & Camp, S. M. (1999). *Global entrepreneurship monitor*. Kansas City: KaufmannCenter for Entrepreneurial Leadership.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, I. (2005). Global Entrepreneurship monitor: data collection design and implementation1998–2003. Small Bus. Econ. 24 (3), 205–231.

Saxenian A. (1994). Regional Advantage. Harvard University Press, Cambridge, MA.

Schumpeter, J. A. (1911/1934). The theory of economic development. Cambridge: Harvard University Press.

Schumpeter, J. A. (1942). Capitalism, socialism, and democracy. London: Harper Perennial.

Smith, A. (1776). An inquiry into the nature and causes of the wealth of nations. Chicago: University of Chicago Press.

Sobel, R. S., Clark, J. R., & Lee, D. R. (2007). Freedom, barriers to entry, entrepreneurship and economic progress. The Austrian Review of Economics, 20, 221–236.

van Stel, A., Storey, D. J., & Thurik, R. (2006). The effect of business regulation on nascent and youngbusiness entrepreneurship. ERIM Report Series Research in Management Rotterdam.

Wennekers, S., Uhlander, L. M., & Thurik, R. (2002). Entrepreneurship and its conditions: a macro perspective. International Journal of Entrepreneurship Education, 1(1), 25–64.

Wennekers, S., van Stel, A., Thurik, R., Reynolds, P. (2005). Nascent entrepreneurship and the level of economic development. Small Bus. Econ. 24 (3), 293–309.

Zacharakis, A. L., Bygrave, W. D., & Shepherd, D. A. (2000). Global entrepreneurship monitor: National entrepreneurship assessment: United States of America. Kansas City: Kaufmann Center for Entrepreneurial Leadership.